Esso Australia Resources Pty Ltd

BASS STRAIT ENVIRONMENT PLAN

CURRENT VERSION

Vol	Rev	Title	Doc Number	Status	Date
	0	Preface	AUGO-EV-EMM-012	Issued for acceptance	09/09/19
1	1	Description of Environment	AUGO-EV-EMM-001	Issued for acceptance	09/09/19
2	0	Impacts and Risks	AUGO-EV-EMM-005	Issued for acceptance	09/09/19
3	2	ER Impacts and Risks	AUGO-EV-EMM-003	NOPSEMA RFFWI for JUR Drilling EP	23/10/19
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Esso Australia Resources Pty Ltd

BASS STRAIT ENVIRONMENT PLAN

Preface

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1 Preface

1.1 Purpose of this document

This preface document provides an overview of the Bass Strait Operations Environment Plan (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 Bass Strait Operations 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 of these activities take place in the Bass Strait and are operated by Esso using the same management systems and processes. Therefore there is direct replication of processes, information and systems across facilities and within facility specific Environment Plans. In an effort to minimse replication and streamline the administrative process, Esso has standardised the sections of the Environment Plans that are identical between activities. The Environment Plan is now presented in four separate volumes which should be read as one volume however can be maintained individually as nessecary.

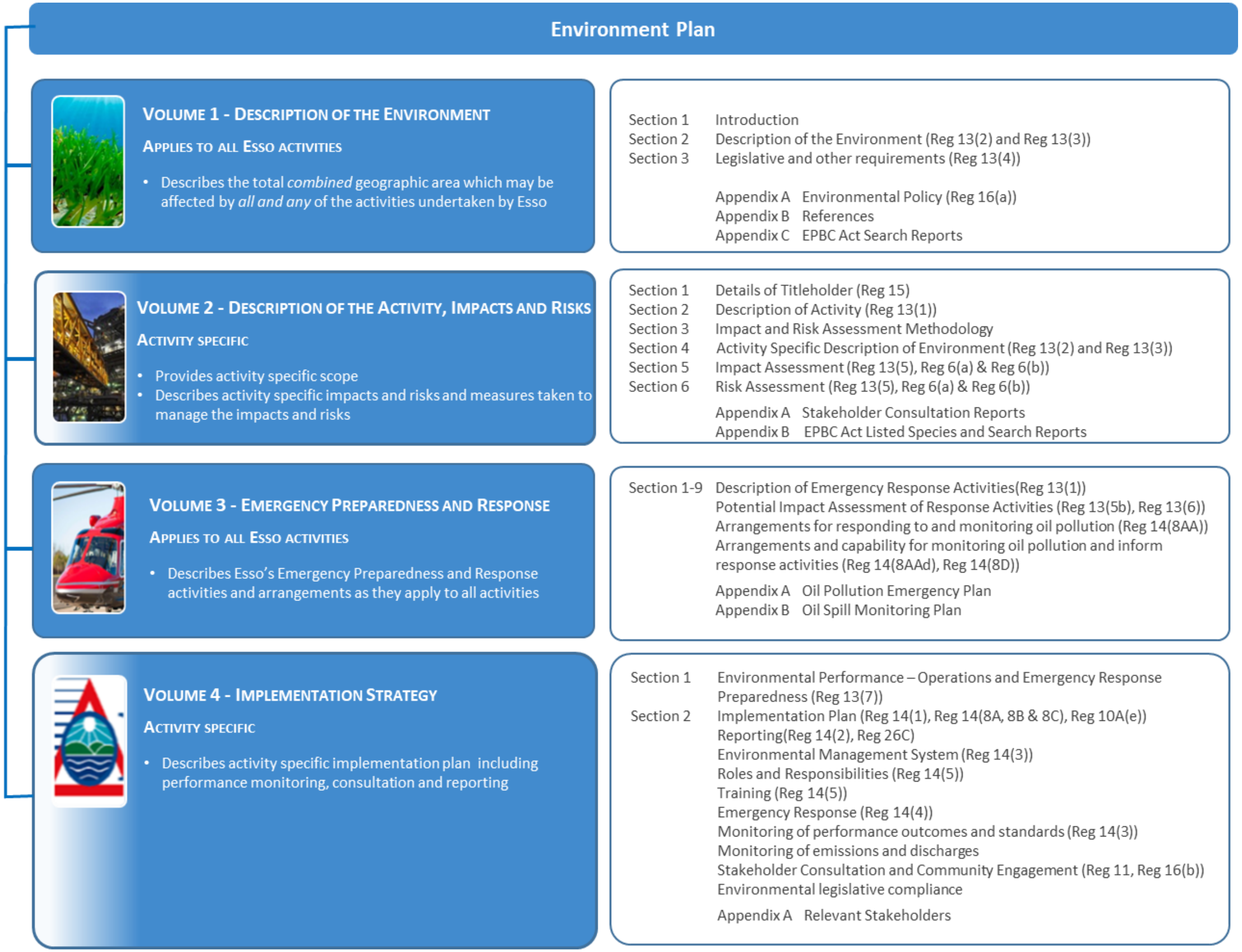

Figure 1-1 Environment Plan Structure for Esso activity submissions under OPGGS(E)R.

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 Bass Strait Operations EP summary has been prepared from material provided in the 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 2.2
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 1 Volume 4 Section 6
Response arrangements in the oil pollution emergency plan	Volume 3, including appendices
Consultation already undertaken and plans for ongoing consultation	Volume 4 Section 10 Volume 4 Section 12 Volume 4 Section 13
Details of the titleholders nominated liaison person for the activity	Volume 2 Section 1.2

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

This Bass Strait Operations 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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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
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)
DoEE	Department of the Environment and Energy

Abbreviation	Description
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)
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)
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

Abbreviation	Description
MMboe	million barrels of oil equivalent
m	metres
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
PEA	Potentially Exposed 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 2.2.6 Australian Marine Parks 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 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 Potentially Exposed Area (PEA) 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 Potentially Exposed Area (PEA) 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 PEA 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 PEA 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 PEA 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.

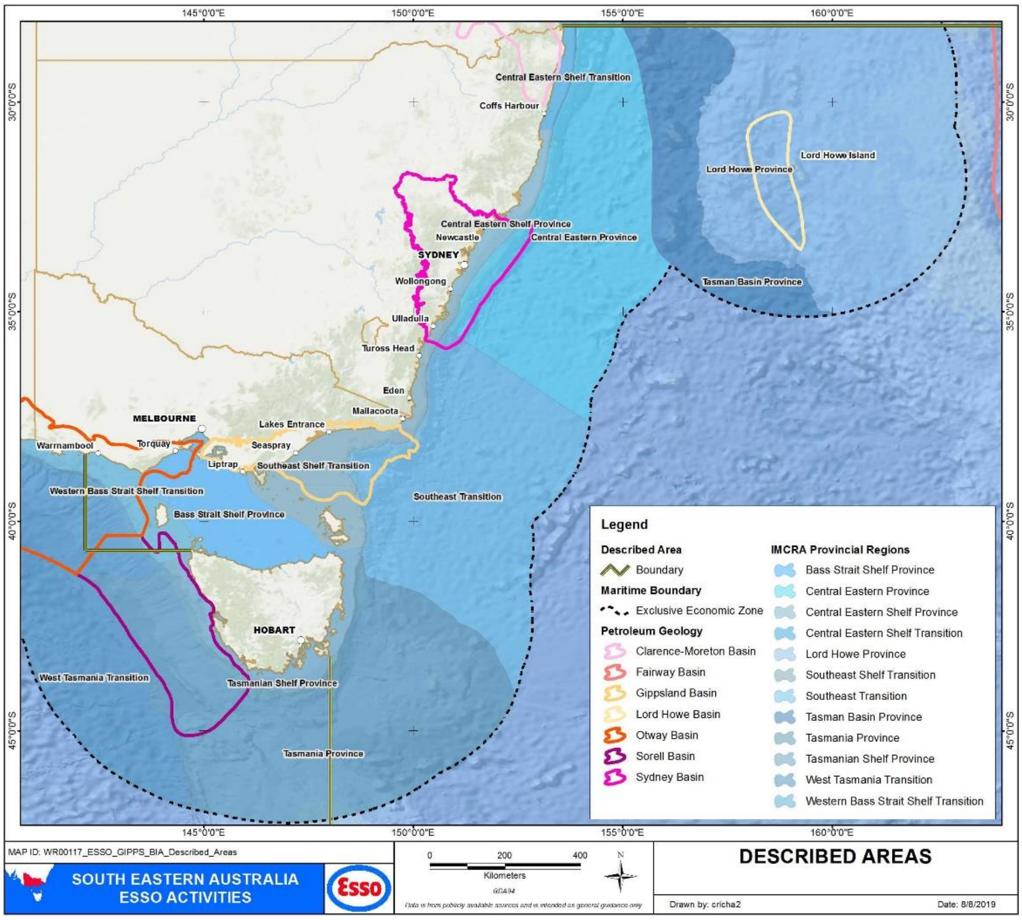


Figure 1-1 Described Area (DA)

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.

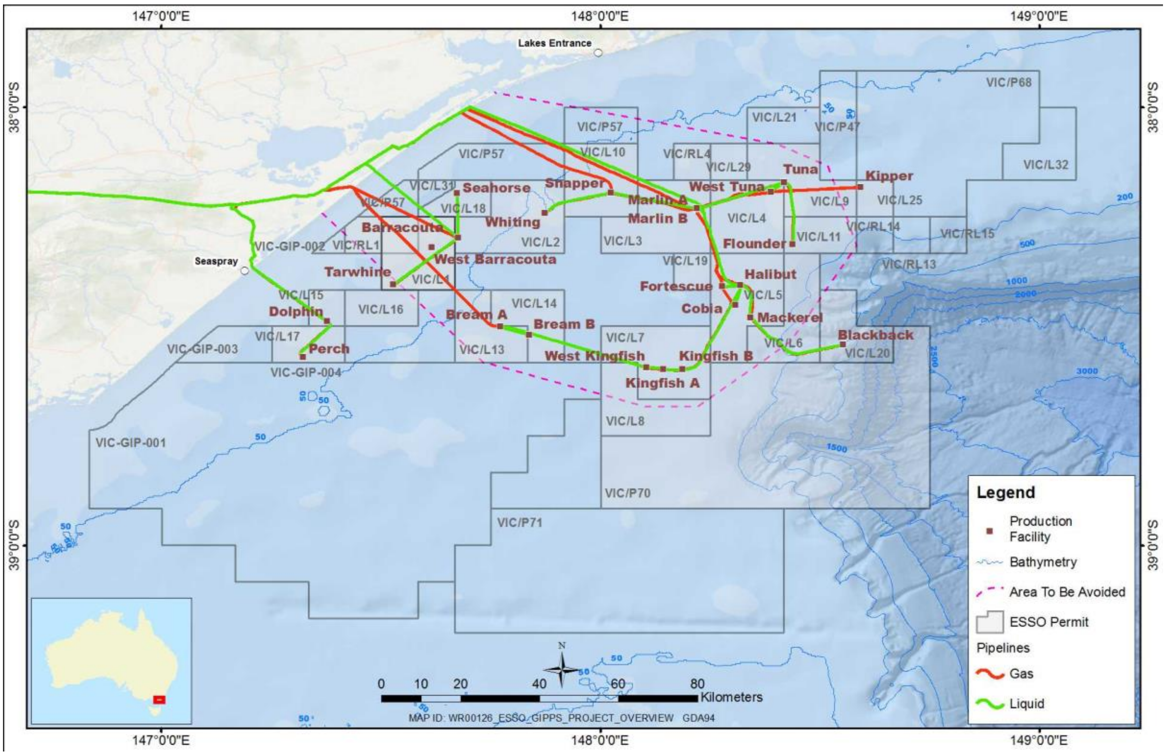


Figure 1-2 Esso Gippsland Basin Permit Area

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	~62-68	~69-93	38° 24' 15" S	148° 19' 12" E
VIC/L05	Fortescue platform	FTA			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).

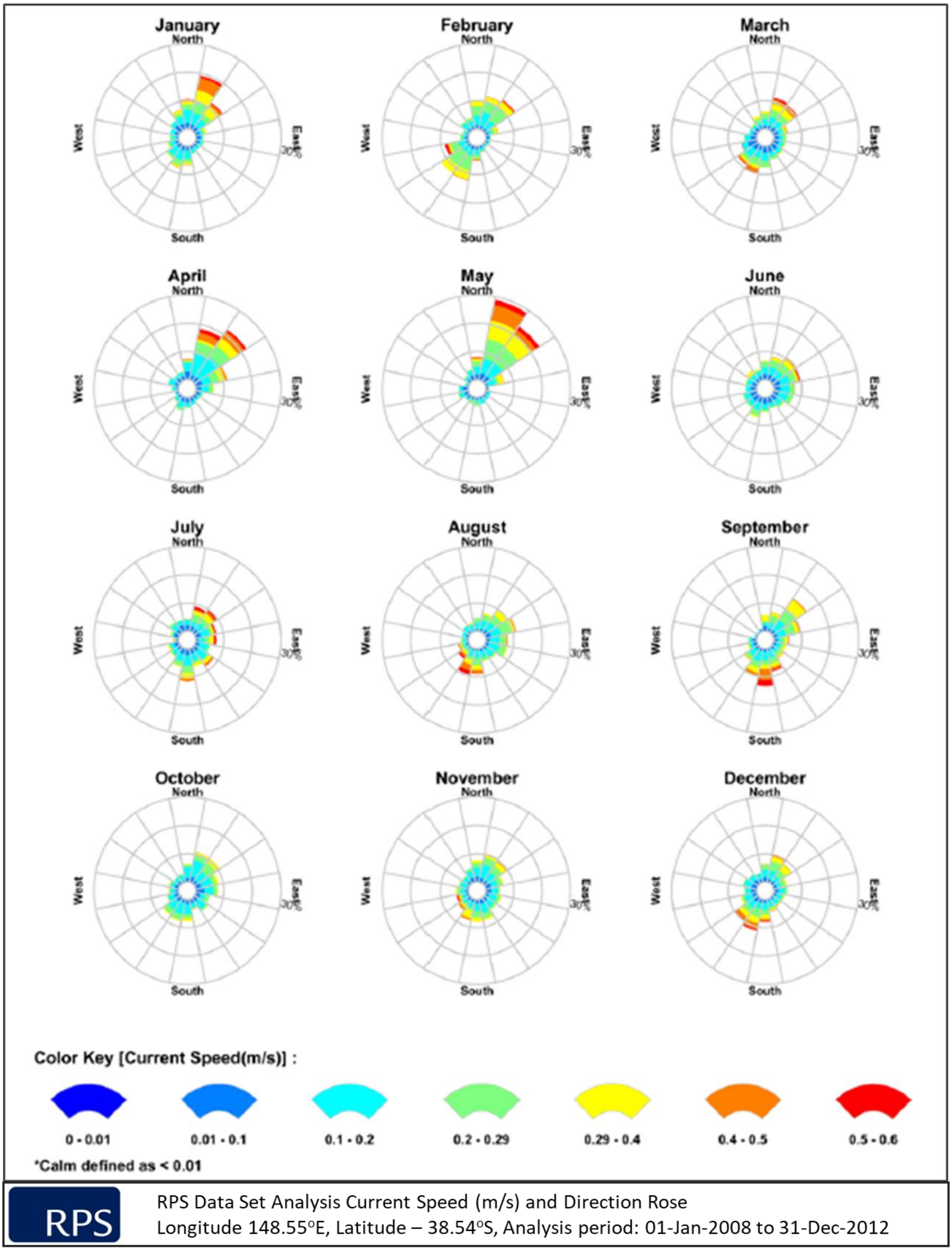


Figure 2-1 Monthly surface current rose plots near Blackback wells.

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/s. 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.

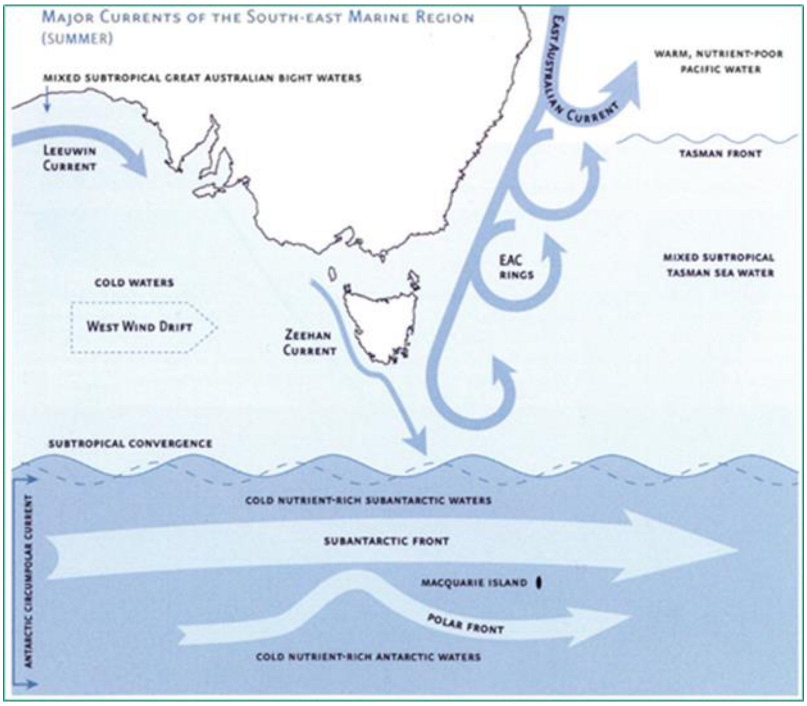


Figure 2-2 Major ocean currents in south-eastern Australian waters summer

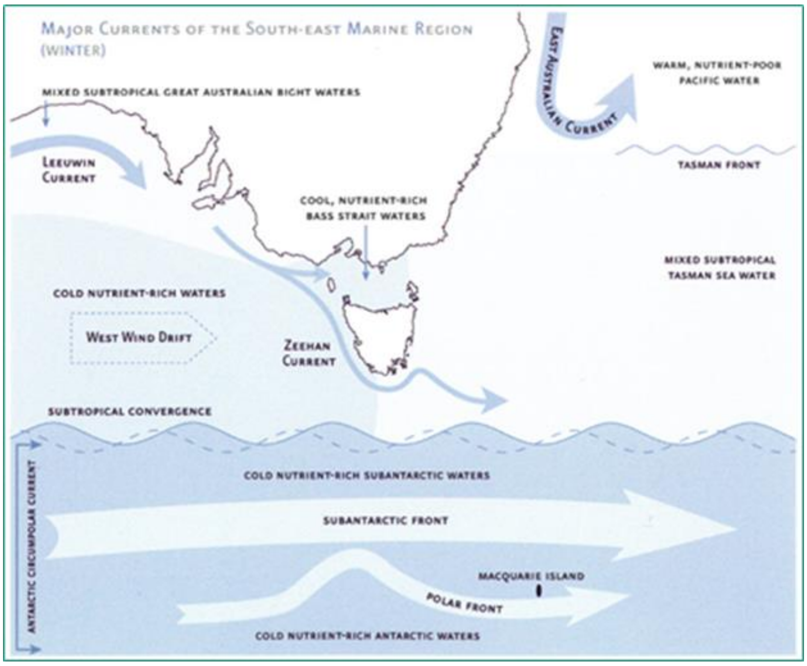


Figure 2-3 Major ocean currents in south-eastern Australian waters winter

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 VIC/P70 permit area that extends out to 90-100 km offshore in water depths of approximately 2,300m. 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) Lord Howe Island Group (2.2.1.3)
	Natural place	New South Wales Lord Howe Island Group (2.2.1.3) Gondwana Rainforests of Australia (2.2.1.4)
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 Ku-ring-gai Chase (2.2.2.2) North Head (2.2.2.3) 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) Elizabeth and Middleton Reefs (2.2.3.14)
Listed Threatened Species and, Listed Migratory Species	Sea Birds and Shorebirds	Refer Section 2.3.1.4
	Fish	Refer Section 2.3.1.1
	Sharks and Rays	Refer Section 2.3.1.3
	Marine Mammals	Refer Section 2.3.1.5
	Marine Reptiles	Refer Section 2.3.1.9
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 (2.2.6.16) Temperate East Marine Region Jervis Bay Marine Park (2.2.6.14) Hunter Marine Park (2.2.6.13) Cod Grounds Marine Park (2.2.6.14) Central Eastern Marine Park (2.2.6.12) Lord Howe Marine Park (2.2.6.11) Solitary Islands 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) West Tasmania Canyons (2.2.7.7) Tasmantid Seamount Chain (2.2.7.8) Lord Howe Seamount Chain (2.2.7.9) Tasman Front and eddy field (2.2.7.10) 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) • Cudgen, Wooyung and Billinudgel Naure Reserves (2.2.8.38) • Cape Byron Marine Park (2.2.8.39) • Byron Coast Group of Nature Reserves (2.2.8.40) • Arakwal National Park and Cape Byron Conservation Area (2.2.8.41) • Broadwater National Park, Bundjalung National Park and Iluka Nature Reserve (2.2.8.42) • Yuraygir National Park (2.2.8.43) • Solitary Islands Marine Park (2.2.8.44) • Coffs Coast Regional Park and Moonee Beach Nature Reserve (2.2.8.45) • Muttonbird Island Nature Reserve (2.2.8.46) • Bongil Bongil National Park (2.2.8.47) • Jagun Nature Reserve (2.2.8.48) • Gaagal Wanggaan (South Beach) National Park (2.2.8.49) • Hat Head National Park (2.2.8.50) • Limeburners Creek National Park (2.2.8.51) • Sea Acres National Park (2.2.8.52) • Crowdy Bay National Park and Watson Taylors Lake (2.2.8.53) • Darawank, Khappinghat and Kattang Nature Reserves (2.2.8.54) • Booti Booti National Park and Wallis Lake (2.2.8.55) • Myall Lakes National Park Little Broughton Island and Stormpetrel Nature Reserves (2.2.8.56) • Tomaree National Park (2.2.8.57) • Worimi Conservation Lands (2.2.8.58) • Glenrock State Conservation Area and Awabakal Nature Reserve (2.2.8.59) • Munmorah State Conservation Area and Bird Island Nature Reserve and Wallarah National Park (2.2.8.60) • Wyrrabalong National Park (2.2.8.61) • Bouddi National Park, Brisbane Water National Park & Ku-ring-gai Chase National Park (2.2.8.62) • Sydney Harbour National Park (2.2.8.63) • Malabar Headland National Park (2.2.8.64) • Towra Point Nature Reserve (2.2.8.65) • Kamay Botany Bay National Park (2.2.8.66) • Royal National Park (2.2.8.67) • Five Islands Nature (2.2.8.68) • Seven Mile Beach National Park (2.2.8.69) • Jervis Bay Marine Park National Park (2.2.8.70) • Booderee National Park (2.2.8.71) • Conjola National Park (2.2.8.72) • Narrawallee Creek Nature Reserve (2.2.8.73) • South Pacific Heathland Reserve (2.2.8.74) • Meroo National Park (2.2.8.75) • Murramurrang National Park (2.2.8.76) • Batemans Marine Park (2.2.8.77)

		• Eurobodalla National Park (2.2.8.78) • Montague Island Nature Reserve (2.2.8.77) • Mimosa Rocks National Park (2.2.8.79) • Bournda National Park (2.2.8.80) • Ben Boyd National Park (2.2.8.81)
Cultural - Indigenous Heritage (2.5.1)	Inigenous Protected Place	Babel Island Mount Chappell Island Big Dog Island Badger Island Iungatalanana
	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 328
	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 2.2.6.11 for information on this park.

2.2.1.4 Gondwana Rainforests of Australia

Gondwana Rainforests of Australia, comprising eight blocks of protected areas (366,703 ha), is situated predominantly along the Great Escarpment on Australia's east coast. The outstanding geological features displayed around shield volcanic craters and the high number of rare and threatened rainforest species are of international significance for science and conservation. One of the protected areas (136 ha) is within the Iluka Nature Reserve (refer Section 2.2.8.38). The reserve is located on the north coast of NSW, approximately 750 km north of Sydney and 150 km south of the NSW/QLD border. The coastal reserve contains the largest single stand in New South Wales of littoral rainforest, a distinctive coastal variant of sub-tropical rainforest, and the least extensive of all New South Wales rainforest types (DoEE, 2019an).

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 four declared World Heritage properties noted above (Darlington Probation Station, Port Arthur Site, Lord Howe Island Group and Gondwana Rainforests of Australia)) 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 2.2.8.50 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 Potter 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 2.2.2.5 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 2.2.8.66) and the Towra Point Nature Reserve (refer Section 2.2.8.65).

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

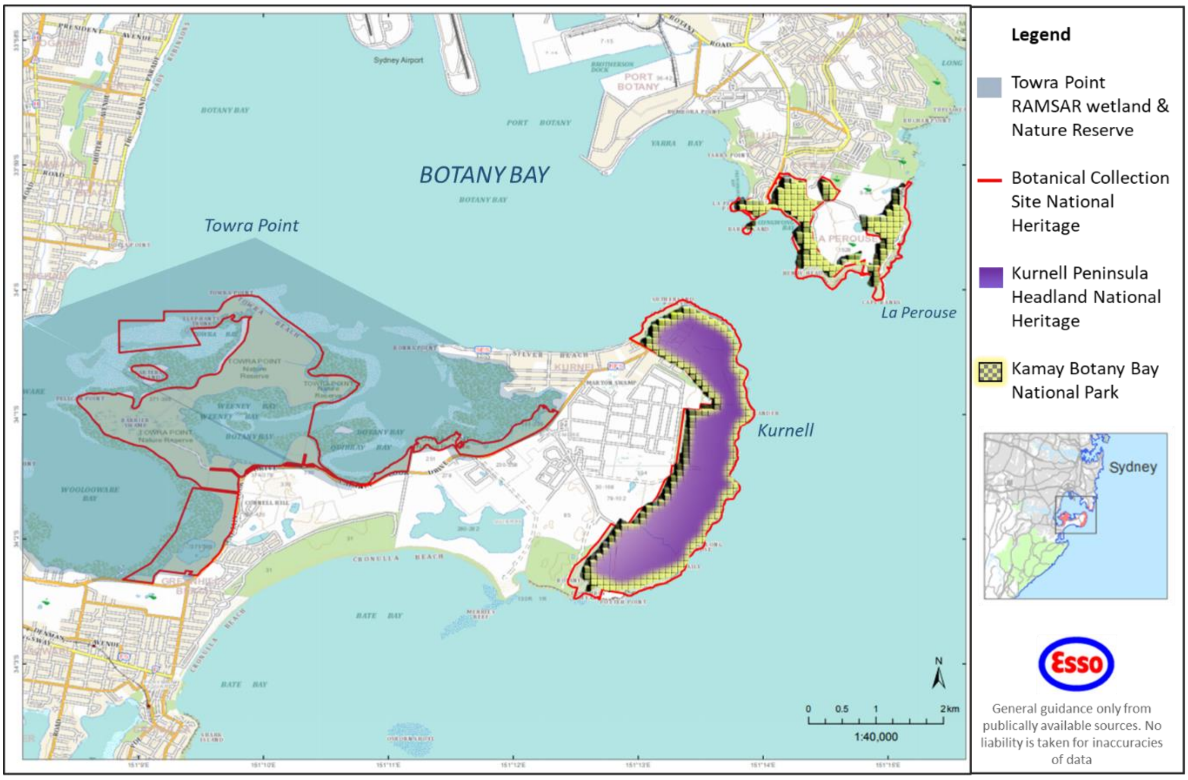


Figure 2-4 National Heritage Places, RAMSAR wetland, National Parks and Reserves in Botany Bay

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 (south of Cronulla) 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 2.2.8.67.

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.

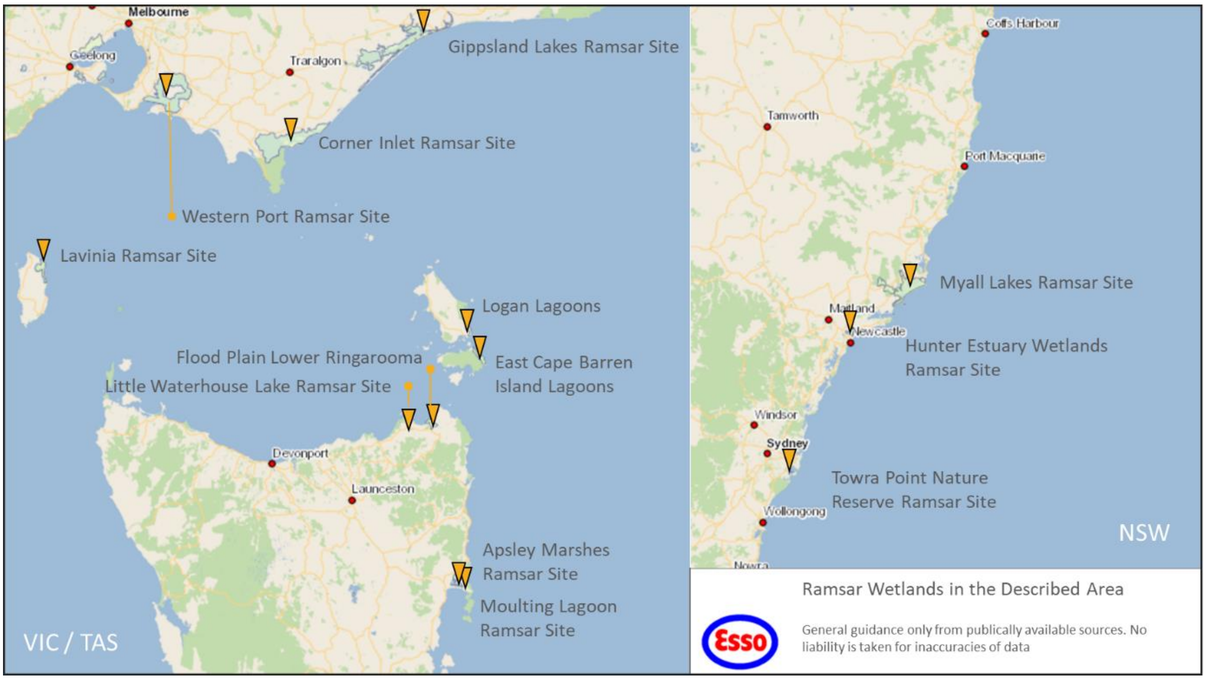


Figure 2-5 Wetlands of International Importance within the DA

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).

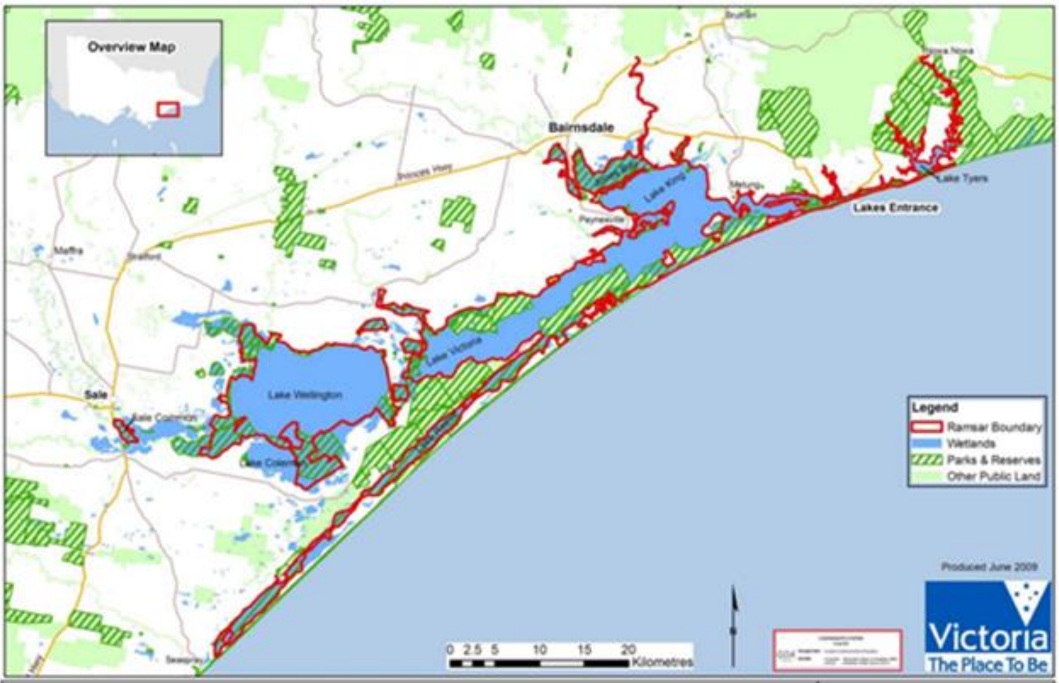


Figure 2-6 Locality of Gippsland lakes Ramsar Site (DSEWPAC, 2010)

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

<table>
<tr><td>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.</td><td>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.</td><td>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.</td></tr>
<tr><td>Supporting Components</td><td>Supporting Processes</td><td>Supporting services/benefits</td></tr>
<tr><td>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).</td><td>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.</td><td>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.</td></tr>
</table>

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

<table>
<tr><th colspan="7">Critical processes</th></tr>
<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><th>Wetland</th><th>Wetting Frequency</th><th>Flushing Frequency</th><th>Required Flushing Volume</th></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).

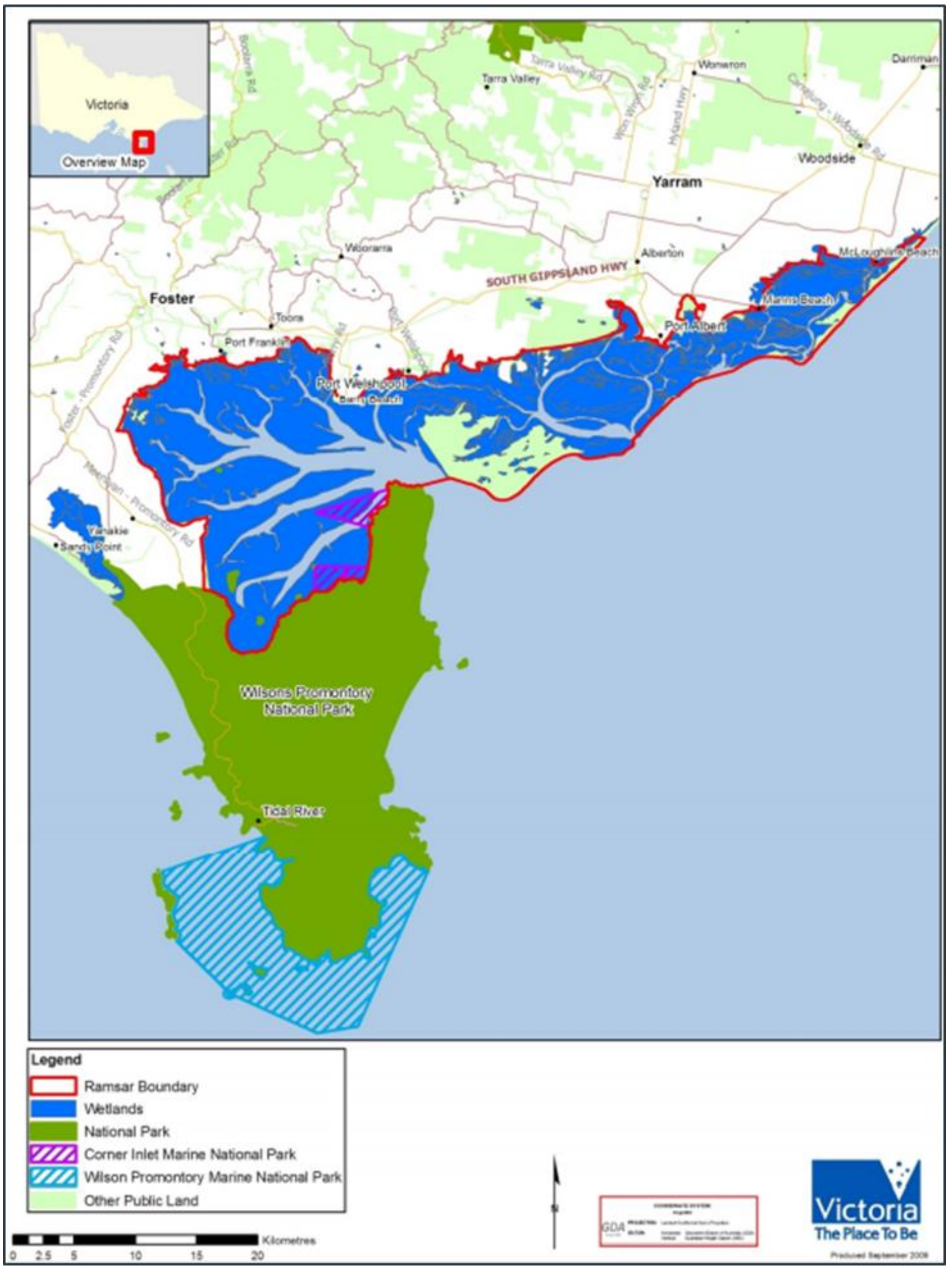


Figure 2-7 Locality of Corner Inlet Ramsar Site (DSEWPAC, 2011b)

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.

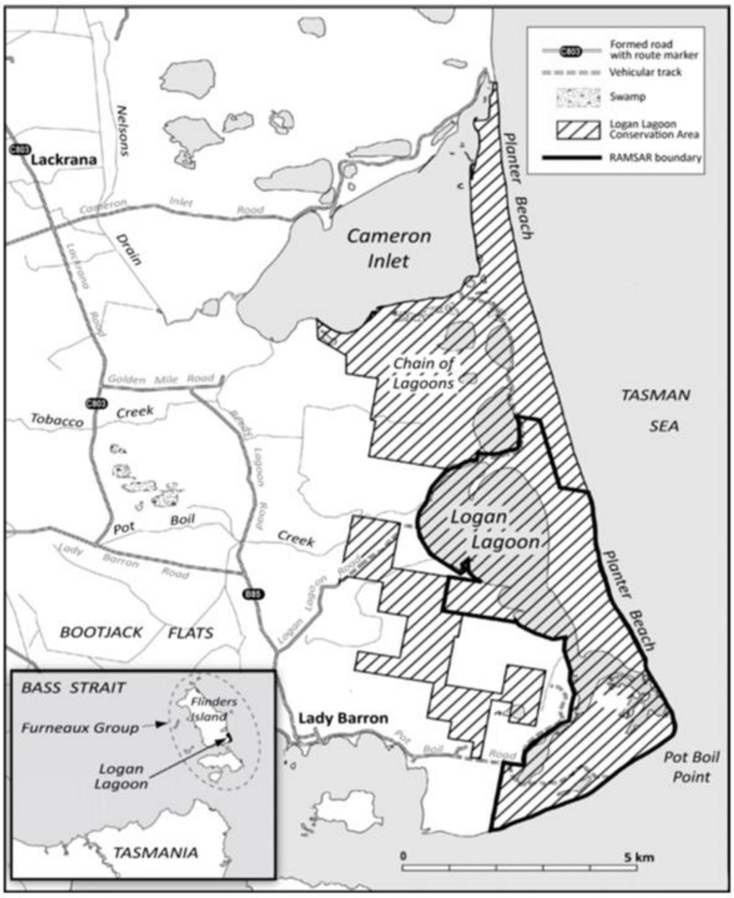


Figure 2-8 Locality Logan Lagoon Ramsar Site (Finley and Roberts, 2010)

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. pH: 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. Salinity: 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. Dissolved Oxygen: No data available. Turbidity: Limited data indicates range between 0.5 and 4.9 NTU: Turbidity varies with freshwater inflows, wind and tidal influences. Nutrients: 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.

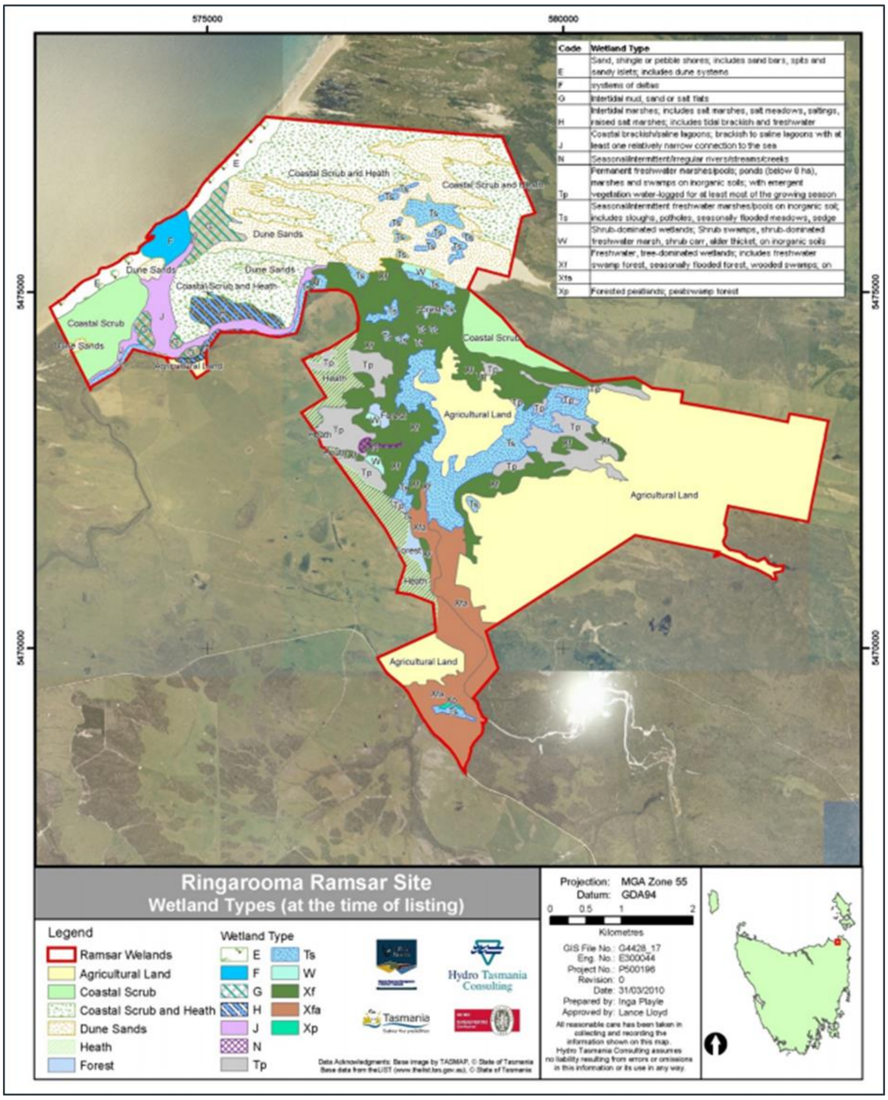


Figure 2-10 Locality and wetland type of Ringarooma Ramsar Site

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.

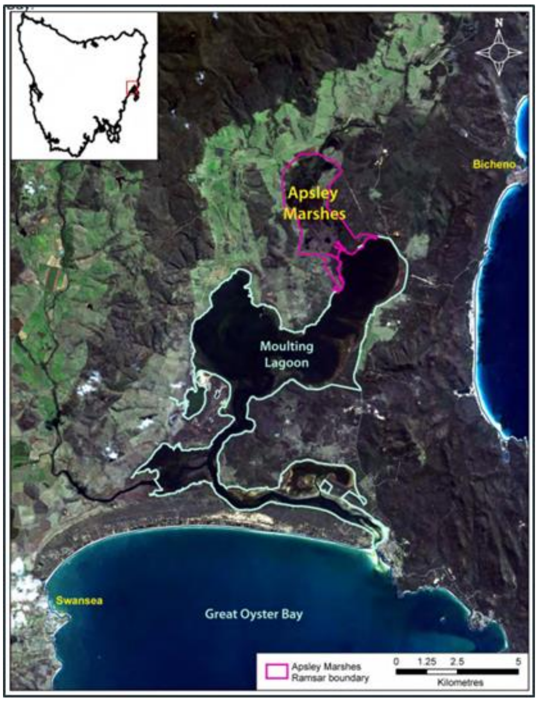


Figure 2-11 Locality of Moulting Lagoon and Apsley Marches Ramsar Sites (Hale &Butcher, 2011).

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 2.2.8.65). 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).

2.2.3.14 Elizabeth and Middleton Reefs Ramsar Site

Elizabeth and Middleton Reefs are located in the northern Tasman Sea, 630 km east of Coffs Harbour (NSW); 690 km east-southeast of Brisbane (Queensland); and 150 km north of Lord Howe Island. Elizabeth and Middleton Reefs are a pair of isolated oceanic platform reefs separated from one another by 45 km of deep oceanic waters and together they represent the southern-most platform reefs in the world. Elizabeth Reef measures 8.2 km by 5.5 km and Middleton Reef, slightly larger but of a similar shape, at 8.9 km by 6.3 km. The site is listed under Ramsar criteria 1, 2, 3, 4 and 8.

Critical Services provided by this site are:

- It is representative of a unique ecosystem in the bioregion: southern-most open ocean coral reef platform in the world;
- It supports threatened species: Green turtle (Chelonia mydas) (feeding habitat only, no nesting);
- It supports regionally high species diversity: fish; coral communities; molluscs; and sea cucumbers (beche-de-mer).
- It supports animal taxa at a vulnerable or critical stage of their lifecycle, particularly the Galapagos Shark (Carcharinus galapagensis)(likely nursery ground); and,
- It supports the last known large population of Black Cod (Epinephelus daemelii).

The threats to this site are the Crown of Thorns starfish which is present at the reefs however its distribution and abundance is not well known. Other threats are illegal fishing of Black Cod and other species (including for the aquarium trade), coral bleaching due to thermal changes in temperature and also water quality changes form pollution (DEWHA, 2006).

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.

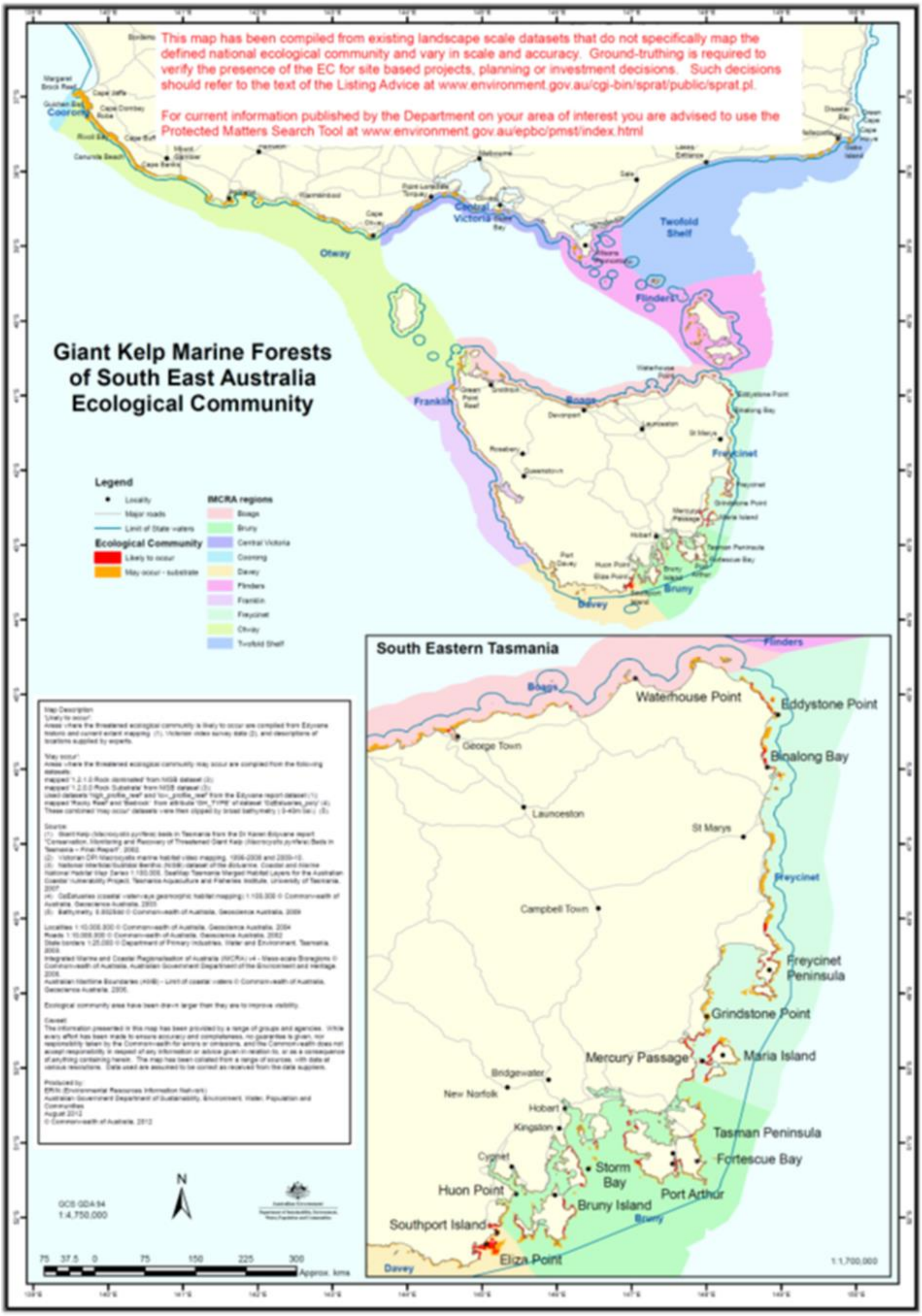


Figure 2-12 Distribution of Threatened Ecological Communities - Giant Kelp Marine Forests of South East Australia

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.

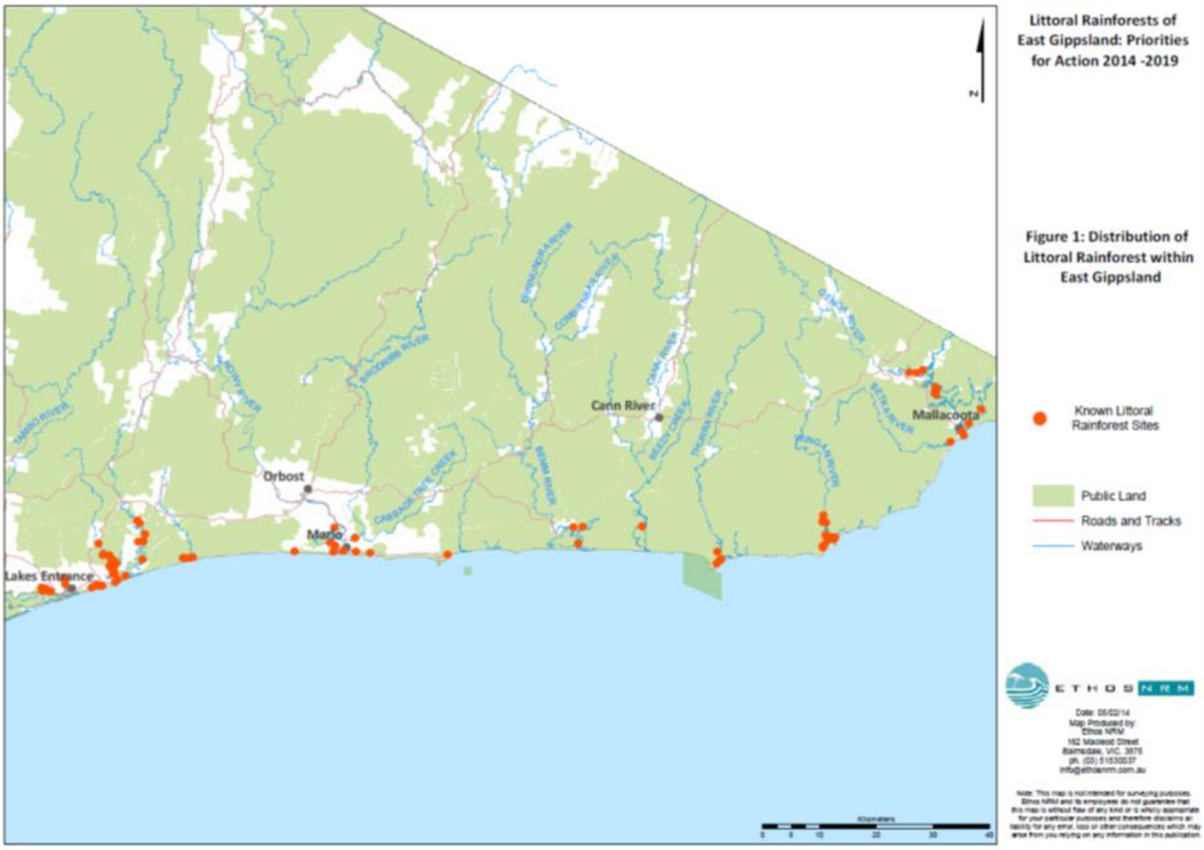


Figure 2-13 Distribution of Threatened Ecological Communities - Littoral Rainforest within East Gippsland (Vic DoE&PI, 2014 Littoral Rainforests of East Gippsland: Priorities for Action 2014-2019)

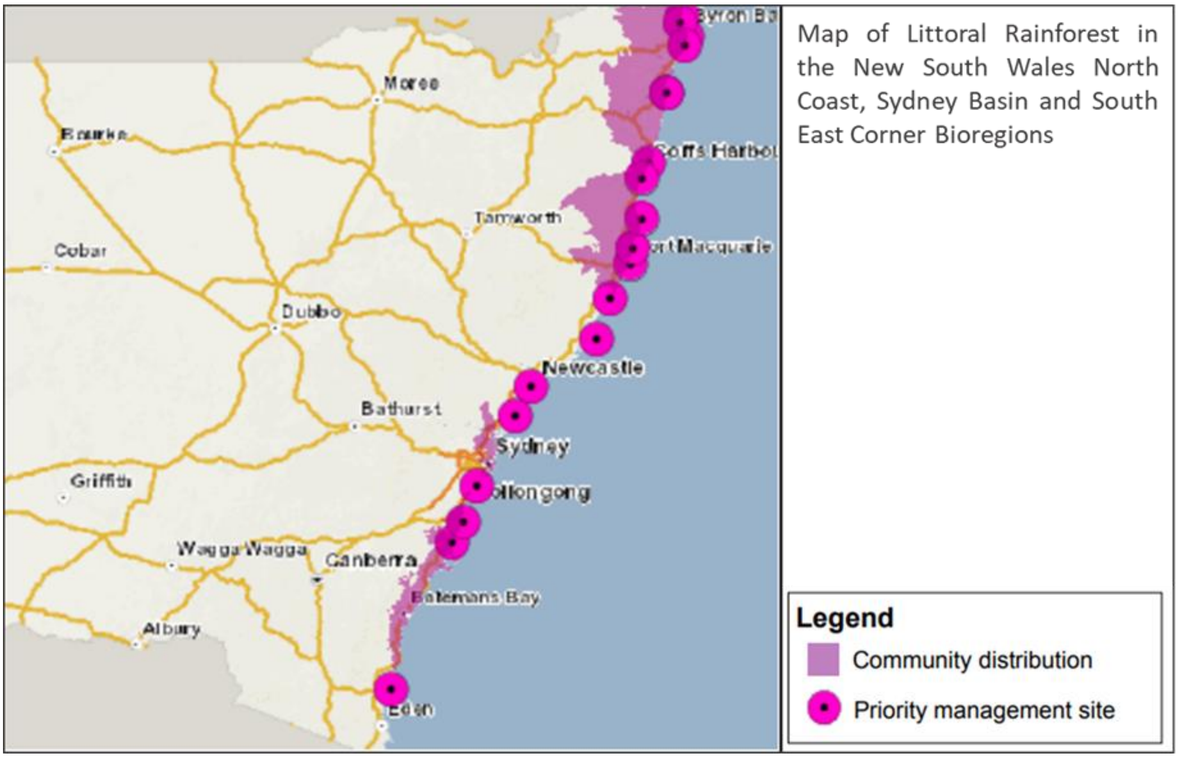


Figure 2-14 Distribution of Threatened Ecological Communities - Littoral Rainforest in NSW (NSW OEH, 2017)

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).

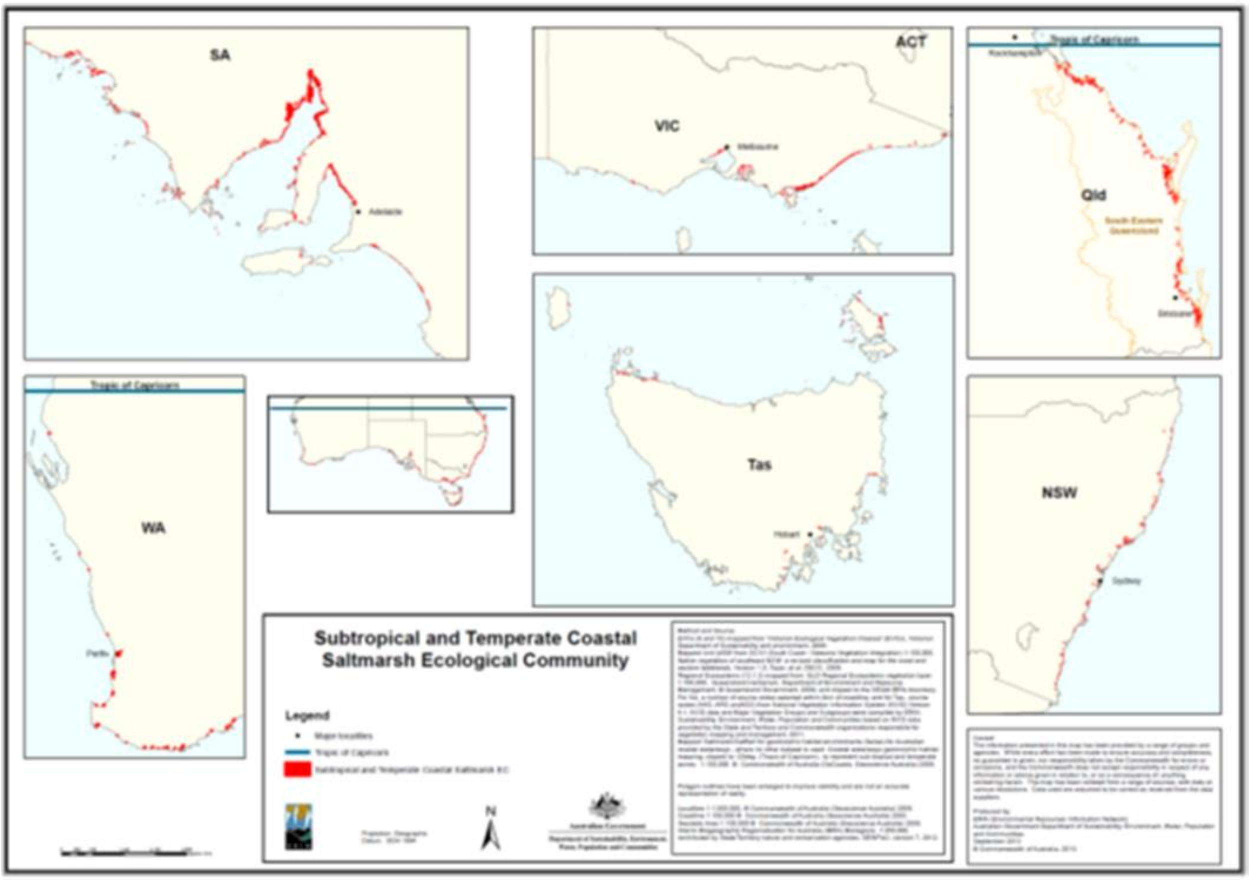


Figure 2-15 Distribution of the TEC Subtropical and Temperate Coastal Saltmarsh

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.

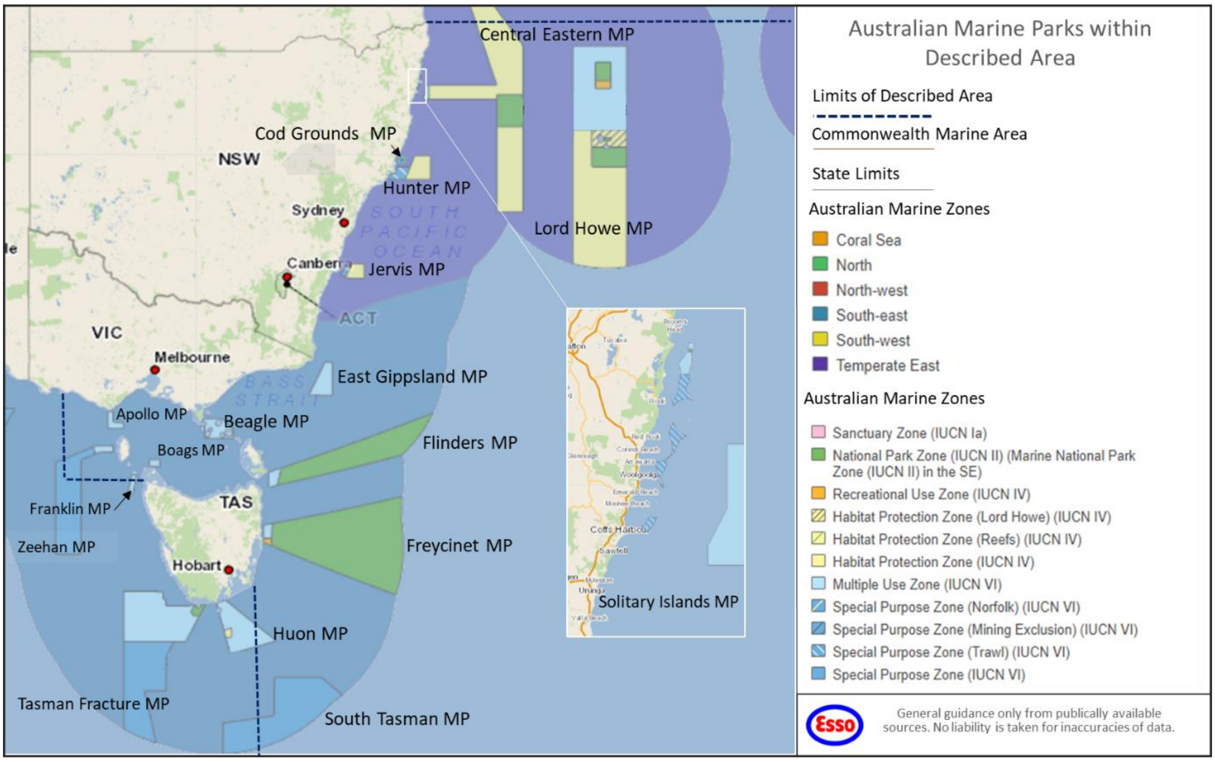


Figure 2-16 Australian Marine Parks within the DA

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); 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 km² (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: **2**	IUCN Ia	IUCN II	IUCN IV	IUCN VI
		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:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
3		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)

<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="3">Assigned zones in reserve: 2</td><td>IUCN Ia</td><td>IUCN II</td><td>IUCN IV</td><td>IUCN VI</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td>Multiple Use Zone (933 km2)</td></tr>
<tr><td>Special Purpose Zone

(18 967 km^2)</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">19,897 km2 (1,989,700 ha).</td></tr>
<tr><td>Major conservation values</td><td colspan="4">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:</td></tr>
</table>

	• 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 Solitary Islands Marine Park

Solitary Islands Marine Park offshore northern NSW is a place where many species occur at the limits of their range as the East Australian Current meets cooler waters from the south. The marine park includes Pimpernel Rock, a submerged pinnacle rising to within a few metres of the surface. Also, the critically endangered grey nurse sharks gather here, making it a popular dive spot. Details of the park are described in Table 2-22 (DNP, 2018).

Table 2-22 Solitary Islands Marine Park CMR: Temperate East Marine Parks Network Management Plan

<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 VI – Multiple Use Zone</td></tr>
<tr><td rowspan="3">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="2"></td><td rowspan="2">National Park Zone</td><td rowspan="2"></td><td>Multiple Use Zone</td></tr>
<tr><td>Special Purpose Zone (Trawl)</td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">between 15 m and 70 m.</td></tr>
<tr><td>Total area</td><td colspan="4">152 km ²</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Natural values:
• Open-ocean, subtidal reef and soft substrate habitats.
• Pimpernel Rock is a significant feature of the Marine Park. It is a submerged pinnacle that rises from the seabed to within a few metres of the surface. It provides habitat for benthic communities, pelagic fish, and other marine life.
• Ecosystems of this area are influenced by tropical waters of the East Australian Current meeting temperate, southern waters, creating a combination of tropical and temperate environments.
• Supports a range of species, including species listed as threatened, migratory, marine or cetacean
Important area for:
• Foraging of seabirds
• Migrating and foraging habitat for sharks
• Migrating humpback whales
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. Yaegl People have native title over this area with their sea country extending into the southern portion of the Marine Park
Heritage
• Nil
Social and economic values
• Tourism, commercial fishing, 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.</td></tr>
<tr><td>Location</td><td colspan="4">Located approximately 5.5 km offshore of New South Wales, adjacent to the NSW Solitary Islands Marine Park (adjacent to the north coast, NSW).</td></tr>
<tr><td>General description of the reserve</td><td colspan="4">The Solitary Islands Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Eastern Shelf Transition. The Marine Park contains habitat for species of special conservation interest such as grey nurse sharks, and biologically important areas for humpback whale, white shark and a number of migratory seabirds.
The Marine Park includes habitats connecting to and complementing the adjacent New South Wales Solitary Islands Marine Park. The Marine Park includes habitats</td></tr>
</table>

	connecting to and complementing the adjacent New South Wales Lord Howe Island Marine Park.

2.2.6.11 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 2-23 (DNP, 2018).

Table 2-23 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.</td></tr>
</table>

	• 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. • 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.

2.2.6.12 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 2-24 (DNP, 2018).

Table 2-24 Central Eastern 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="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.</td></tr>
</table>

	• 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 • 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).

2.2.6.13 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 2-25 (DNP, 2018).

Table 2-25 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.

2.2.6.14 Cod Grounds Marine Park

Cod Grounds covers a small, 4km2 area, 5.5 km offshore, NSW (south of Port Macquarie). It is an important aggregation ground for grey nurse sharks (DNP, 2018). Details of the Cod Ground Marine Park are described in Table 2-26 (DNP, 2018).

Table 2-26 Cod Gounds CMR: Temperate East Marine Parks Network Management Plan 2018 (DNP, 2018)

Proclaimed	14 December 2013

<table>
<tr><td>IUCN category assigned by this Management Plan and reserve management zone name</td><td colspan="4">IUCN category II – National Park 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>National Park Zone</td><td></td><td></td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">between 21 m and 46 m.</td></tr>
<tr><td>Total area</td><td colspan="4">4 km²</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Ecosystems, habitats and communities associated with::
• Central Eastern Shelf Transition— ecosystems in this area are influenced by tropical waters of the Eastern Australian Current meeting temperate waters, creating a combination of topical and temperate environments. Many species found withing the marine park are at or close to, either their southern or northern geographical limits.
Important area for:
• Migratory pathway and aggregation area for grey nurse sharks
• Migratory and foraging habitat for humpback whales
• Foraging habitat for seabirds
Key ecological features of the Marine Park are:
• Shelf rocky reefs— predominantly rocky reef surrounded by boulder and cobble slopes that support diverse and abundant marine communities. The reefs are interlaced with sand and cobble gutters.
Cultural
• Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia. There is limited, other information about the cultural significance of this Marine Park.
Social and economic values
• Tourism, scientific research and recreation activities are important in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation</td></tr>
<tr><td>Location</td><td colspan="4">The Cod Grounds Marine Park is 5.5 km offshore, NSW (south of Port Macquarie).</td></tr>
<tr><td>General description of the reserve</td><td colspan="4">The Cod Grounds Marine Park is significant because it contains habitats, species and ecological communities representative of the Central Eastern Shelf Transition. It provides habitat for grey nurse sharks.</td></tr>
</table>

2.2.6.15 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 2-27 (DNP, 2018).

Table 2-27 Jervis 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="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>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 5000 m</td></tr>
<tr><td>Total area</td><td colspan="4">2473 km²</td></tr>
<tr><td>Major conservation values</td><td colspan="4">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).</td></tr>
<tr><td>Location</td><td colspan="4">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.</td></tr>
<tr><td>General description of the reserve</td><td colspan="4">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.</td></tr>
</table>

2.2.6.16 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 2-28 (DNP, 2013).

Table 2-28 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.

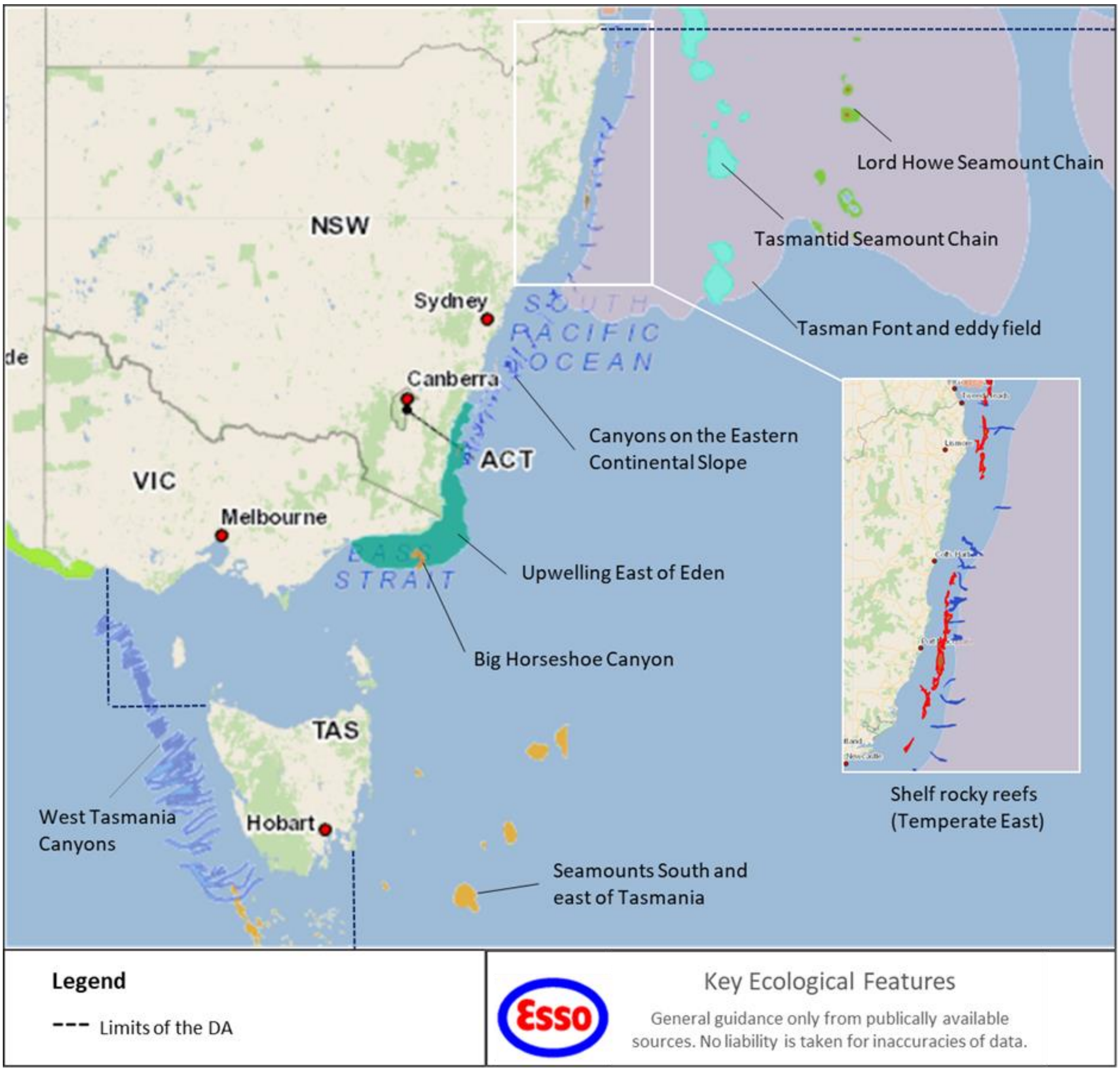


Figure 2-17 Key Ecological Features within the DA

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 epifauna. 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.

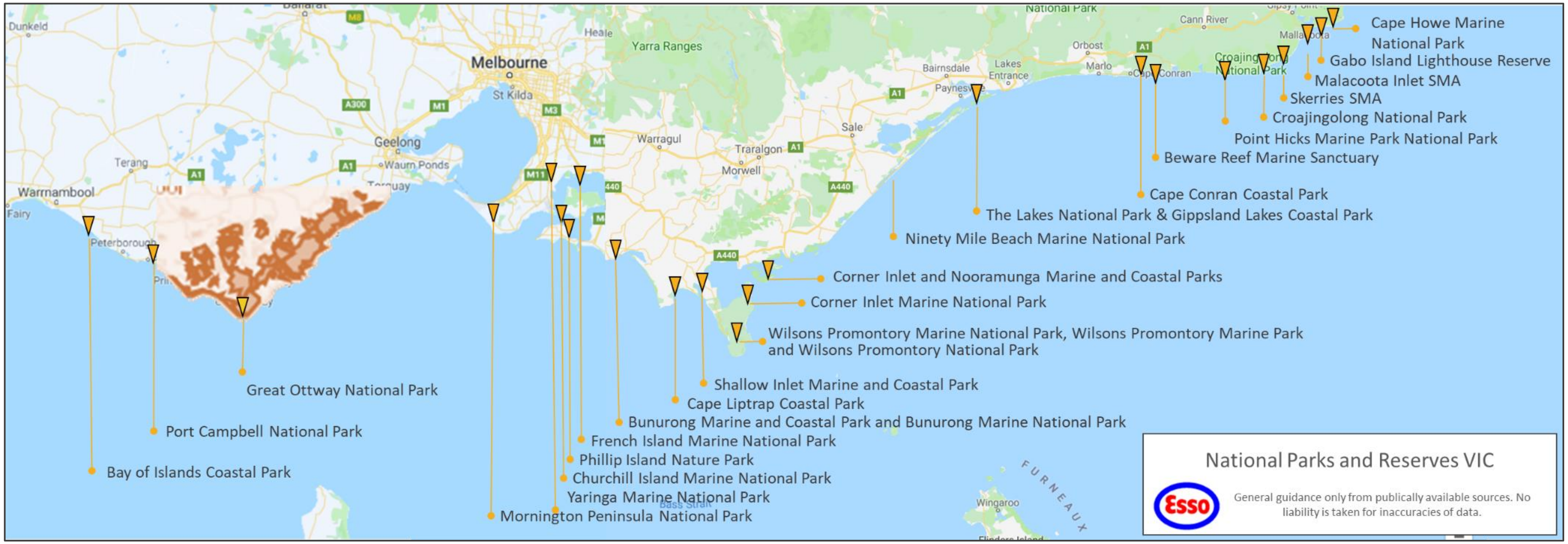


Figure 2-18 National Parks and reserves in the DA in Victoria

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

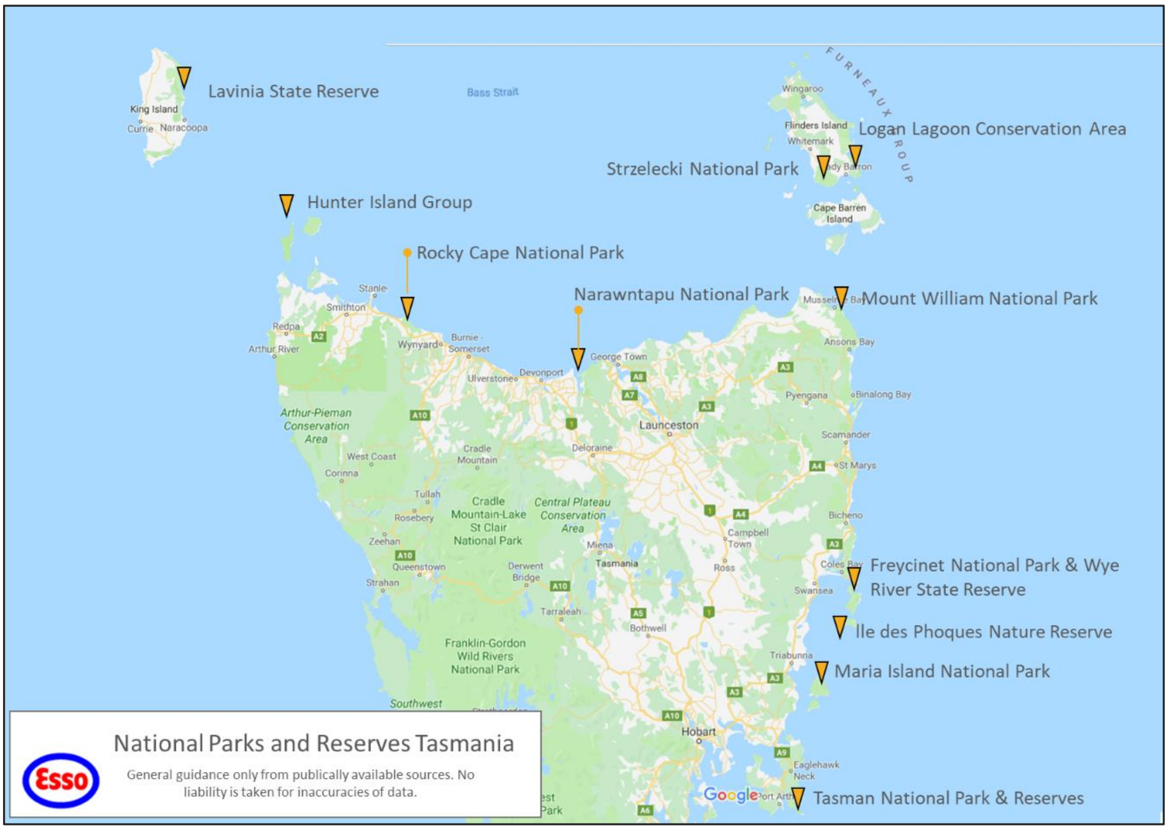


Figure 2-20 National Parks and Reserves in the DA on and around mainland Tasmania

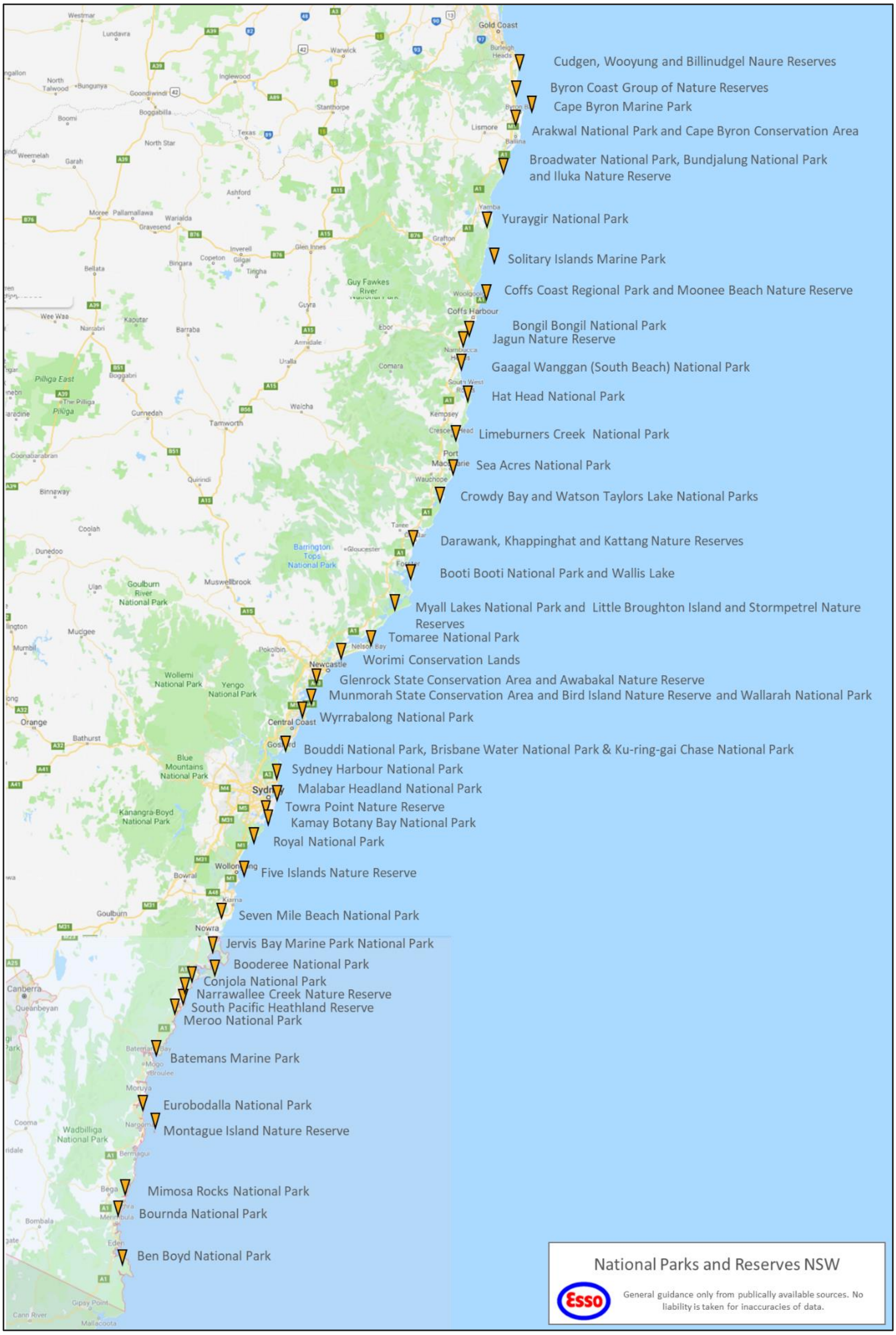


Figure 2-21 National Parks and reserves in the DA in New South Wales

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 island 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 Cudgen, Wooyung and Billinudgel Nature Reserves - NSW

Cudgen, Wooyung and Billinudgel Nature Reserves are located just south of the QLD/NSW border and collectively cover approximately 7km of coastline. All are characterised by high species diversity and contain an overlap of the tropical and subtropical species close to the extent of their range. The three reserves conserve important coastal landscapes, remnant vegetation, and wildlife habitat in a region subject to considerable pressures from agricultural, residential, infrastructure and tourism development (DECC, 2007).

Cudgen Nature Reserve is also significant for wetland conservation in a local, regional and state context (NPWS, 1998d).

2.2.8.39 Cape Byron Marine Park - NSW

The Cape Byron Marine (State) Park is situated off the far north coast of NSW, wrapping around Cape Byron headland at Byron Bay and covers approximately 220 km^2 of NSW waters from the mean high water mark to 3 nautical miles offshore. It includes the tidal waters of the Brunswick River and its tributaries and Belongil and Tallow Creeks. It has multiple zones including Sanctuary, Habitat Protection and General Use.

The marine park conserves many subtropical marine habitats which support high levels of biodiversity including some threatened and protected species. It is strongly influenced by the East Australian Current (EAC) as warm waters from the north come together with cooler waters from the south. Julian Rocks within the park is an aggregation site for the endangered Grey Nurse Sharks, Carcharias taurus, who visit in winter (DPI, 2019a).

2.2.8.40 Byron Coast Group of Nature Reserves - NSW

The Brunswick Heads, Tyagarah and Broken Head nature reserves, together form the Byron Coast Group of Nature Reserves and cover about 922 hectares to the north and south of Byron Bay, a major tourist location. Like many of the parks and reserves described in this region, their importance as a group of protected areas is greater than their importance individually for nature conservation. These reserves, together with the surrounding parks and reserves form a discontinuous chain that protect habitats which support a diverse range of wildlife and plant communities including refuges for animals of ecological significance and important links in the north-south migration of certain animal species. Protection of these reserves becomes increasingly important in the face of growing population and recreational use (NPWS, 1998c).

2.2.8.41 Arakwal National Park and Cape Byron Conservation Area- NSW

Arakwal National Park is a 185.2 ha area created under an Indigenous Land Use Agreement (ILUA) with the Arakwal people as part of resolving a native title claim. It is situated 2km south of Byron Bay which is a regional and international tourist destination. It is a core component of the protected areas in the Byron Coast Group of reserves discussed above and also has significant values to its aboriginal people, the Arakwal people, who have been associated with the coastal landscape for over 22,000 years. The Park protects significant coastal habitat including a large area of honeysuckle country (Banksia heathland) that is home to a range of native plants and animals including threatened ecological communities and species (DEC, 2007).

Situated on the most easterly point of the Australian mainland on the far north coast of NSW, Cape Byron Headland Reserve is a State Conservation Area of 98.5 ha. It adjoins the Arakwal National Park and is equally important to the Arakwal people. It has rich historical heritage symbolised by the Cape Byron Lighthouse and is a major tourist attraction in walking distance to the Byron Bay township, providing various recreational activities including hiking, hang-gliding and whale watching (CBT, 2002).

2.2.8.42 Broadwater National Park, Bundjalung National Park and Iluka Nature Reserve - NSW

Broadwater National Park, Bundjalung National Park and Iluka Nature Reserve collectively form part of a major conservation system covering much of the subtropical coast of northern NSW. They protect most of the coastline (over 20,000 ha of coastal land) from Ballina on the Richmond River to the north and Iluka on the Clarence River to the south. The parks are significant as they exhibit high levels of biodiversity and a range of faunal species, which reflects the diverse vegetation communities and climatic conditions within the three areas. They contain subtropical communities, being at the end of the southern range of the subtropics, as well as coastal communities and also support temperate species. The parks protect more than 280 species of reptiles, birds and mammals. Twenty-six species of birds are recognised as being either endangered or vulnerable and therefore of high conservation status. (NPWS, 1997). The coastal wetlands, dunes and ocean foreshores are important feeding and roosting sites for a number of migratory and resident shorebirds. The Iluka Nature Reserve also protects a significant remnant area of sub-tropical littoral rainforest as part of a system of rainforest parks which are World Heritage listed (refer 2.2.1.4) (NPWS, 1997).

2.2.8.43 Yuraygir National Park - NSW

Yuraygir National Park on the north coast of NSW covers an area of 32,898 ha including over 80 kms of coastline. The park protects a wide range of vegetation communities and protects habitats which support a diverse range of wildlife communities including animals of ecological significance and species at the limit of their distribution (tropical and subtropical overlap). The park is also an important link in the north-south migration of certain animal species including the little tern, ruddy turnstone, Mongolian plover, pied oyster-catcher, sooty oyster-catcher, white-bellied sea eagle, eastern curlew, red-necked stint and the common sandpiper (NPWS, 2003).

2.2.8.44 Solitary Islands (State) Marine Park - NSW

Adjacent to the Yuraygir National Park and continuing south to Coffs Harbour is the Solitary Islands Marine Park which covers the area between the coast and the Commonwealth Solitary Islands Marine Park (refer Section 2.2.6.10). It has multiple zones including Sanctuary, Habitat Protection and General Use. It is approximately 710 km^2 from the mean high water mark to three nautical miles offshore, including estuaries to their tidal limit. The marine park is unique in that it contains diverse habitats (estuaries, sandy beaches, intertidal rocky shores, sub-tidal reefs, submerged solitary islands and open oceans) that support a diverse range of fish species including large pelagic fish. Turtles, shelled animals and many marine snails and slugs are also present, especially on the western side. In Anemone Bay in the north of the park the wildlife is particularly diverse and supports the dense coverage of anemone and anemone fish. The park is also the northern most breeding site recorded for the giant cuttlefish (DPI, 2019b).

2.2.8.45 Coffs Coast Regional Park and Moonee Beach Nature Reserve - NSW

Coffs Coast Regional Park covers a narrow, disjunct strip of coastal land stretching from near Corindi to the northern end of Park Beach, Coffs Harbour, covering an area of 562ha. The position of the park adjacent to a major regional city, a number of coastal villages and a wide range of tourism accommodation (including resorts and caravan parks) leads to pressure on the park from high visitation rates and varied land uses next to the park (NSW OEH, 2017c).

Moonee Beach Nature Reserve covers 336 ha and is located between areas covered by the Coffs Coast Regional Park. Many threatened species of fauna are found in the reserve, many of which are migratory bird species such as the wedge-tailed shearwater and the little tern. They too are threatened by increasing visitation rates (NSW OEH, 2012d).

2.2.8.46 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)

2.2.8.47 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)

2.2.8.48 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).

2.2.8.49 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).

2.2.8.50 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 2.2.8.51) 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).

2.2.8.51 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 wetland. 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).

2.2.8.52 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).

2.2.8.53 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).

2.2.8.54 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).

2.2.8.55 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 2.2.8.56 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).

2.2.8.56 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).

2.2.8.57 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).

2.2.8.58 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 Worimi 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 2.2.8.57), 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).

2.2.8.59 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).

2.2.8.60 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)

2.2.8.61 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).

2.2.8.62 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 suburban Sydney they are popular tourist and recreational locations.

2.2.8.63 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),

2.2.8.64 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.

2.2.8.65 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).

2.2.8.66 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).

2.2.8.67 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.

2.2.8.68 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.

2.2.8.69 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).

2.2.8.70 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.

2.2.8.71 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).

2.2.8.72 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).

2.2.8.73 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).

2.2.8.74 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).

2.2.8.75 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).

2.2.8.76 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).

2.2.8.77 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).

2.2.8.78 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, sand spits and dunes.

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

2.2.8.79 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).

2.2.8.80 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).

2.2.8.81 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).

2.2.8.82 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 2.2.8.77), 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 2019b, DoEE 2019l, DoEE 2019m, DoEE 2019r, DoEE 2019at, DoEE 2019au).

2.3.1.1 Fish

2.3.1.2 Fish (bony)

Bony fish are a diverse group of fish that have skeletons primarily composed 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 2-29 (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. The last known significant population of Black cod is at Elizabeth and Middleton Reefs (refer 2.2.3.14). 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 2-29 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	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 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
Threatened Species: *V Vulnerable* *CE Critically Endangered*	*Type of Presence:* *MO Species or species habitat may 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)
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

2.3.1.3 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 six shark and three 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 2-32.

Sharks and Rays

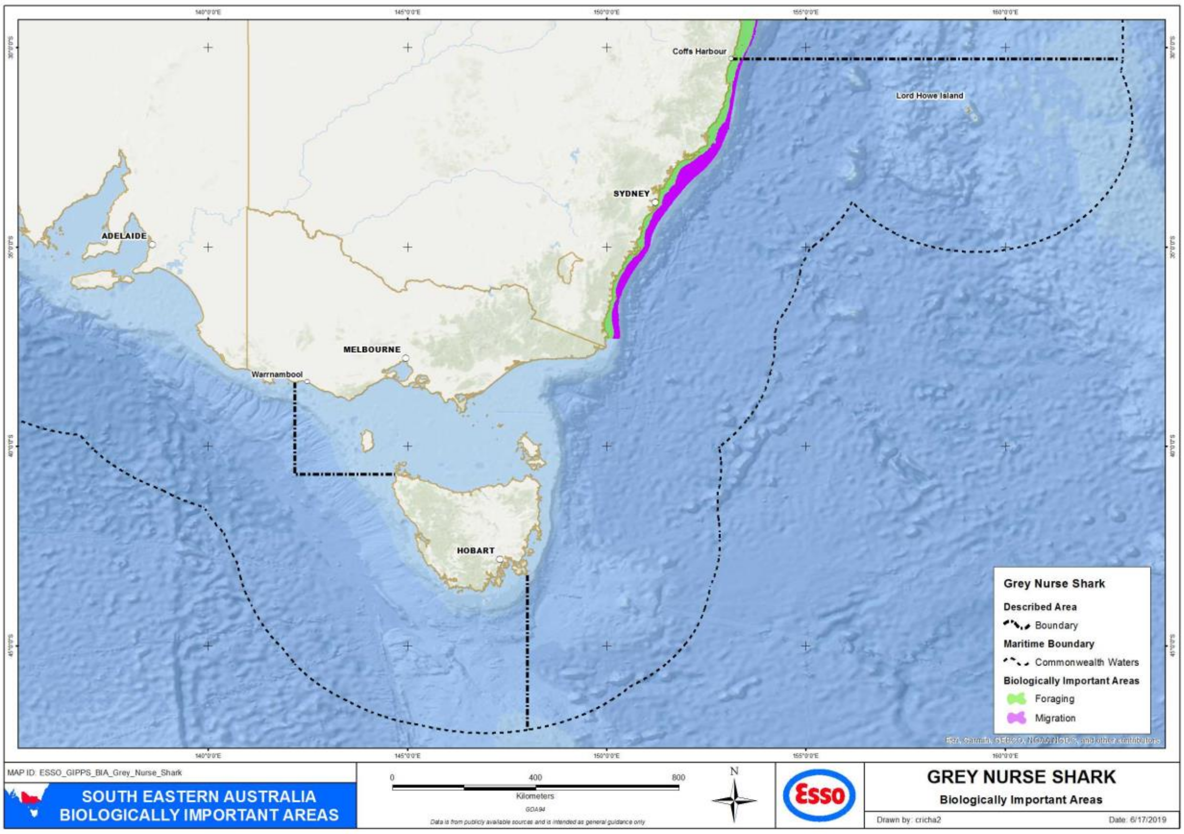
In Australia, the Grey Nurse Shark primarily has an inshore coastal distribution in sub-tropical to cool temperate waters on the continental shelf (DoE, 2014). The east coast population covers a range extending from the Capricornia coast (central Queensland) to Narooma in southern New South Wales (DoE, 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-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,

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

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 longfin mako (*Isurus paucus)*, often mistaken for the shortfin mako, is an epipelagic species with a usual depth range between 120 and 240 metres. Its exact range is not known however it known to have a worldwide distribution in tropical and temperate seas. Within Australia it is known to occur in the north and to the south to at least Port Stephens in NSW. It is thought to feed on pelagic fish and cephalopods (DSEWPAC, 2012g).

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).



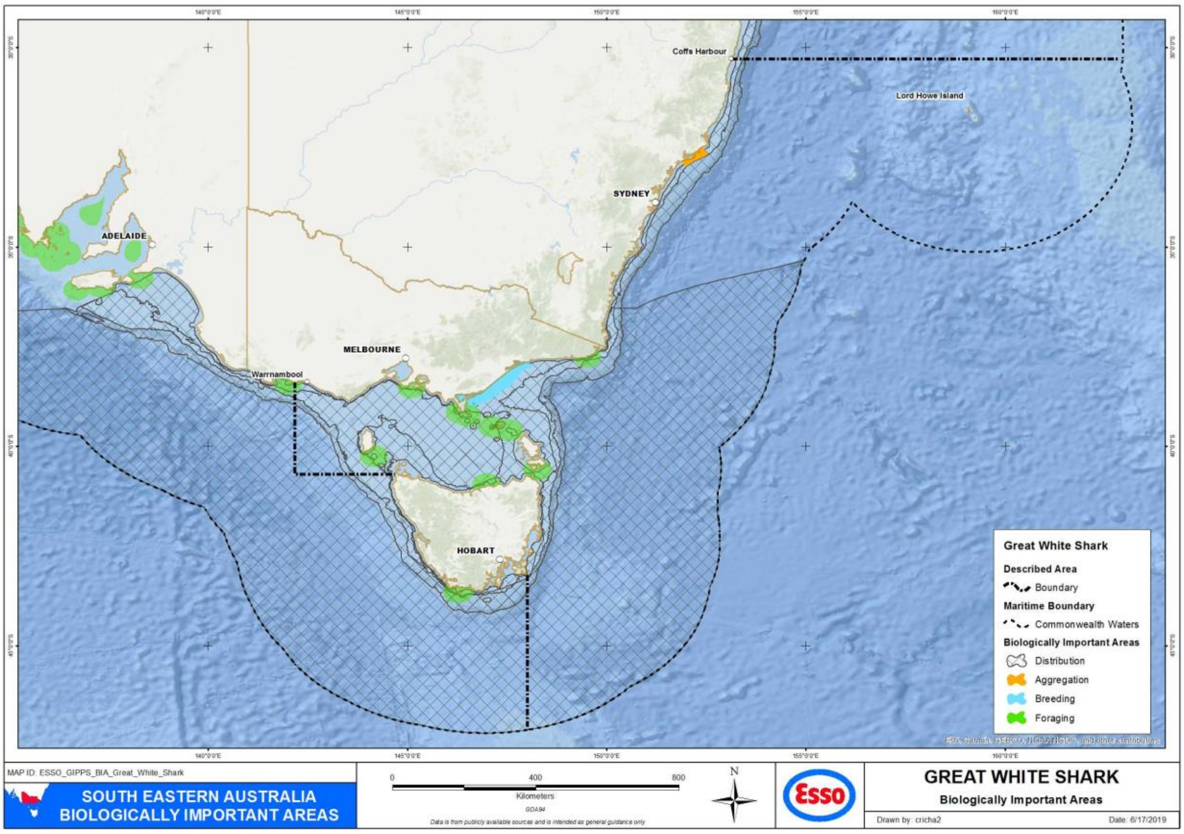


Figure 2-22 Biologically important areas for shark species

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).

The Green Sawfish, is a species of ray listed as vulnerable, with a body of a shark and a flattened head and an elongated snout with 24–28 pairs of unevenly-spaced rostral (saw-like) teeth. The species was last recorded in waters of NSW in 1926 but appears to have contracted its range and has not been detected in NSW or southern Queensland waters since then. It is currently distributed from the Whitsundays in Queensland across northern Australian waters to Shark Bay in Western Australia. The fins are highly sought after in the international market and anecdotal reports suggest sawfish populations have declined significantly as a result (DoEE, 2019ap).

Table 2-31 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
Isurus paucus	Longfin Mako		✓			MO
Lamna nasus	Porbeagle		✓			LO
Manta birostris	Giant Manta Ray		✓			KO
Manta aldfredi	Reef Manta Ray		✓			KO
Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish	V	✓			BKO
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*					

Table 2-32 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

2.3.1.4 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 121 seabird and shorebird 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). The type of presence varies between species, and includes important behaviours (e.g. foraging, roosting, breeding) for some species.

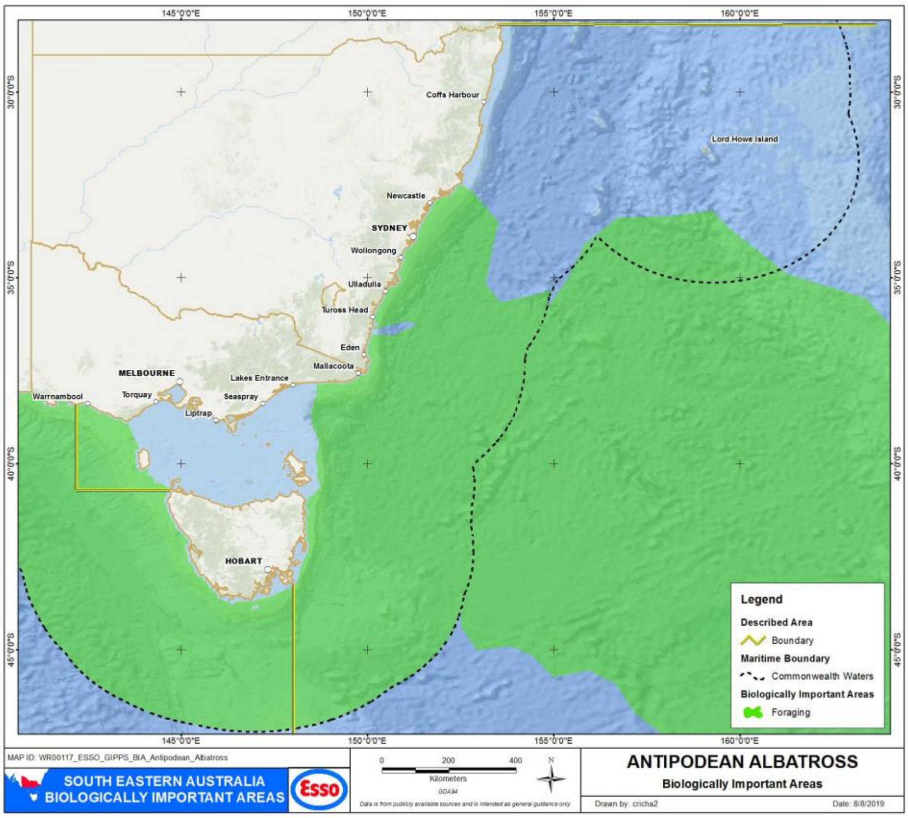
The coast and neighbouring islands within the DA provide feeding and nesting habitats for many coastal and migratory bird species. Seabirds spend much of their lives at sea in search of prey only to return for a short time to breed and raise chicks. Most species tend to forage on their own, though large 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 2-34.

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 2-33). 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.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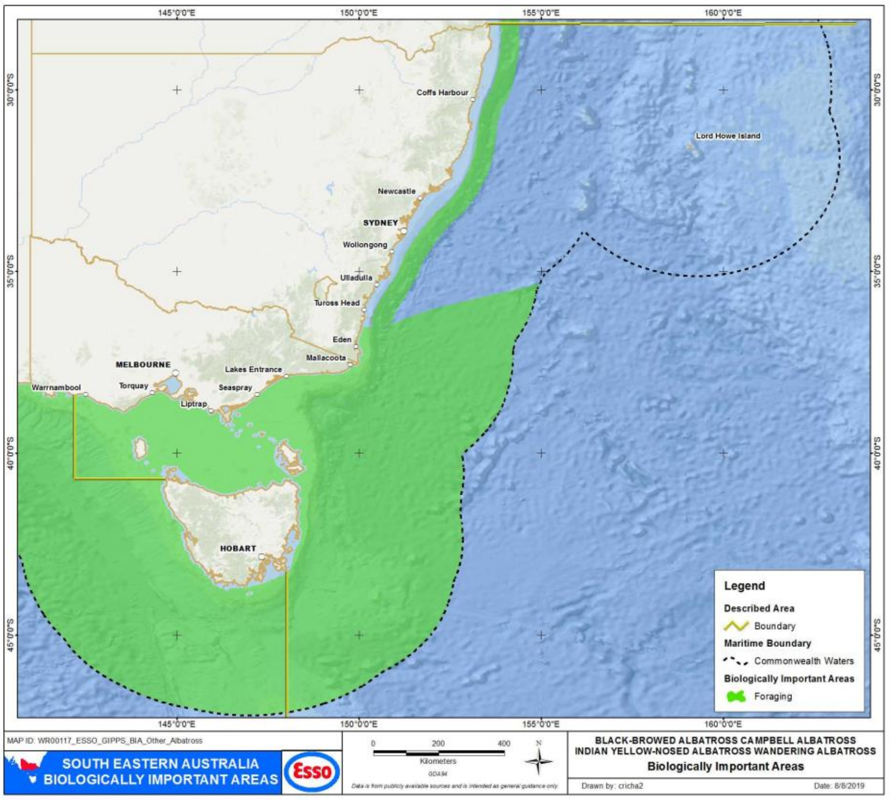
Newcastle
SYDNEY
Wollongong
Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
MAP ID: WR00117_ESSO_GIPPS_BIA_Antipodean_Albatross
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
ANTIPODEAN ALBATROSS
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019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Ulladulla
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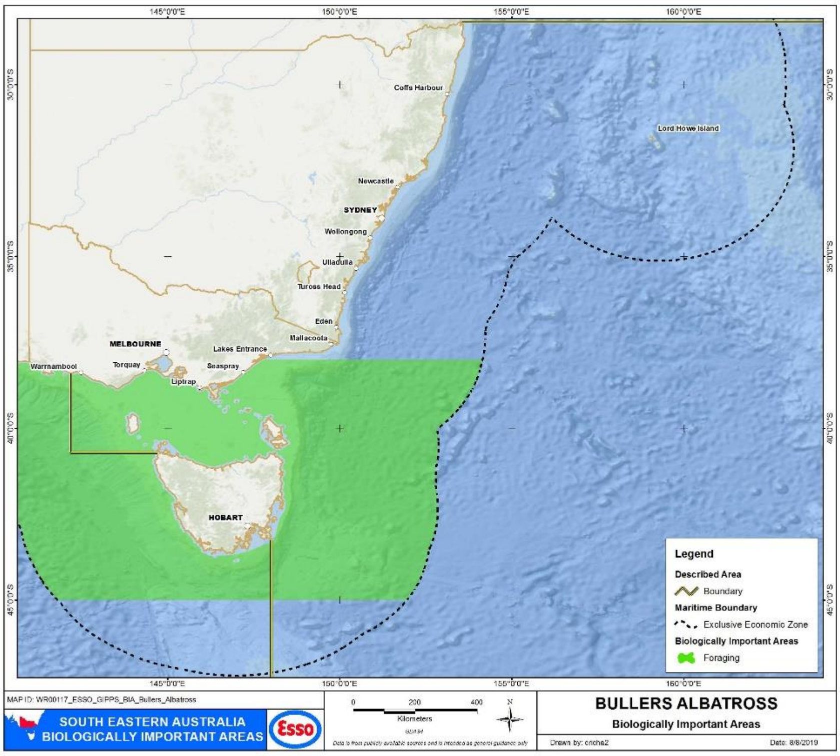
Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
MAP ID: WR00117_ESSO_GIPPS_BIA_Other_Albatross
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
BLACK-BROWED ALBATROSS CAMPBELL ALBATROSS
INDIAN YELLOW-NOSED ALBATROSS WANDERING ALBATROSS
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019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Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Exclusive Economic Zone
Biologically Important Areas
Foraging
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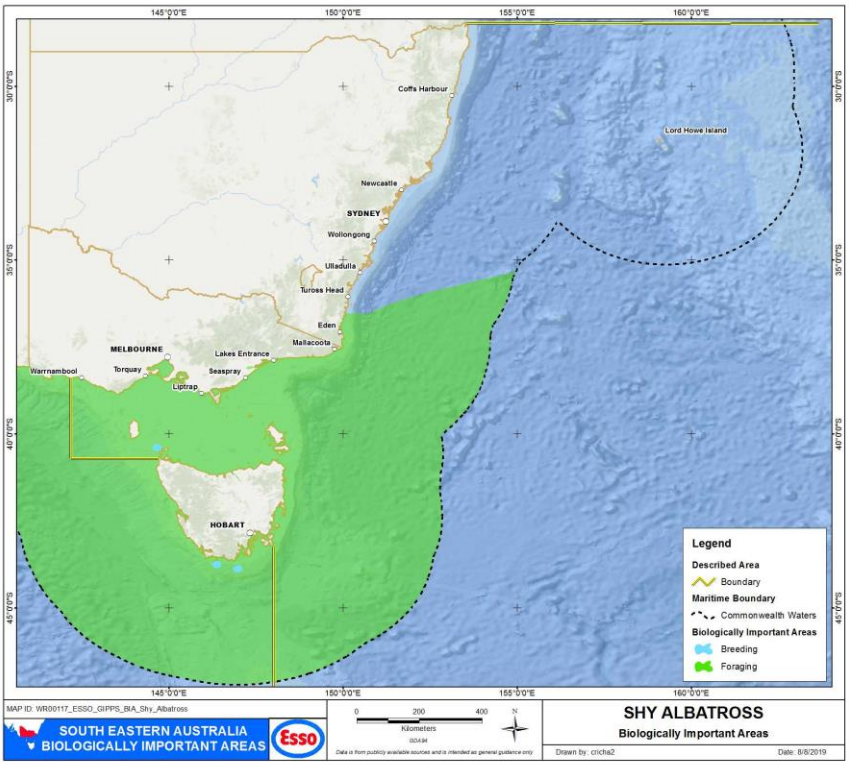
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
BULLERS ALBATROSS
Biologically Important Areas
Date: 8/8/2019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Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
MAP ID: WR00117_ESSO_GIPPS_BIA_Shy_Albatross
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
SHY ALBATROSS
Biologically Important Areas
Date: 8/8/2019

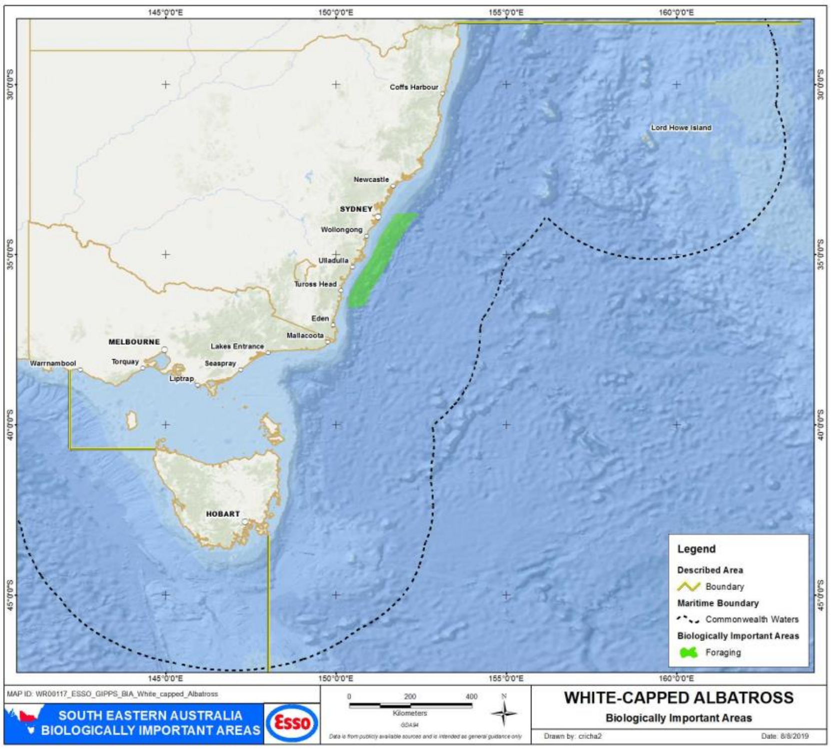


Figure 2-23 Biologically Important Areas for albatross species

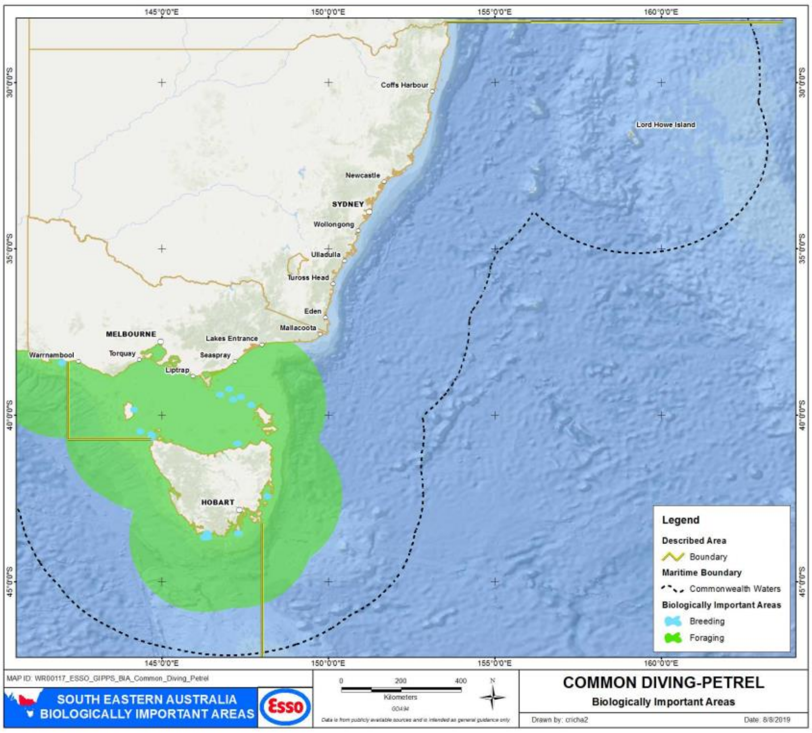
Petrels

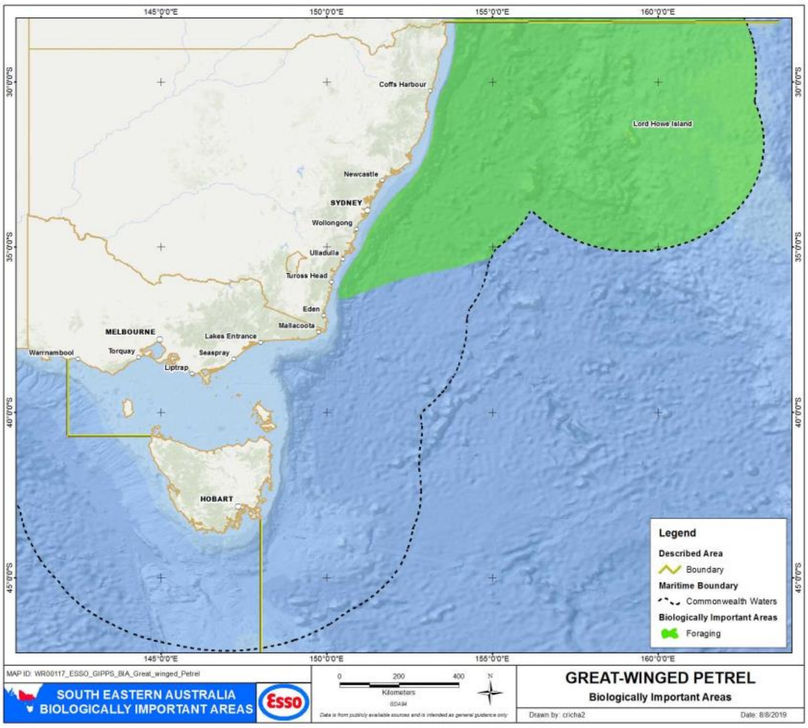
There are 13 species of petrel that may occur within the DA, with most either foraging and/or breeding within the area (Table 2-33). Similar to albatrosses, the petrels have a diverse foraging range, and all waters within Australian jurisdiction can be considered foraging habitat for this species. Typical diet for petrels includes cephalopods (e.g. squid) and fish, and prey is predominately caught by surface-seizing (DSEWPaC, 2011a).

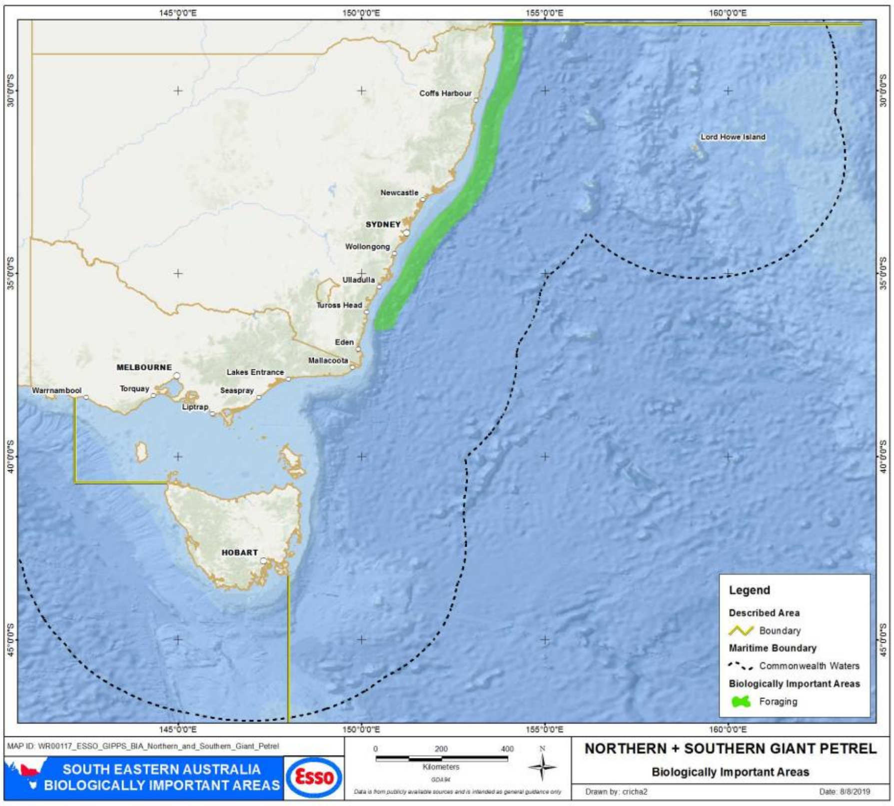
BIAs, for foraging and breeding, have been identified for the White-faced Storm Petrel, Common Diving-Petrel, Black-winged Petrel and Providence Petrel. BIAs for foraging have also been defined for the Northern and Southern Giant Petrel and the Great-winged Petrel (Figure 2-24) (DoEE, 2015h).

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).



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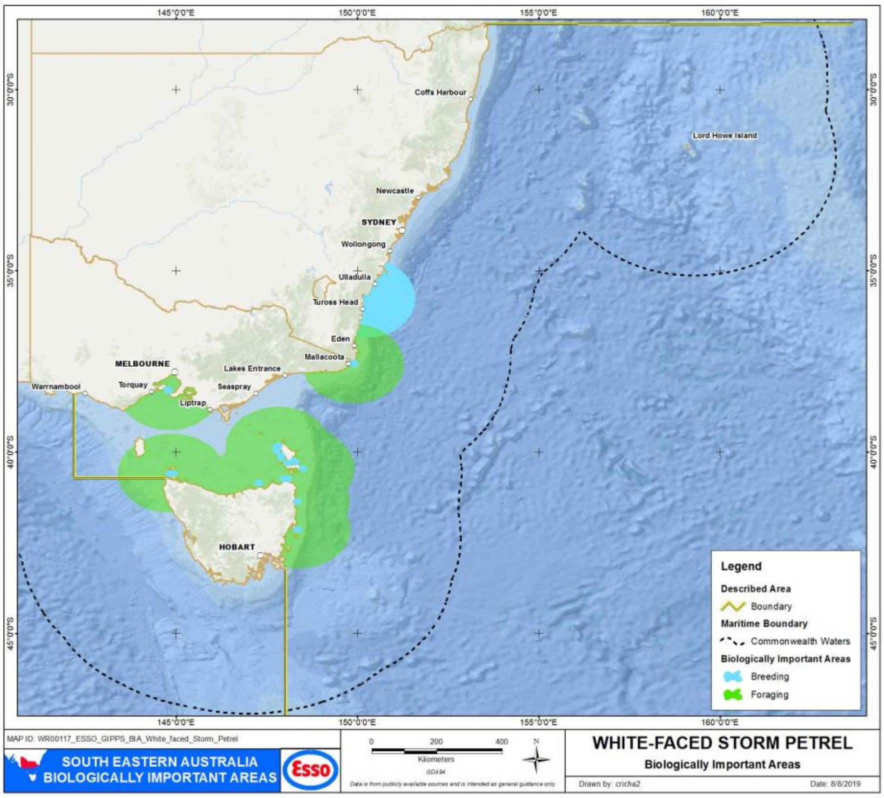
Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
Wollongong
Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
MAP ID: WR00117_ESSO_GIPPS_BIA_Northern_and_Southern_Giant_Petrel
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
0 200 400
Kilometers
NORTHERN + SOUTHERN GIANT PETREL
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019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Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
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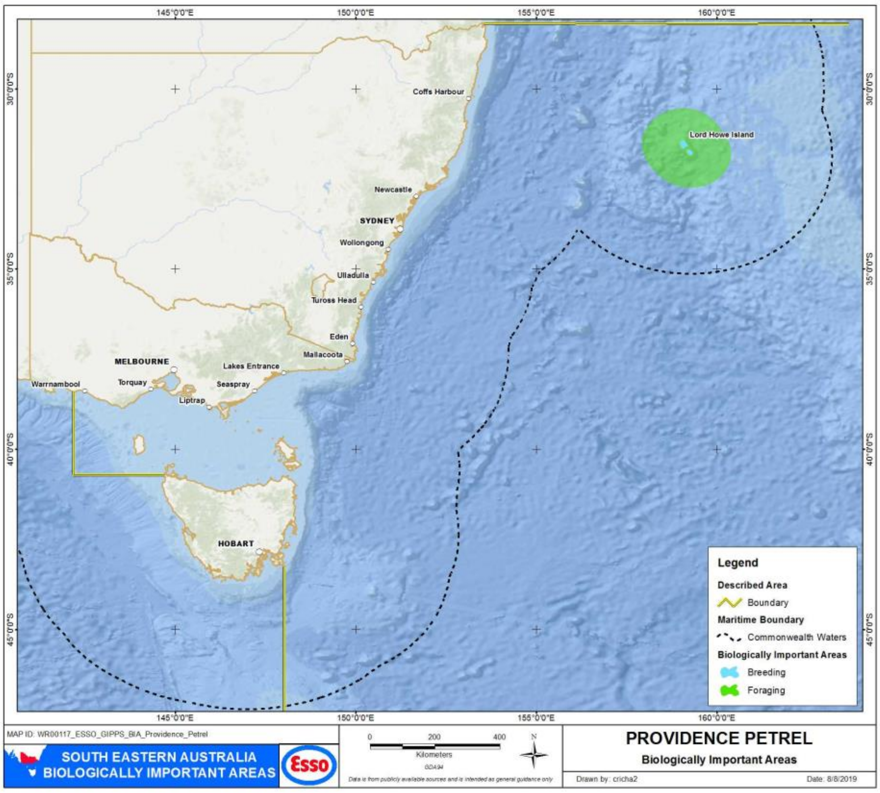
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
0 200 400
Kilometers
WHITE-FACED STORM PETREL
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019



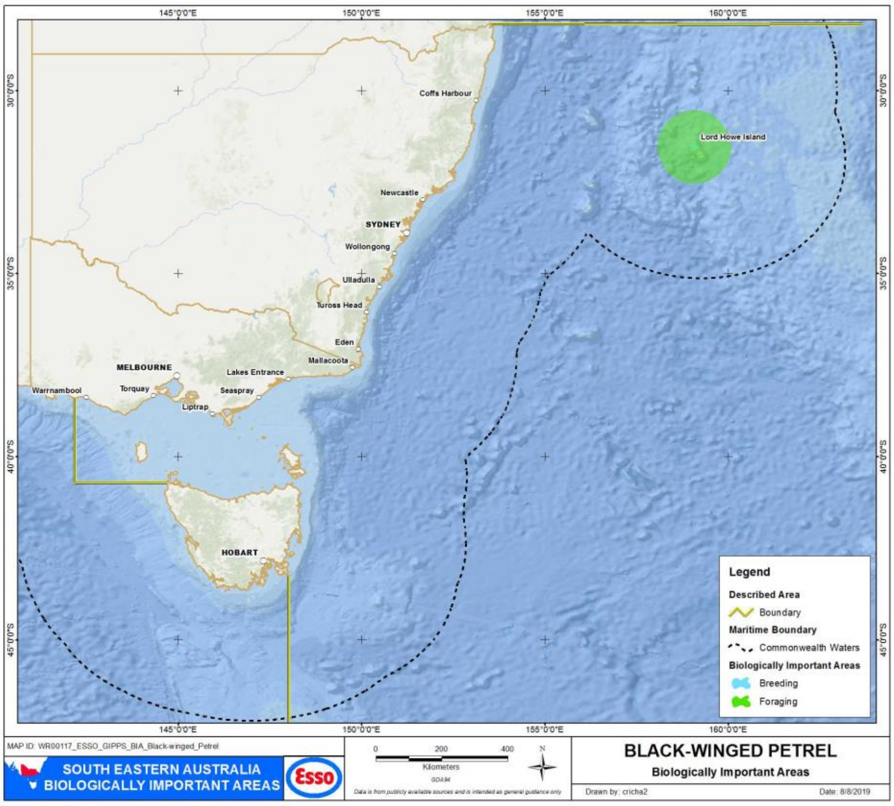


Figure 2-24 Biologically Important Areas for Petrel species.

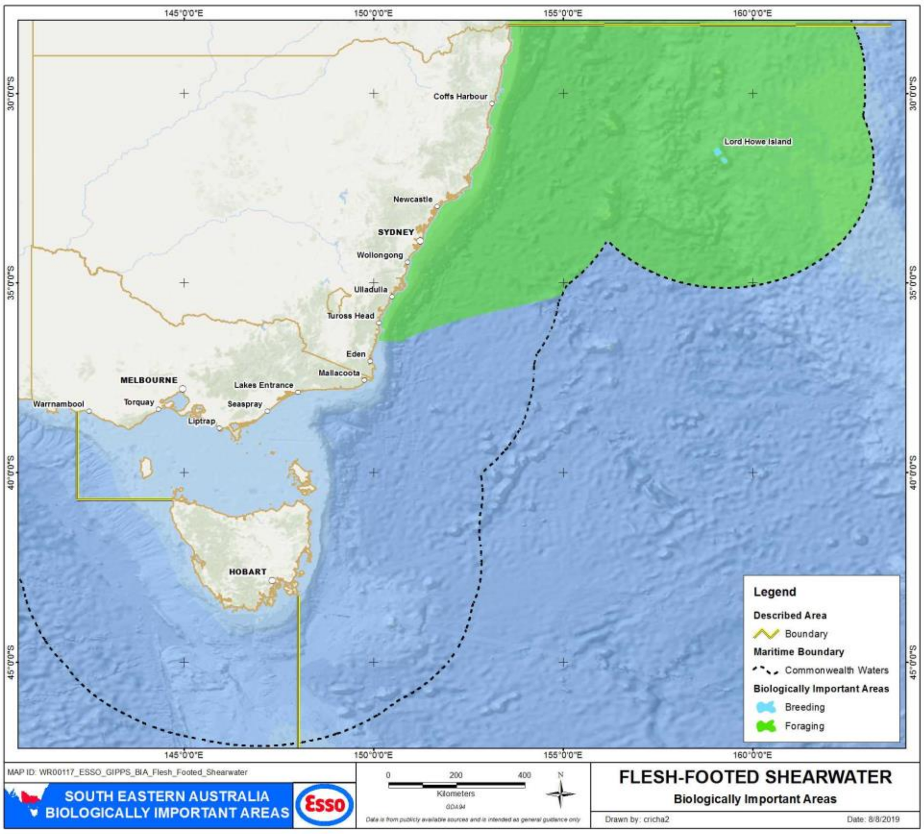
Shearwaters

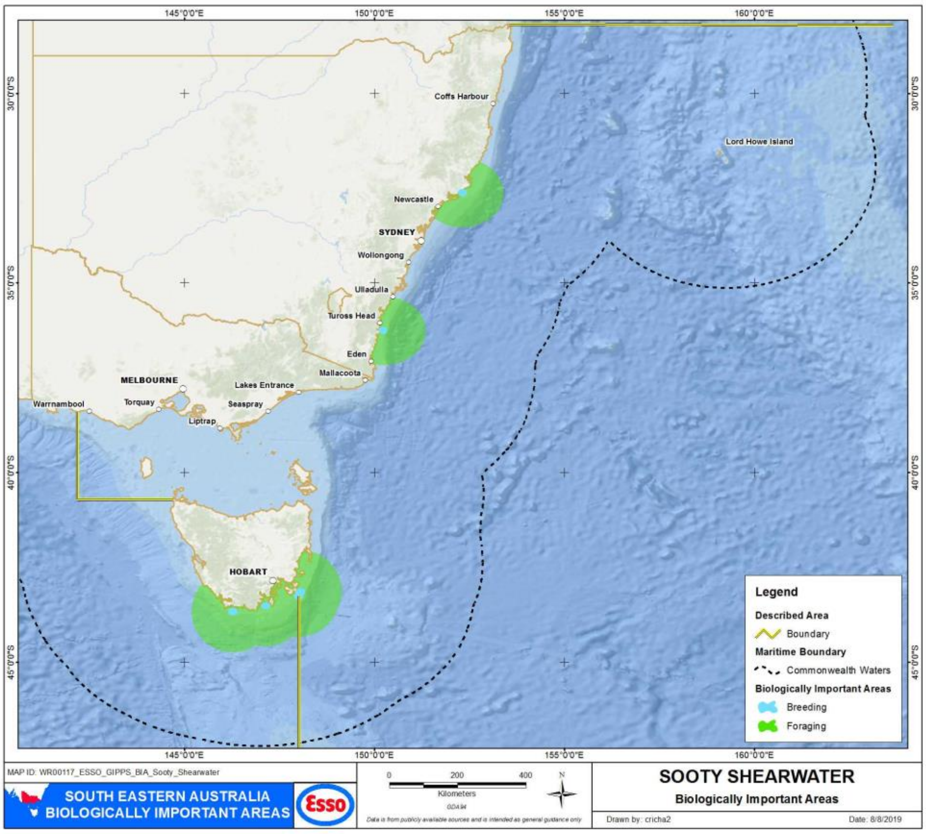
The shearwaters represent the most abundant seabird in Australia. There are five species of shearwater that may occur within the DA, and all have been identified as using the area for foraging and breeding (Table 2-33). BIAs, for foraging and breeding, have been identified for the following species: 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).




SOOTY SHEARWATER
Biologically Important Areas
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
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Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
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Lord Howe Island
Newcastle
SYDNEY
Wollongong
Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
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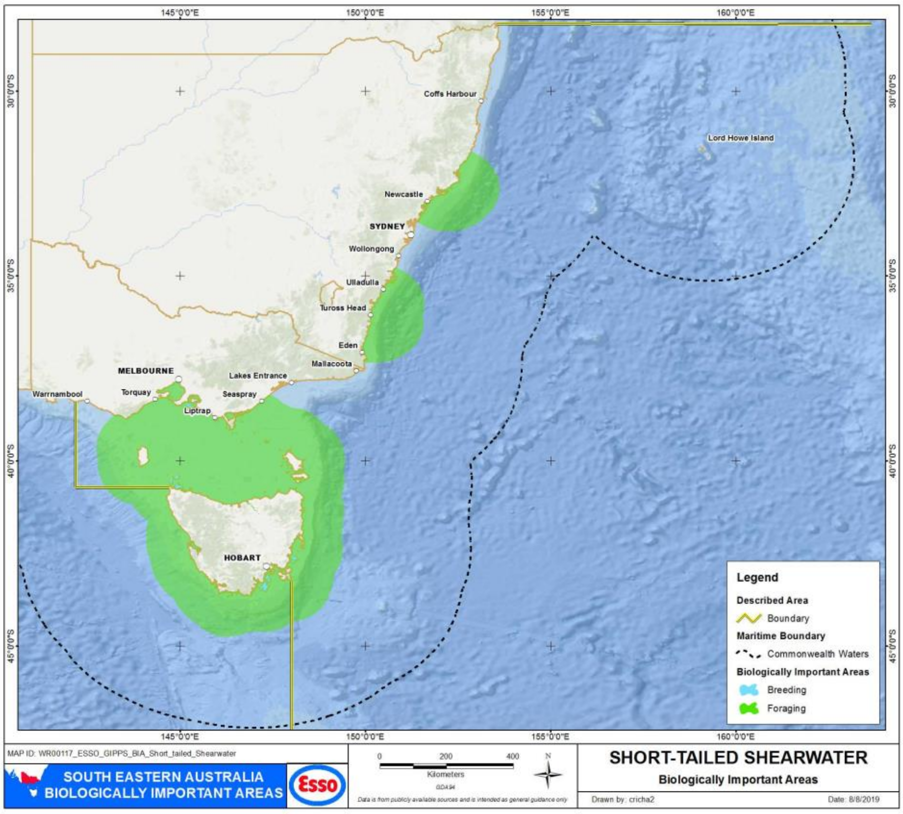
Torquay
Seaspray
Liptrap
HOBART
Kilometers
Drawn by: cricha2
Date: 8/8/2019


SHORT-TAILED SHEARWATER
Biologically Important Areas
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
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Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
Wollongong
Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
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Date: 8/8/2019

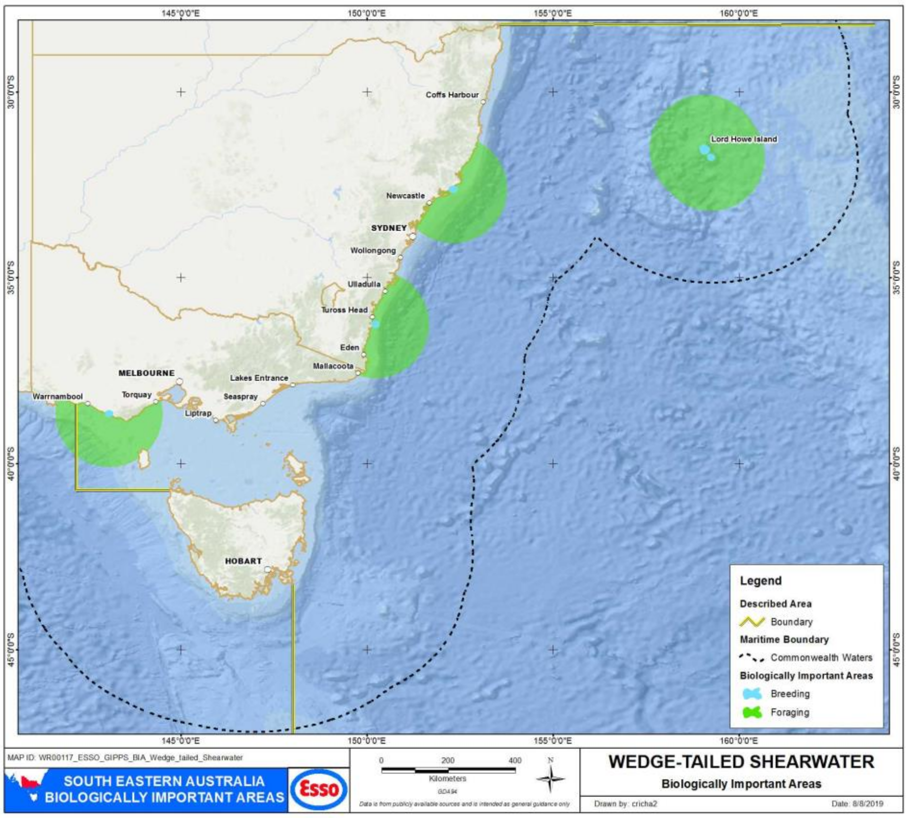


Figure 2-25 Biologically Important Areas for Shearwater species

Terns

There are eight species of tern that may occur within the DA, and all have been identified as using the area for breeding (Table 2-33). 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).

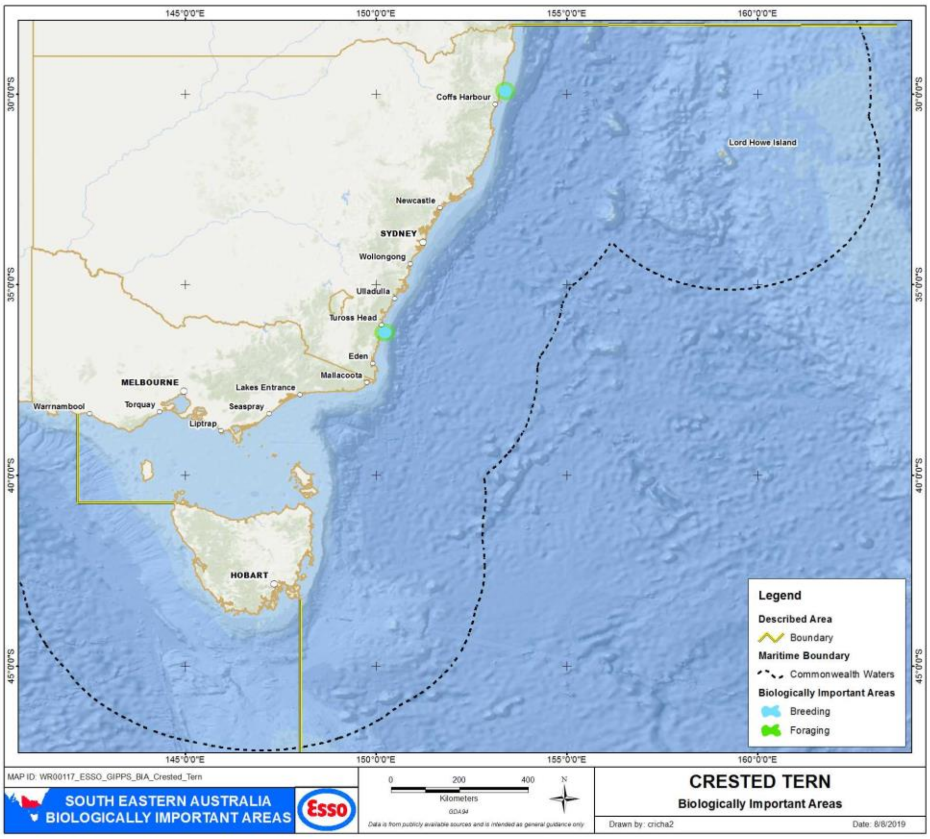


Figure 2-26 Biologically Important Areas for Crested Tern

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 2-33), 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).

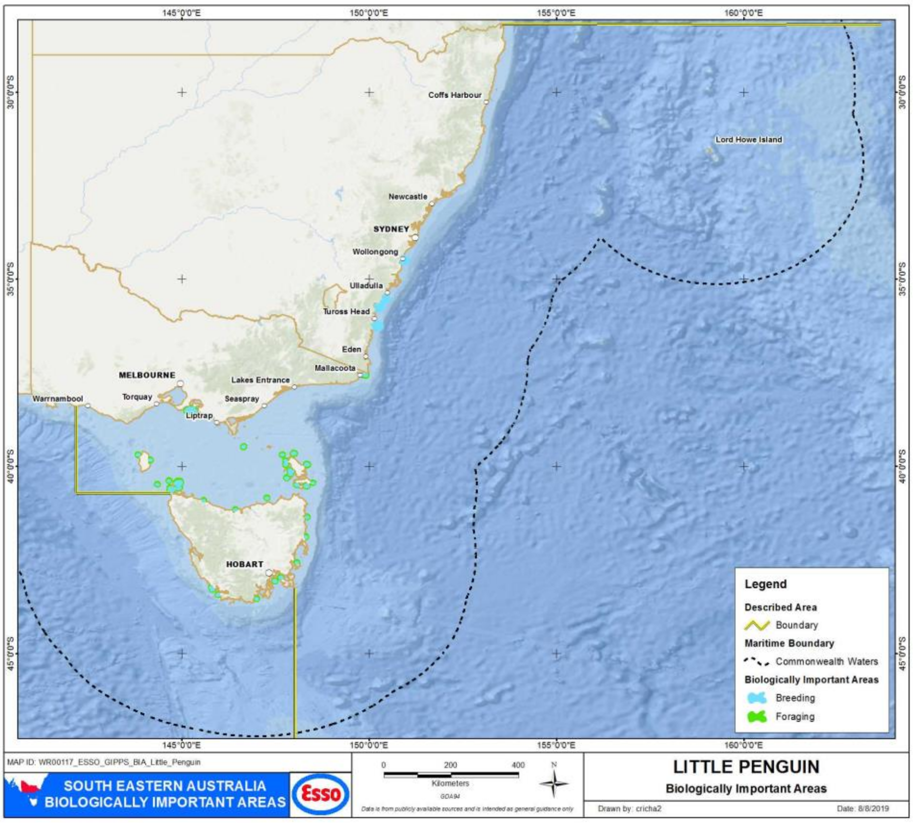


Figure 2-27 Biologically Important Area for Little Penguin

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 2-33 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	Pacific 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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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 subminuta	Long-toed 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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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						
Procelsterna cerulea	Grey Ternlet			✓		BKO
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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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 (Pied 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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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 2-34 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		
Buller's Albatross		
Pacific Albatross		
Shy Albatross		
Chatham Albatross		
Campbell Albatross		
Black-browed Albatross		
Salvin's Albatross		

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
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 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

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
		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
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

2.3.1.5 Marine Mammals

2.3.1.6 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 18 dolphin species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (Table 2-35) (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 2-36. 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).

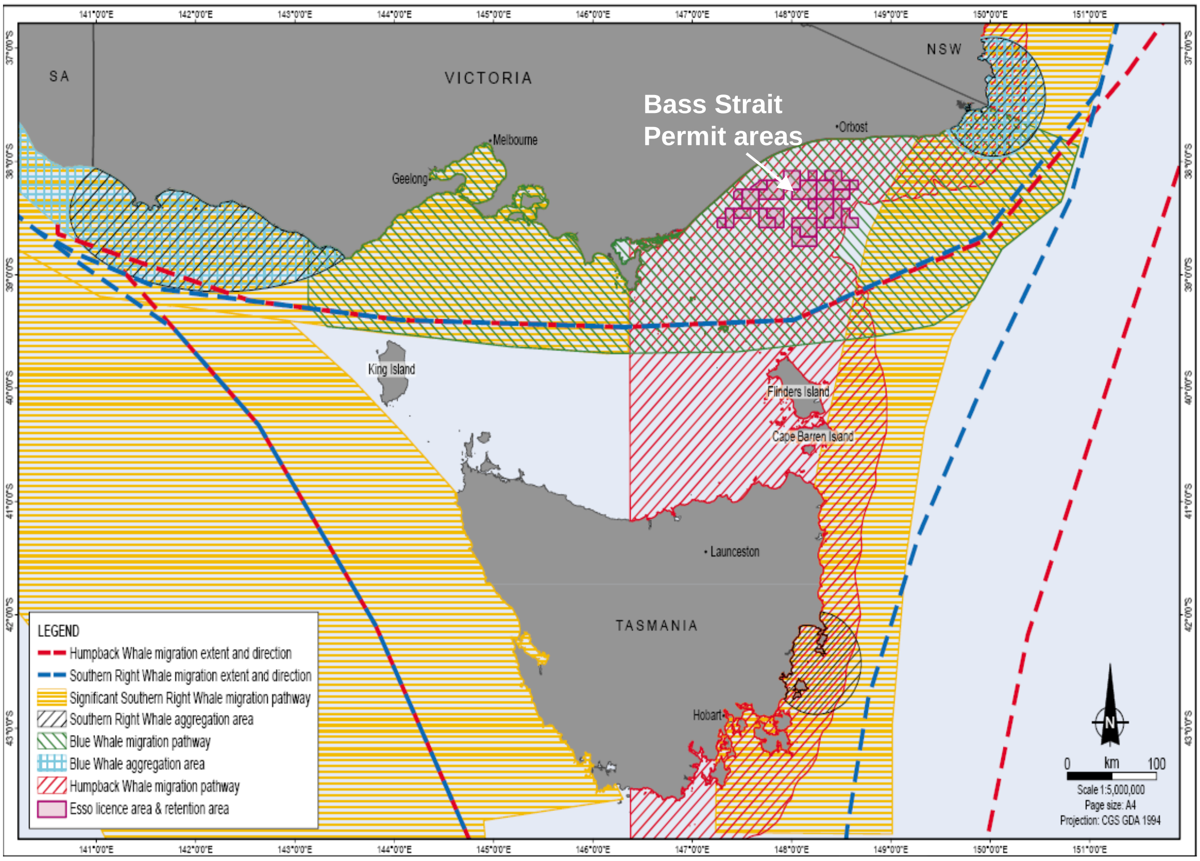


Figure 2-28 Whale migration pathways and aggregation around the Bass Strait petroleum permit areas

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).

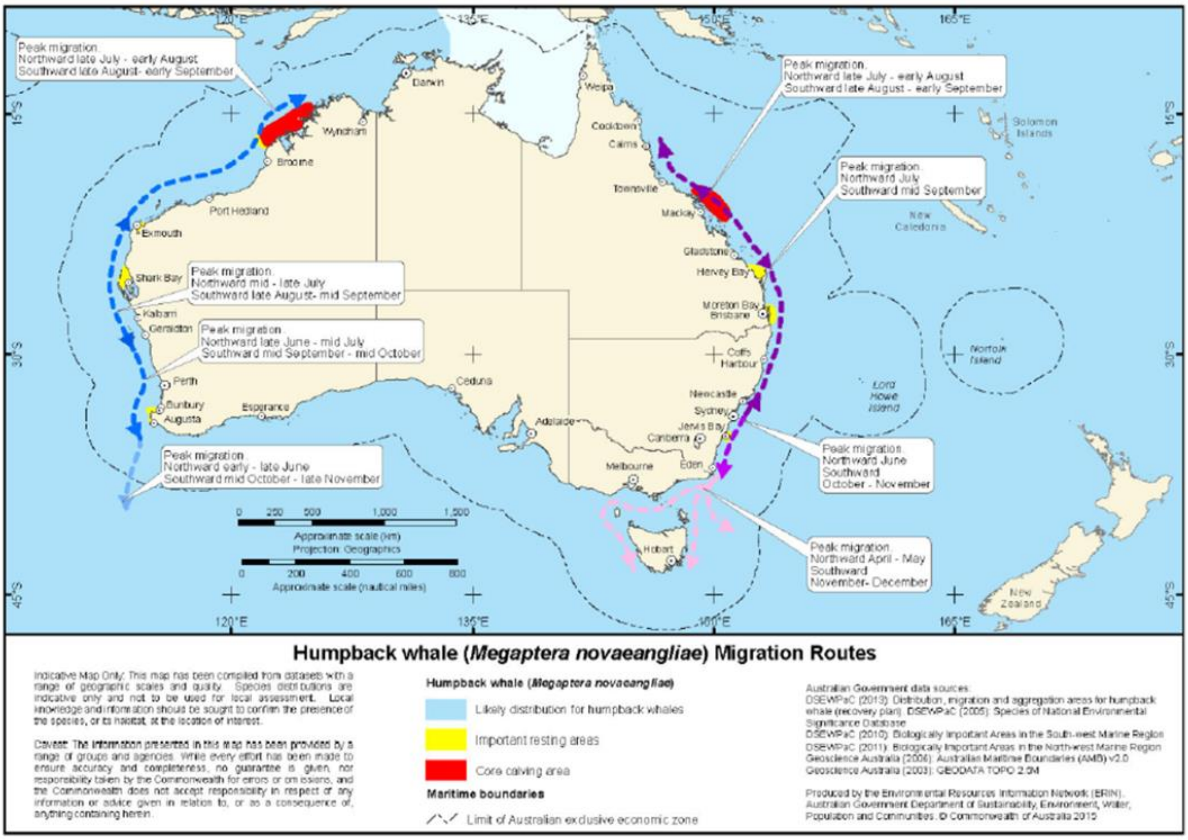


Figure 2-29 Migration routes for Humpback Whales around Australia (TSSC, 2015c)

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).

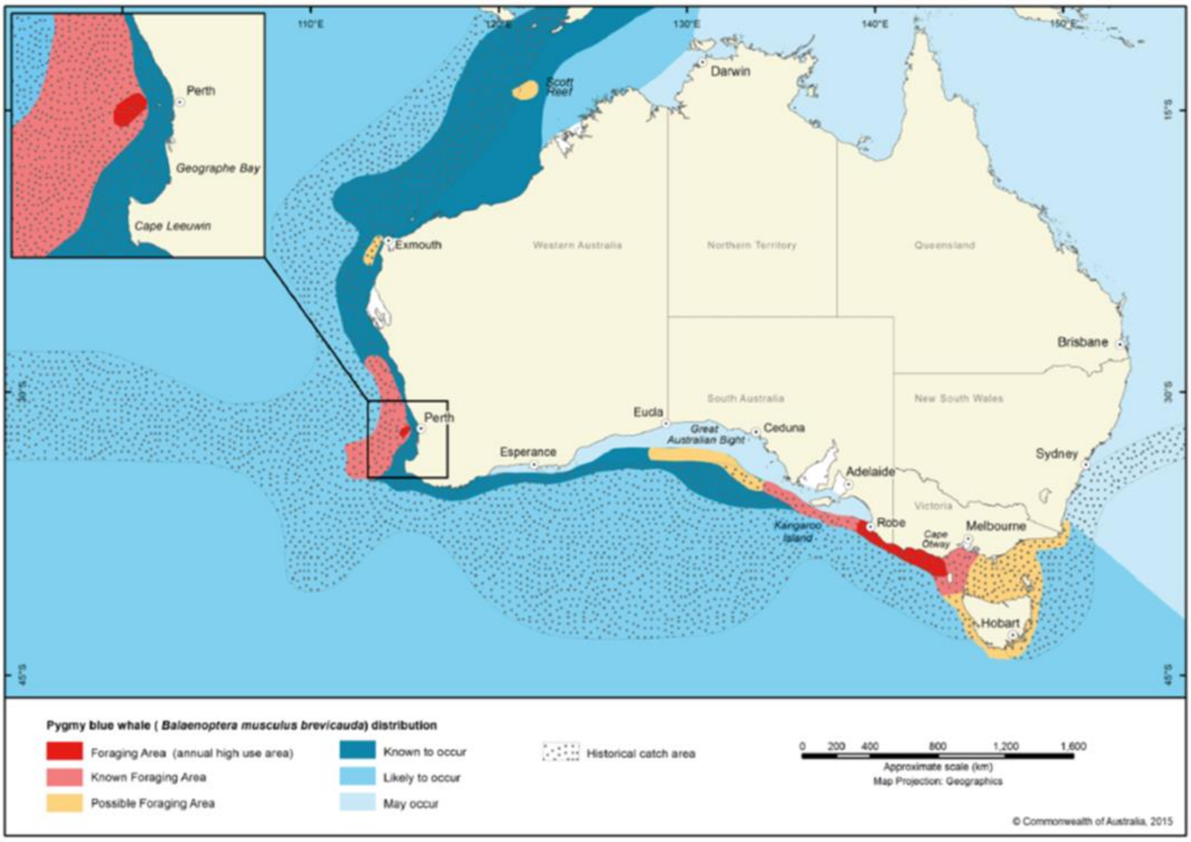
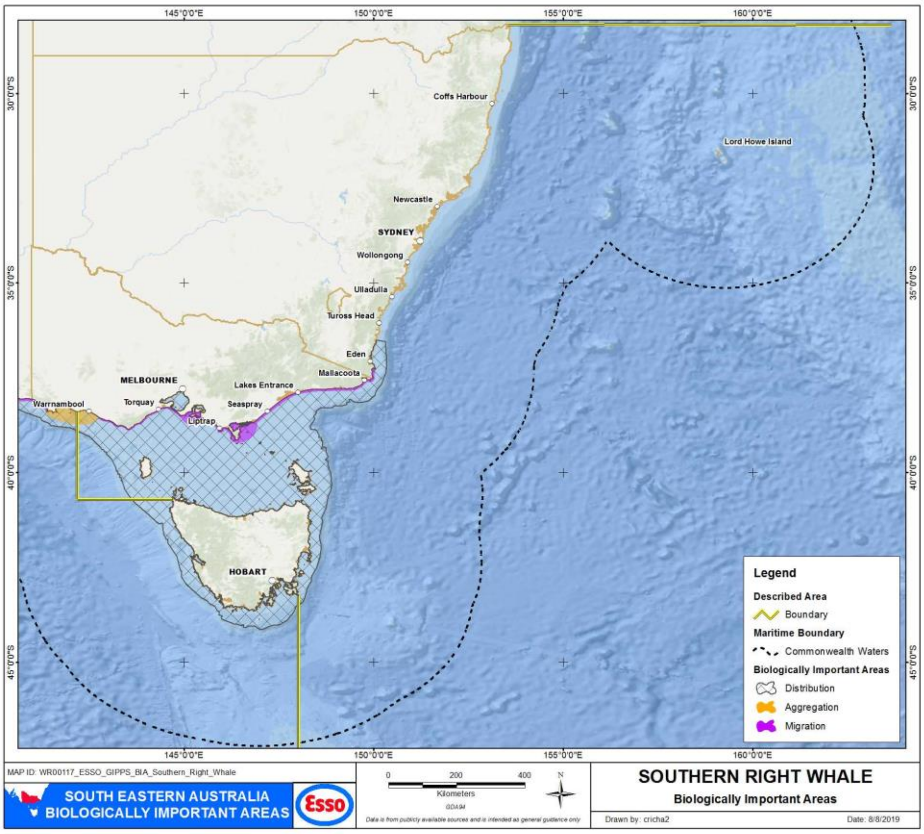


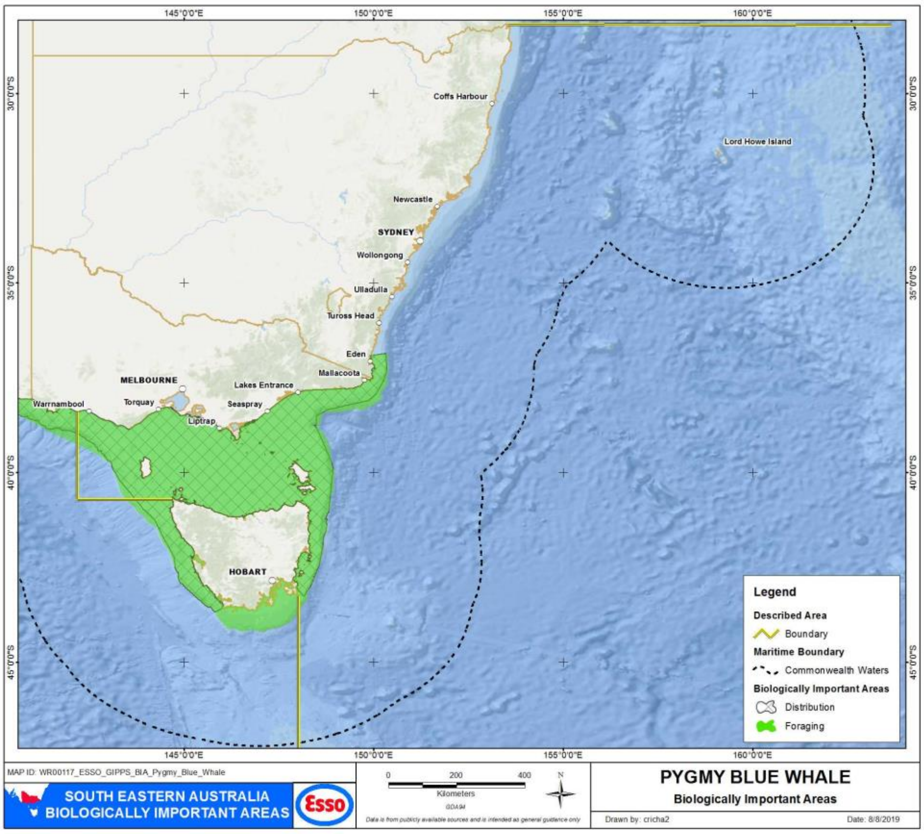
Figure 2-30 Distribution and foraging areas for the Pygmy Blue Whale (DoE, 2015d)

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). Sei 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
Newcastle
SYDNEY
Wollongong
Ulladulla
Tuross Head
Eden
Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Distribution
Aggregation
Migration
MAP ID: WR00117_ESSO_GIPPS_BIA_Southern_Right_Whale
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
SOUTHERN RIGHT WHALE
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019


Coffs Harbour
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Mallacoota
MELBOURNE
Lakes Entrance
Warrnambool
Torquay
Seaspray
Liptrap
HOBART
Legend
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Distribution
Foraging
MAP ID: WR00117_ESSO_GIPPS_BIA_Pygmy_Blue_Whale
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
PYGMY BLUE WHALE
Biologically Important Areas
Drawn by: cricha2
Date: 8/8/2019

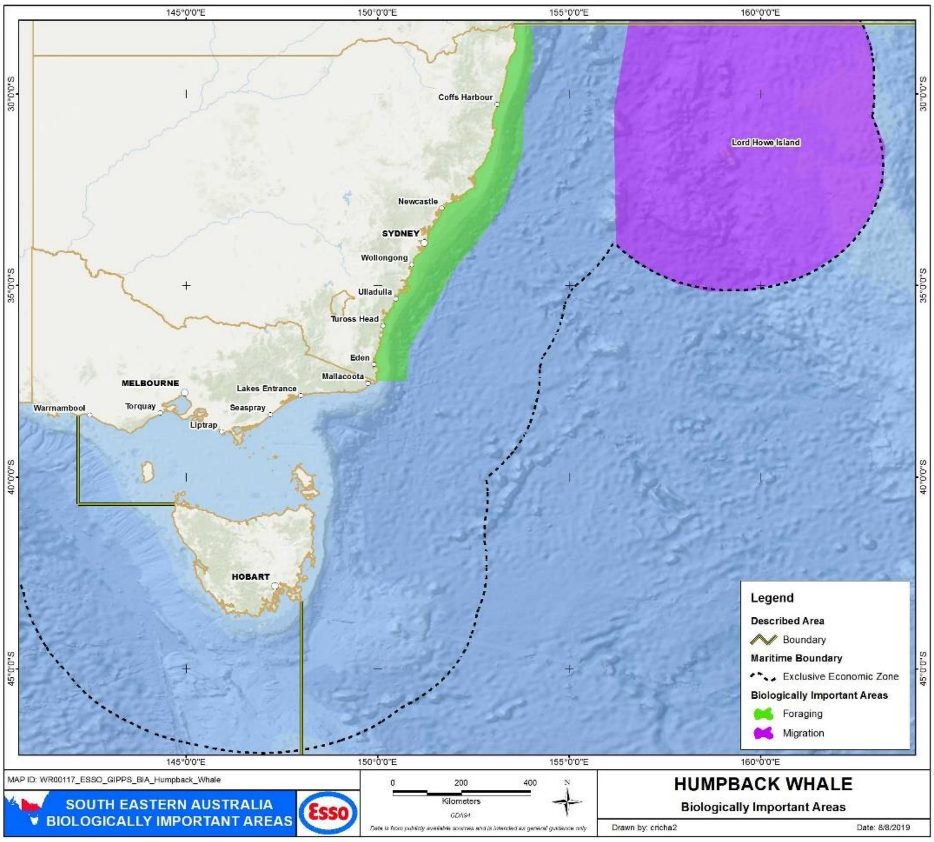

Figure 2-31 Biologically Important Areas for whale species

Dolphins

All dolphins are a protected species in Australian waters. None that are listed as occurring in the DA are listed as vulnerable, endangered or critically endangered. They are found in a variety of marine habitats, from the open ocean to coastal bays and inlets. Dolphins are migratory animals and their habits vary. Species that live in coastal areas are less likely to travel compared to species that live in open water.

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 Phillip Bay (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). Of the same genus as the Dusky dolphins are the Hourglass dolphins which may occur in the area. These are circumpolar in pelagic waters of the Subantarctic and Antarctic zones. Little information is know about species feeding or breeding habitats (DoEE, 2019am).

There are a number of pelagic dolphins that may occur in the DA. The population size of these species is not known however none are considered to be rare. No specific conservation or listing advice exists 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 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).

Fraser’s Dolphin is another pelagic or oceaic dolphin which in Australia is found north of 300 S and in waters deeper than 1000 m. Increasing ocean temperatures predicted by climate change scenarios could potentially increase the extent of occurrence of Fraser's Dolphin, with warmer water extending southwards along both coasts. Fraser's Dolphin feeds on mesopelagic fish, squid and crustaceans. It is a stocky dolphin with a short beak and thick tail stock. Distribution information on this species in Australia is derived from beach casts and is thought to be potentially abundant, however it is not well surveyed (DoEE, 2019as).

Australian Snubfin Dolphins are characterised by a broadly rounded head and no beak, with a straight mouth line. All available data on the distribution and habitat preferences of Australian Snubfin Dolphins indicate that they mainly occur in one location: shallow coastal and estuarine waters of Queensland, Northern Territory and north Western Australia. Feeding may occur in a variety of habitats, from mangroves to sandy bottom estuaries and embayments, to rock and/or coral reefs, primarily in waters less than 20m depth. A study of a polulation in Cleveland Bay, north Queensland showed that the species spends most of its time foraging and travelling and little time socialising. This population only spent approximately 30 days in the year in this one location, following a pattern of emigration and reimigration, suggesting that the territories or ranges for this species is large (DoEE, 2019aq).

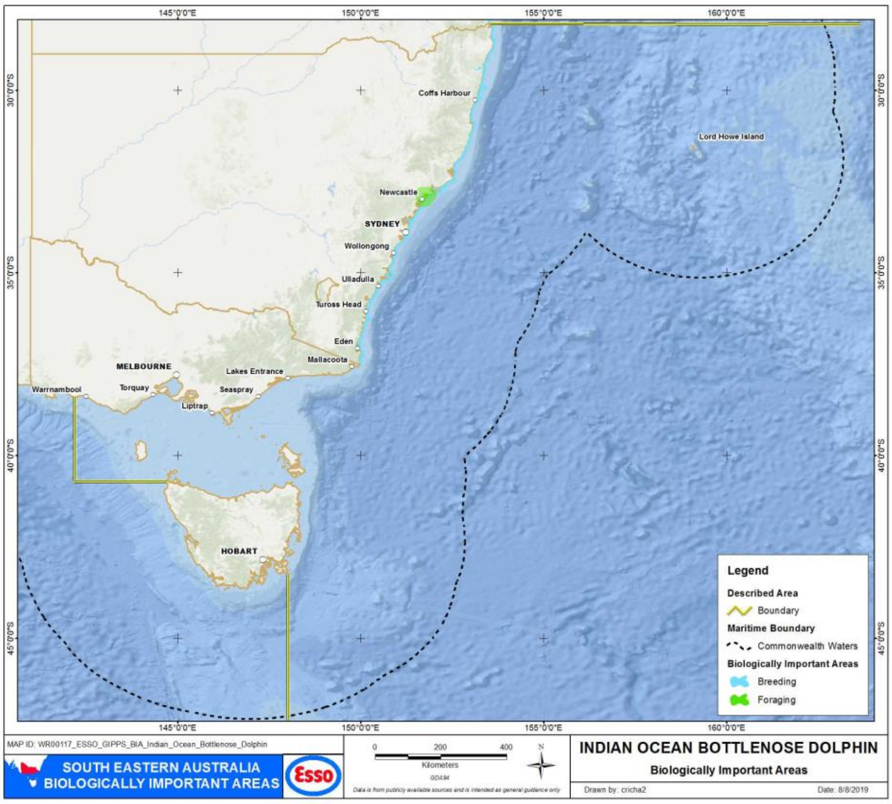

Figure 2-32 Biologically Important Areas for Indian Ocean Bottlenose Dolphin

Table 2-35 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	Sei 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
Globicephala melas	Long-finned Pilot Whale					MO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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
Lagenodelphis hosei	Fraser's Dolphin, Sarawak Dolphin					MO
Lagenorhynchus cruciger	Hourglass Dolphin					MO
Lissodelphiss peronii	Southern Right Whale Dolphin					MO
Orcaella brevirostris	Australian Snubfin Dolphin (formerly Irrawaddy Dolphin)		✓			LO
Orcinus orca	Killer Whale		✓			LO
Peponocephala electra	Melon-headed Whale					MO
Pseudorca crassidens	False Killer Whale					MO
Sousa chinensis	Indo-Pacific Humpback Dolphin		✓			LO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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				bc	LO
Tursiops truncatus s. str.	Bottlenose Dolphin					MO
Porpoise						
Phocoena dioptrica	Spectacled Porpoise		✓			MO
<u>Threatened Species</u>: *V Vulnerable* *E Endangered* *<u>Biologically Important Areas</u>:* *bc Breeding, calving* *f Foraging* *m Migration*	*<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* *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 2-36 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

2.3.1.7 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 2-37) (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 2-37 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 Important Areas:*	*Type of Presence:* *MO* *Species or species habitat may occur within the area* *BKO* *Breeding known to occur within the area* *KO* *Species or species habitat known to occur within the area*					

Table 2-38 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

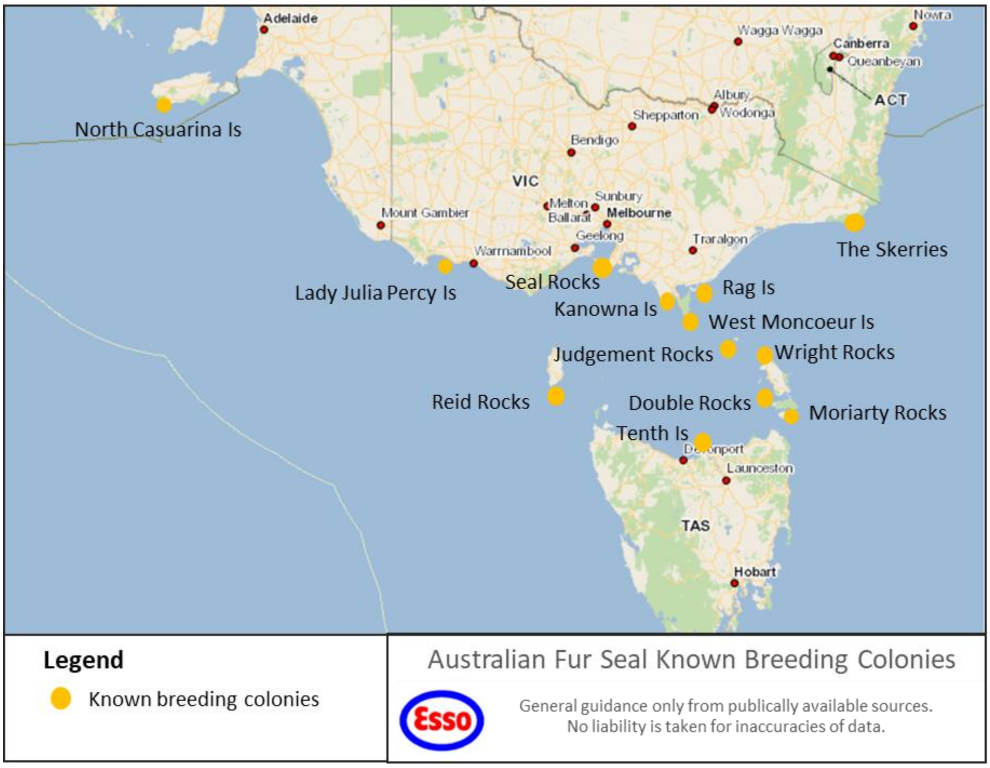

Figure 2-33 Known breeding colonies for the Australian Fur-seal (PINP, 2019)

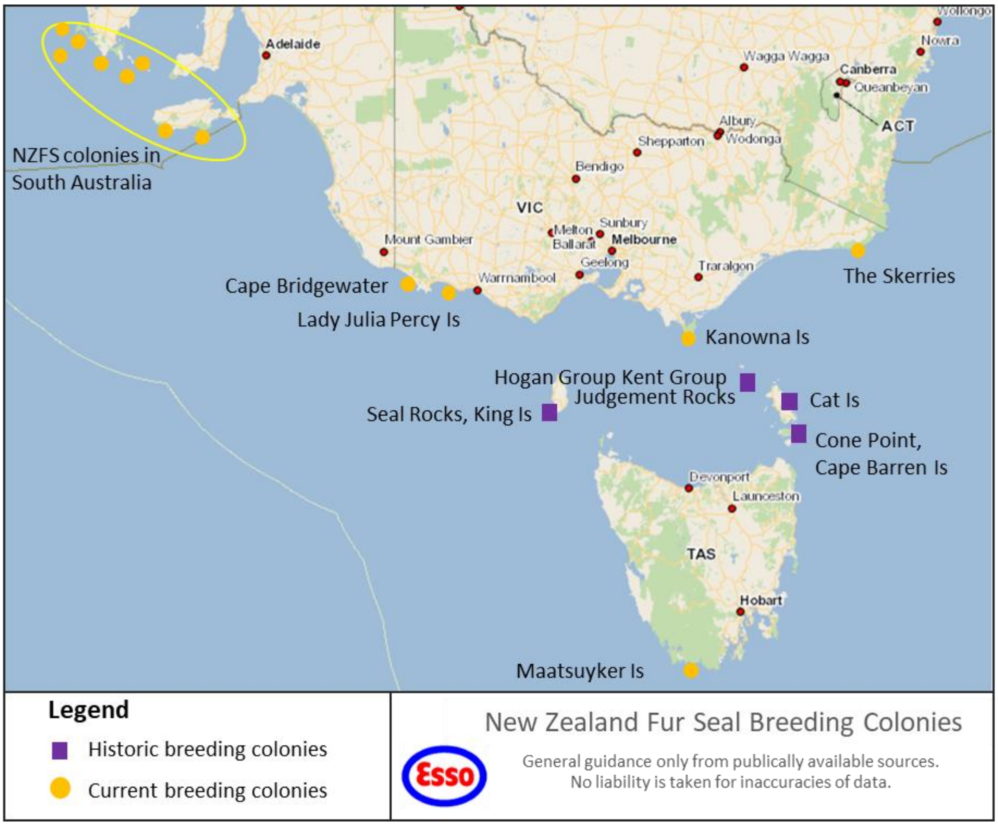

Figure 2-34 Historic (square icon) and current (circle icon) breeding colonies for the New Zealand Fur-seal (K*irkwood et al., 2009)*

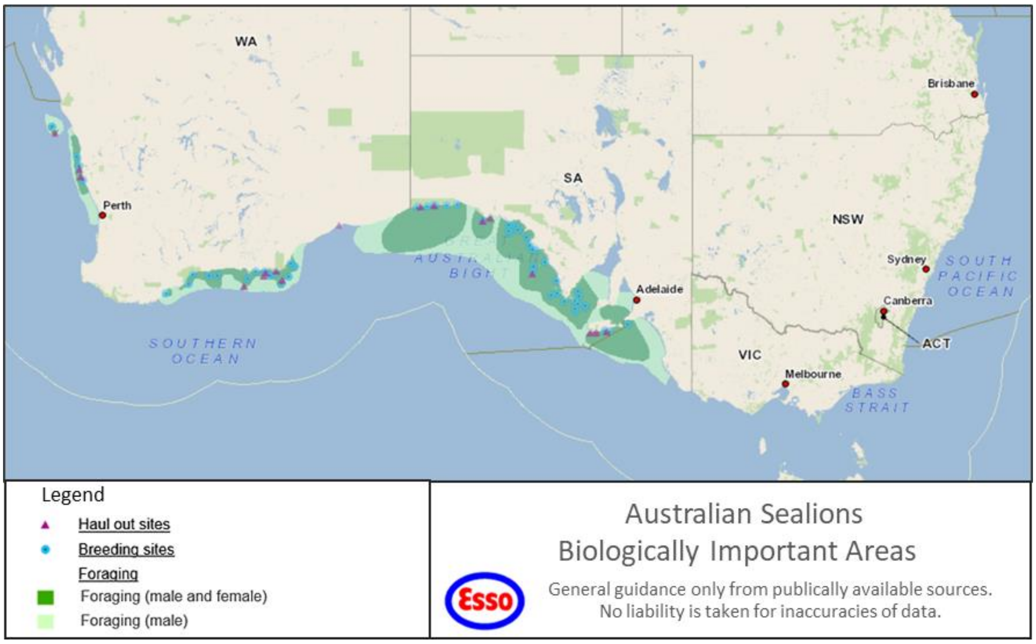

Figure 2-35 Biologically important areas for Australian Sealion (NCVA, 2019)

2.3.1.8 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 2-39) (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 2-39 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
<u>Threatened Species</u>: *<u>Biologically Important Areas</u>:*	*<u>Type of Presence</u>:* *MO Species or species habitat may occur within the area*					

2.3.1.9 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 six marine turtle species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (Table 2-40) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). A list of the conservation advice and/or recovery plans, with relevant management actions, is shown in Table 2-41. 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).

The Olive Ridley Turtle is the smallest of Australian sea turtles. Low density nesting of the Olive Ridley turtle occurs inin the northern parts of Australia including Arnhem Land coast and north-western Cape York Pennsula. Important foraging areas include the Great Barrier Reef but other shallow foraging habitats extend to south-east Queensland; most individuals have been captured by trawlers in the East Coast Otter Trawl fishery in Queensland. The EPBC database lists the species as likely to breed in the area of the DA, the Olive Ridley turtle has been identified as a conservation value in the North and North-west bioregional plans only and the literature suggests that only foraging may occur within the DA (DoEE, 2019ao).

Table 2-40 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
Lepidochelys olivacea	Olive Ridley Rurtle	V	✓	✓		BLO
Natator depressus	Flatback Turtle	V	✓	✓		FKO

Threatened Species:	*Type of Presence*:
V *Vulnerable* *E* *Endangered*	*FKO* *Foraging, feeding or related behaviour known to occur within the area* *BLO* *Breeding likely to occur within the area*

Table 2-41 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
Olive Ridley Turtle		
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

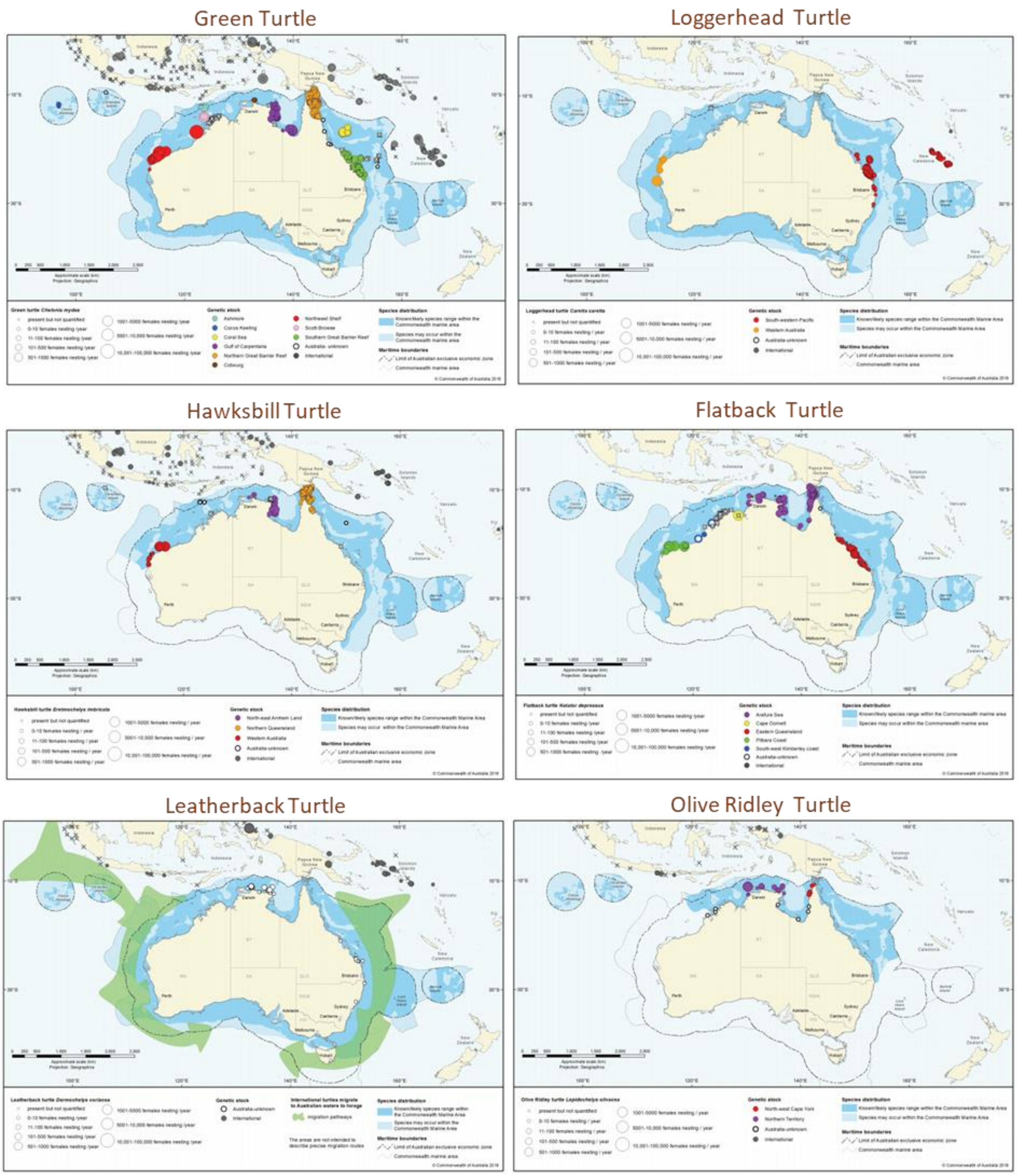

Figure 2-36 Marine turtle species distribution and nesting sites

2.3.1.10 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.

The Stokes' Seasnake inhabits the tropical seas of northern Australia, including Western Australia, the Northern Territory and Queensland. It occurs in the Great Barrier Reef Marine Park and in the Commonwealth Reserve of Ashmore Reef in Western Australia. It is amongst the largest and bulkiest of seasnakes reaching 2 metres in length and 26cm in girth. The Stokes' Seasnake is a strong swimmer and forages for slow-moving fish in holes and crevices on the sea floor, muddy substrates and in reefs. In Australia, the Stokes' Seasnake moves southward into more temperate latitudes of Queensland and Western Australia during summer and therefore may approach the DA in this season (DoEE, 2019ar).

Table 2-42 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
Astrotia stokesii	Stokes' Seasnake			✓		MO
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). 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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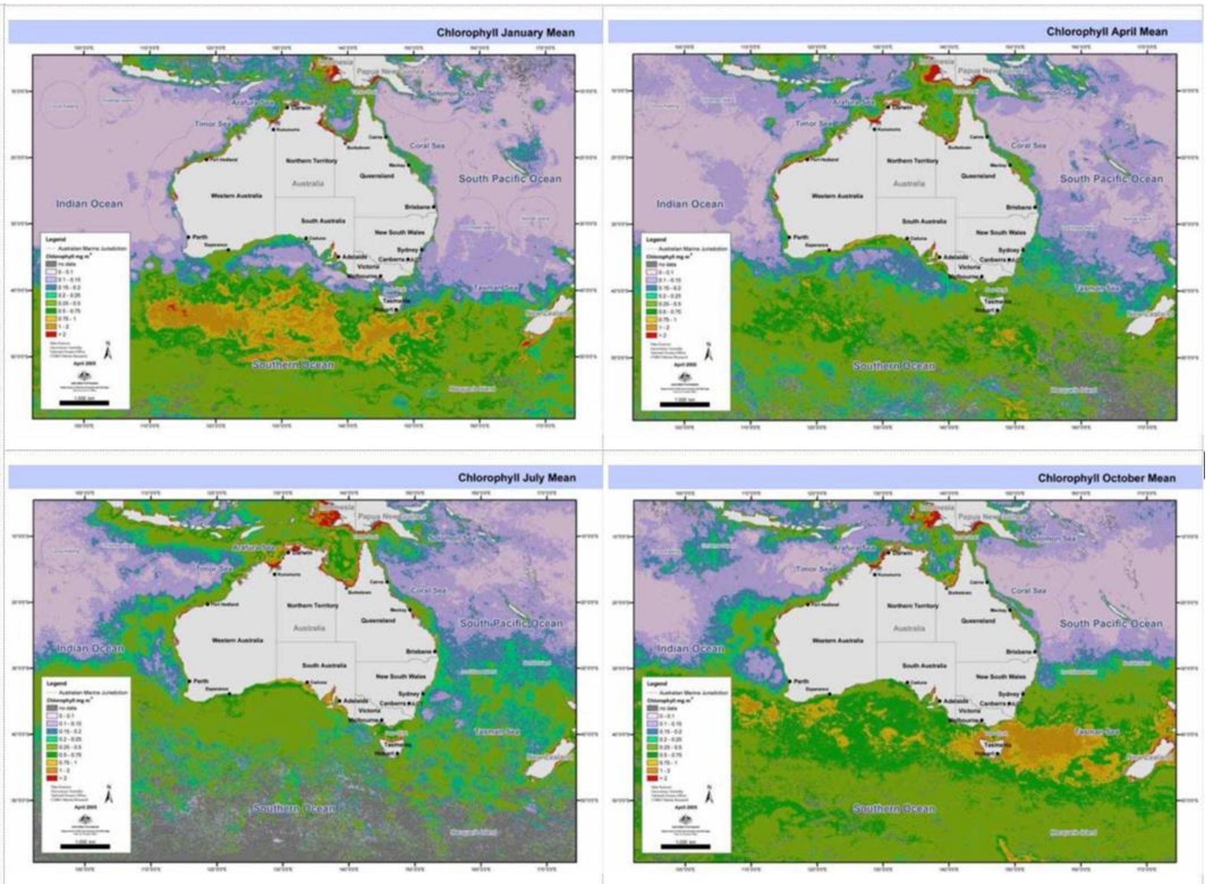


Figure 2-37 Seasonal phytoplankton growth from MODIS ocean colour composites (McClatchie et al. 2006)

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). A study of the seascape of the south-eastern Australian continental shelf conducted in 2001 found that 89% of the seabed was sediment flats/bare substrate with prominent hard-grounds making up the remaining 11% of the seabed (CSIRO, 2001).

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].

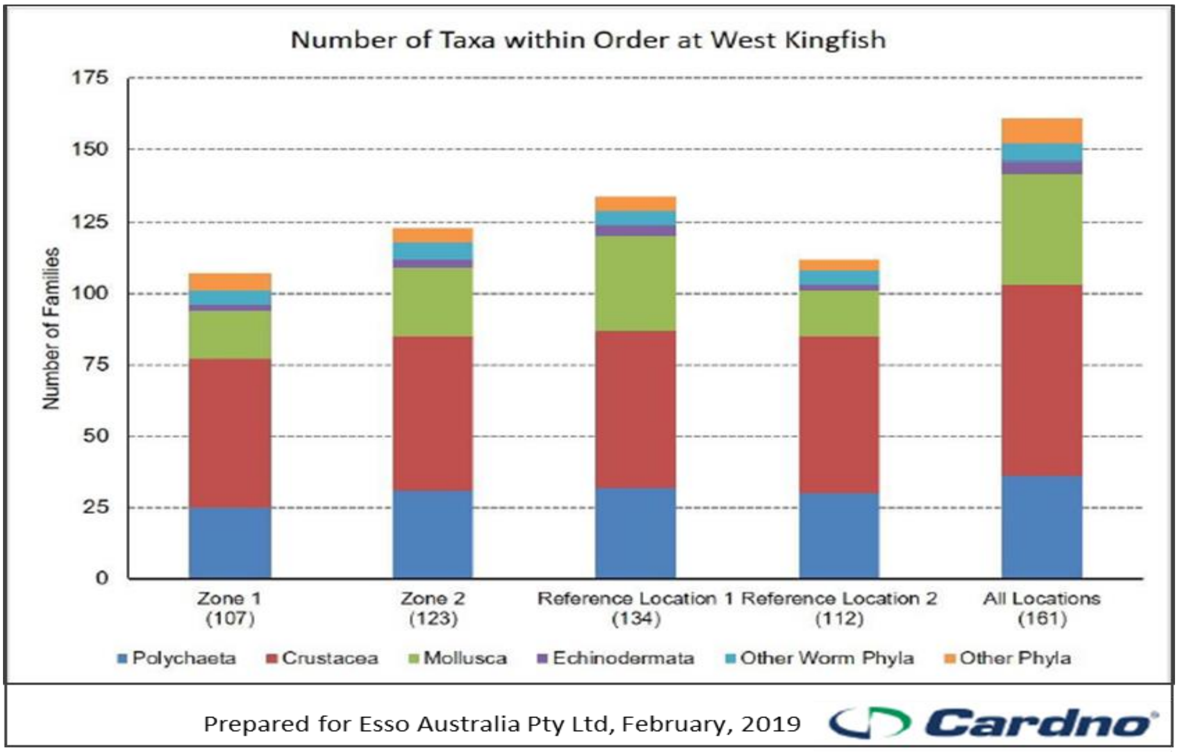


Figure 2-38 Number of taxa sampled at West Kingfish platform (Zones 1 and 2) and reference locations (Locations 1 and 2). Values in parentheses indicate the total number of taxa sampled.

[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

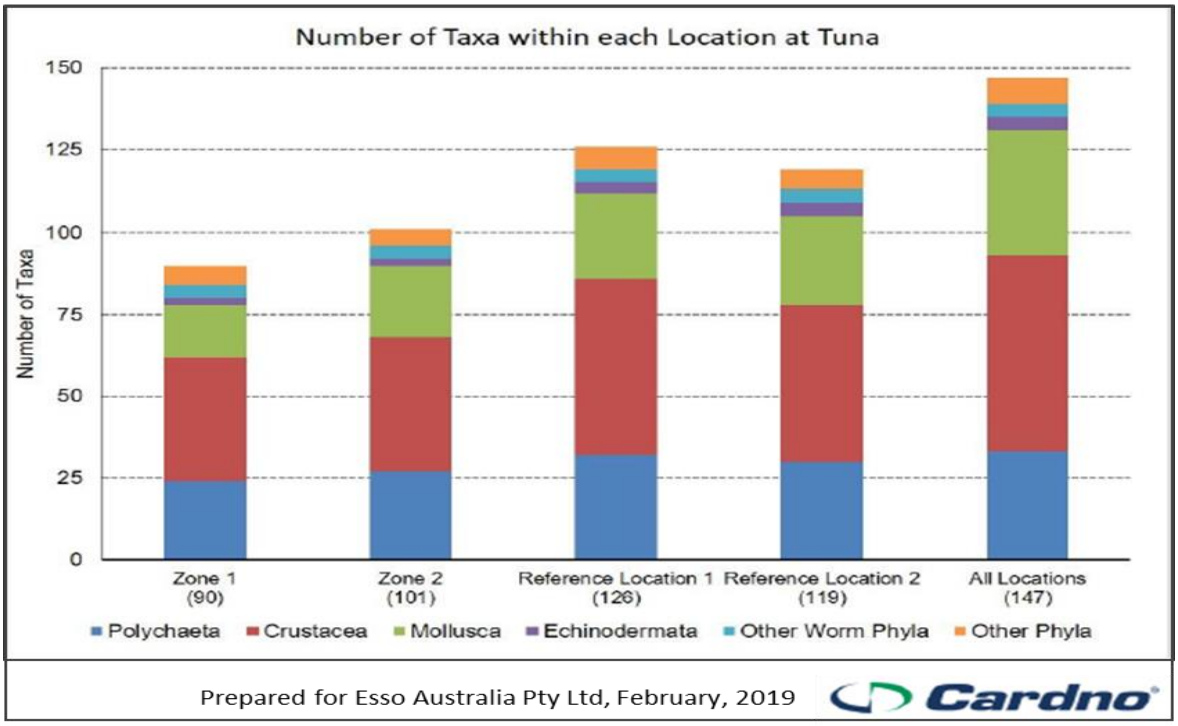


Figure 2-39 Number of taxa sampled at Tuna platform (Zones 1 and 2) and reference locations (Locations 1 and 2). Values in parentheses indicate the total number of taxa sampled.

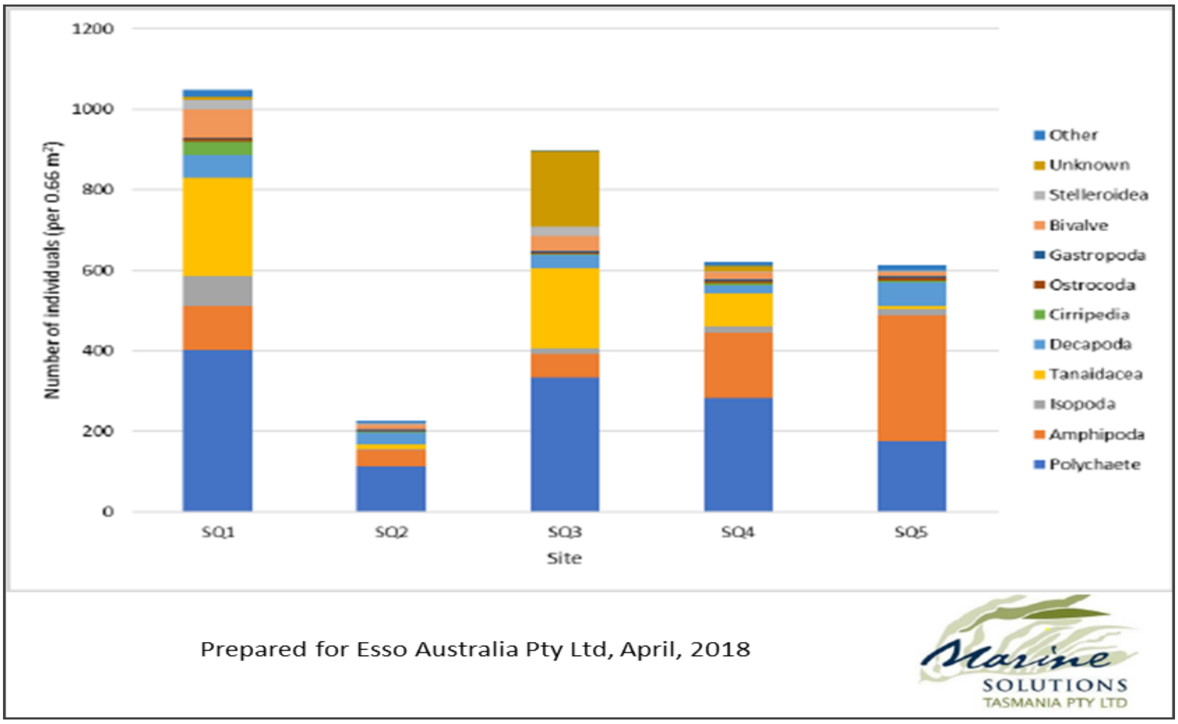


Figure 2-40 Taxa classed abundance of infauna at West Barracouta monitoring

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.

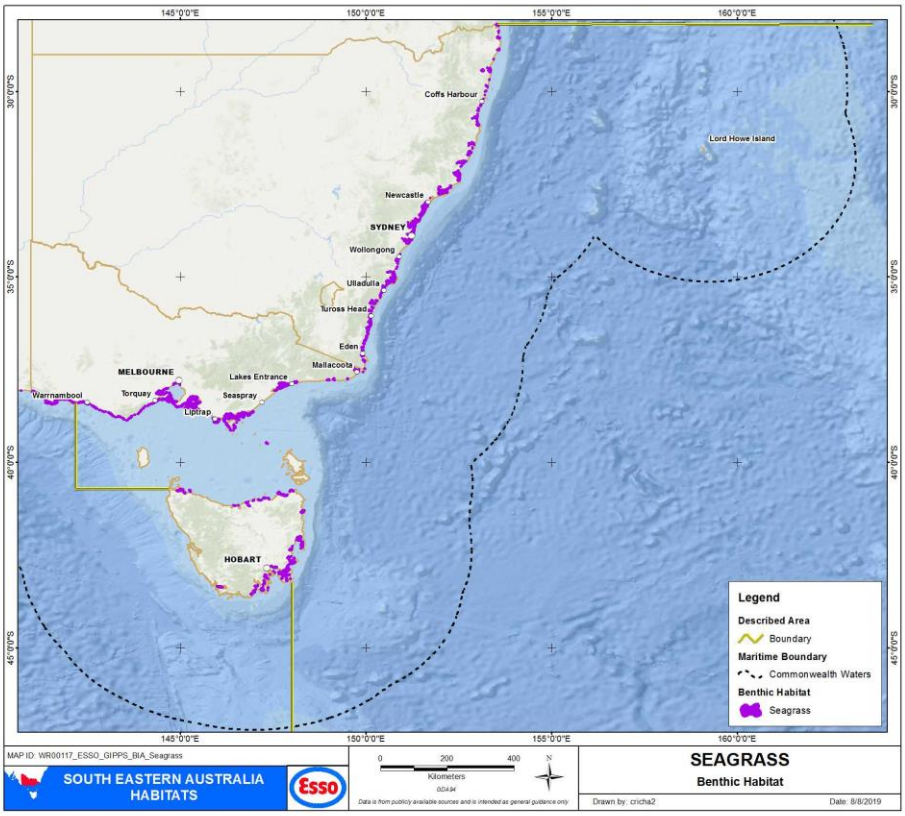


Figure 2-41 Seagrass dominated nearshore habitat within the DA

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. Subtidal rocky reefs are scattered along the Gippsland shore and make up approximately 11% of the south-eastern Australian shelf (CSIRO, 2001).

This habitat consists of subtidal substrates composed primarily of limestone reefs and outcrops of sandstone and granite. The composition and characteristics of the substrate varies across the region based on its geologic origin and history. Fossiliferous limestone, as the name suggests, is composed of skeletons of dead animals, such as bivalve and bryozoan clasts. The skeletal elements are cemented together by a fine-grained calcareous matrix formed by a slow rate of sedimentation suggesting that the process is continuing to (slowly) occur on the Gippsland basin continental shelf (CSIRO, 2001). Known locations of this type of substrata are Howe Reef, Gabo Reef and Broken Reef.

Limestones usually form in large, tabular slabs of low relief (<2 m) as is the case in Broken Reef, however they can also form as low-lying hard grounds that are bored and encrusted by benthic organisms. These are likely to form ‘patches’ or mosaics of hard substratum that show little (<20 cm) or no vertical relief. An example of this is the low relief limestone South-east Reef which occurs in the vicinity of the VIC/L5 licence area.

Another form of the hard substrate is the coarse-grained, quartz rich sandstone. In Gippsland, sandstone, together with fossiliferous sandstone, occurs as elongate, low relief slabs which crop out from soft sediments along the Gippsland coastline. Whilst not confirmed this type of sandstone is also likely to be a common constituent of banks or reefs further offshore.

On the inner shelf of the Gippsland coastline are relatively localized, higher relief (>10m) outcrops formed of distinctive irregular, hexagonally jointed, coarsely crystalline granite, or hard reefs. Point Hicks and New Zealand Star Banks are areas of granite reef. Figure 2 42 shows high level substrata distribution in south-east Australia (CSIRO, 2001).

Rocky reef habitats can support rich, diverse communities of attached epifauna (e.g., stalked chrinoids, sponges, ascidians etc.) and associated algae and other fauna. Structures with a higher relief (reef or bank) several metres high can provide protection and food and attract a diversity of fish and invertebrate species (NOAA 2010).

The substrata is only one factor which influences the presence of biological communities. The distribution of fish and invertebrate communities is also correlated with latitude, depth, temperature and hydrology. Areas where the overlap of temperate and subtropical currents coincide will have a different distribution of communities to places like Horseshoe Canyon where upwelling occurs.

Other known areas of subtidal rocky reef include ; Bastion Point, Quarry Beach, Little Rame Head, Long Reef, Wingan Point, The Skerries Special Management Area, Rame Head, Petrel Point, Thurra River, Pearl Point, Yeerung River Estuary (Intermittently open), Cape Conran (East Cape, Cowrie Bay, Flat Rocks), Point Ricardo and Ricardo Beach.

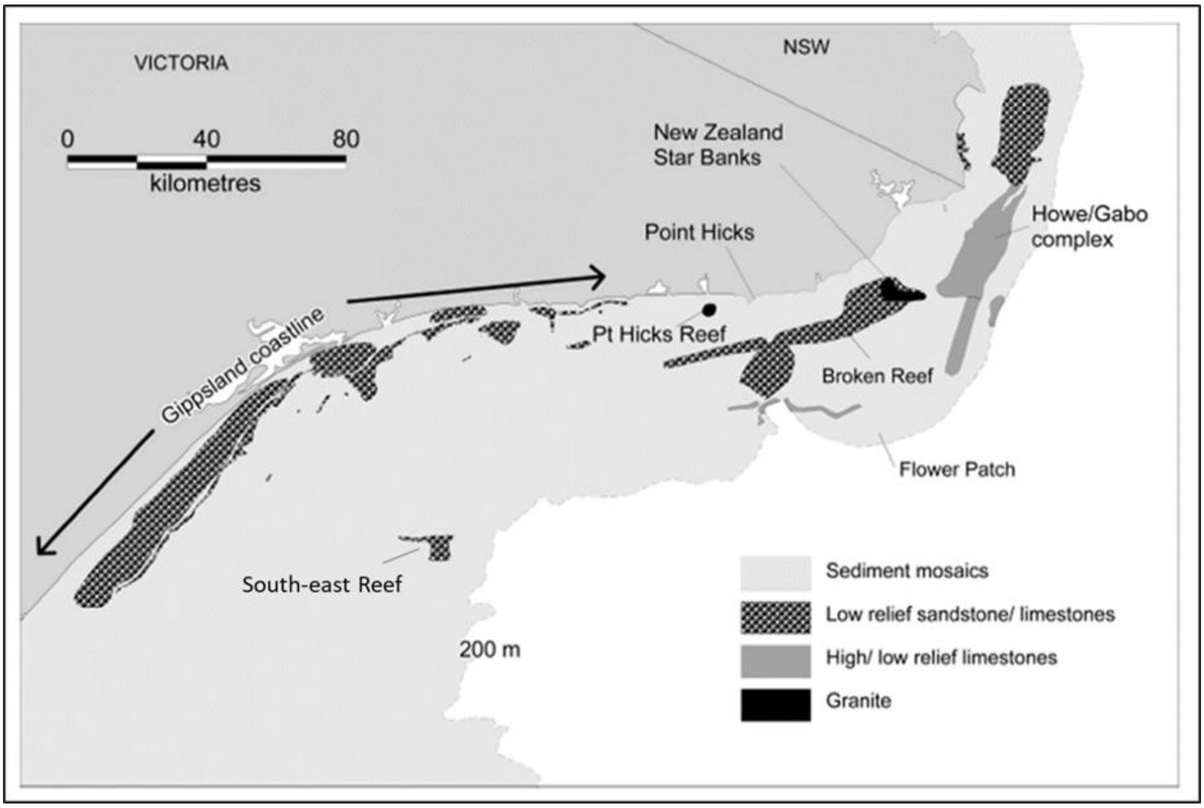


Figure 2-42 Substrata on the south-eastern Australian continental shelf

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 2-43) (Lucieer et al., 2017).

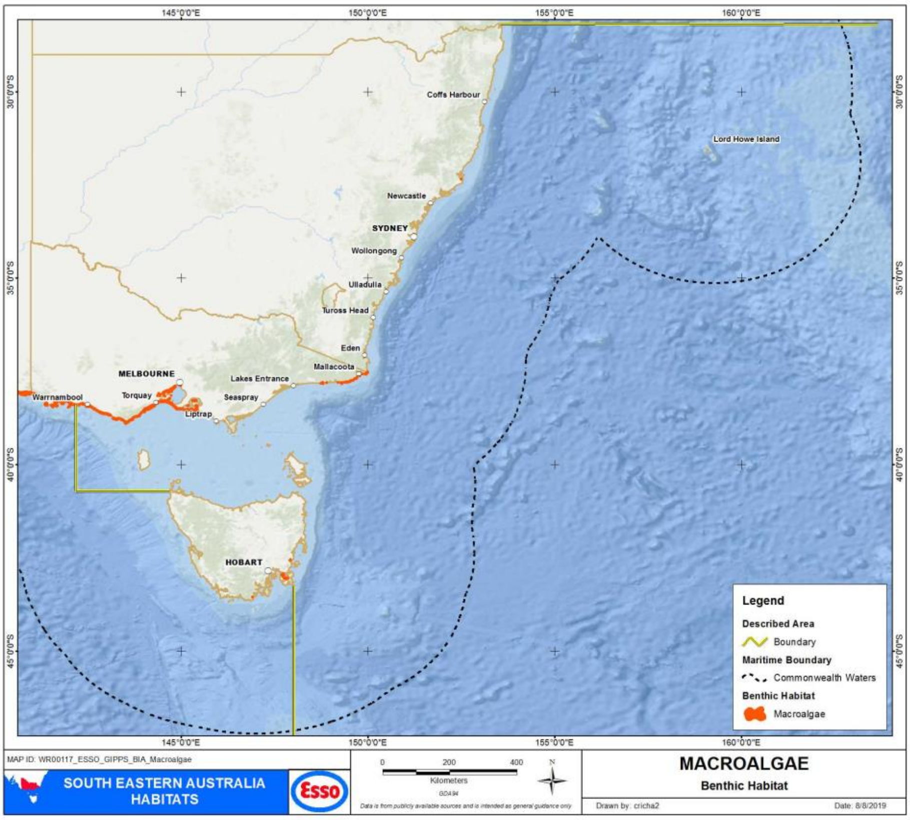


Figure 2-43 Macroalgae dominated nearshore habitat within the DA

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

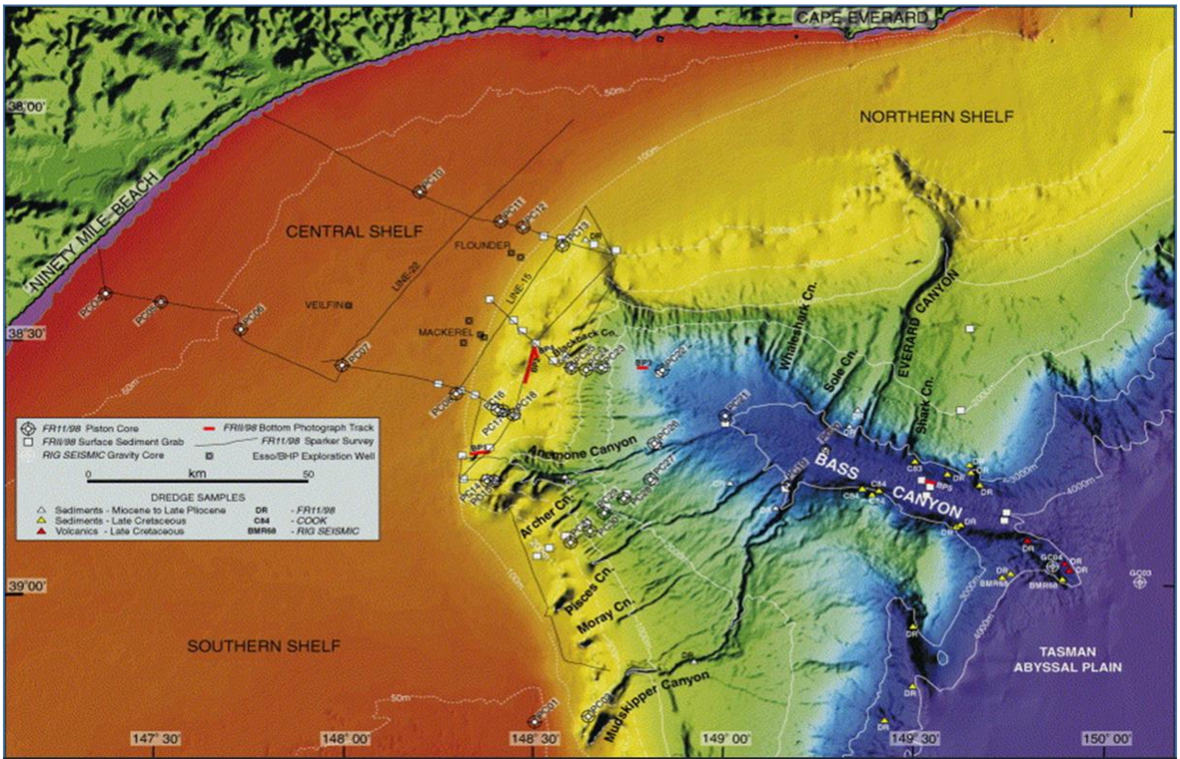
Submarine canyons are abundant features along continental and oceanic island margins that connect continental shelves to deep ocean basins. Because of the physical complexity of canyon habitats, predictions concerning the effects of canyons on diversity are not straightforward since a variety environmental 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 2-44) (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).



Bass Canyon Bathymetry

General guidance only from publically available sources. No liability is taken for inaccuracies in data.

Figure 2-44 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 2-45 (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.

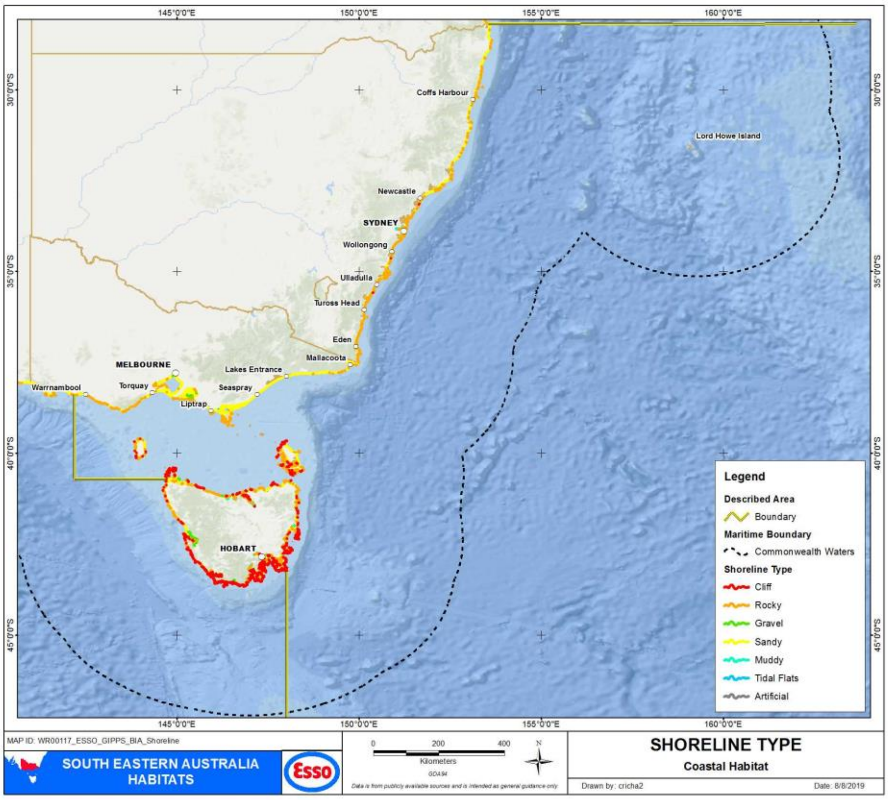


Figure 2-45 Shoreline types within the DA

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 2-45).

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 2-46) (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).

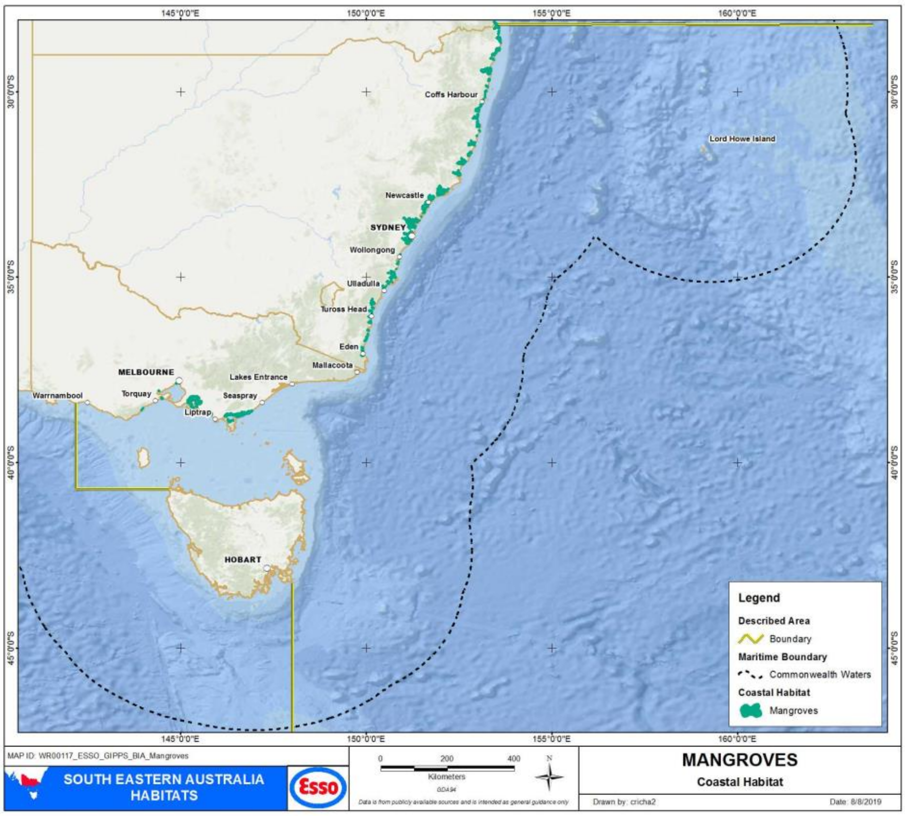


Figure 2-46 Distribution of Mangroves within DA

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 2-47), 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).

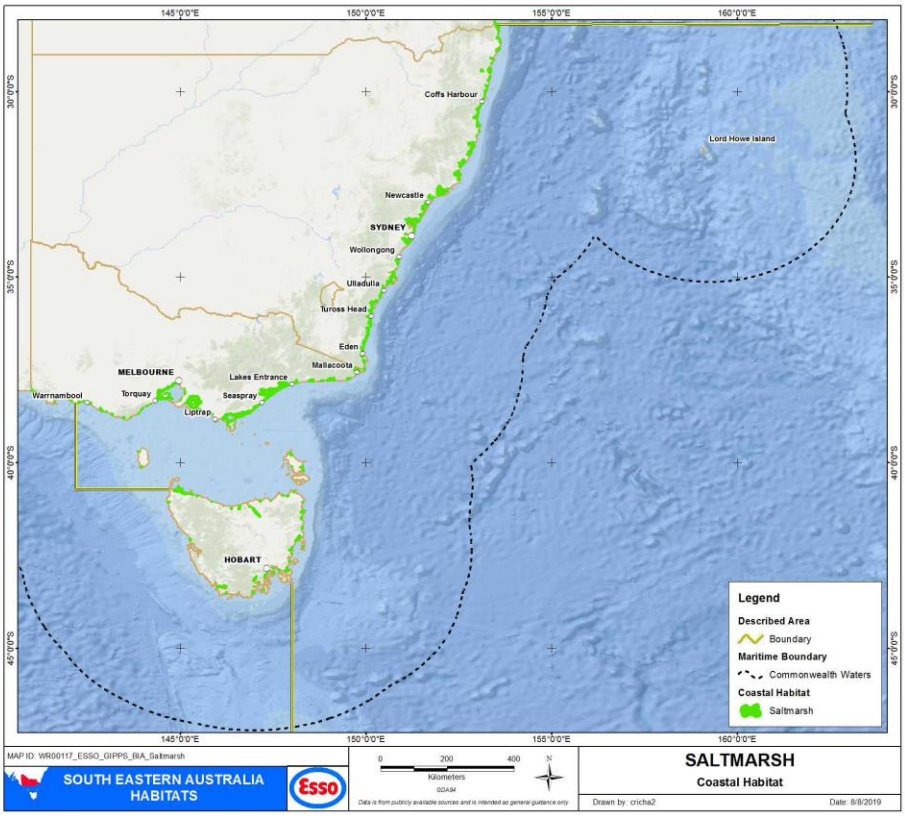


Figure 2-47 Saltmarsh dominated nearshore habitat within the DA

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 2-48).

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.

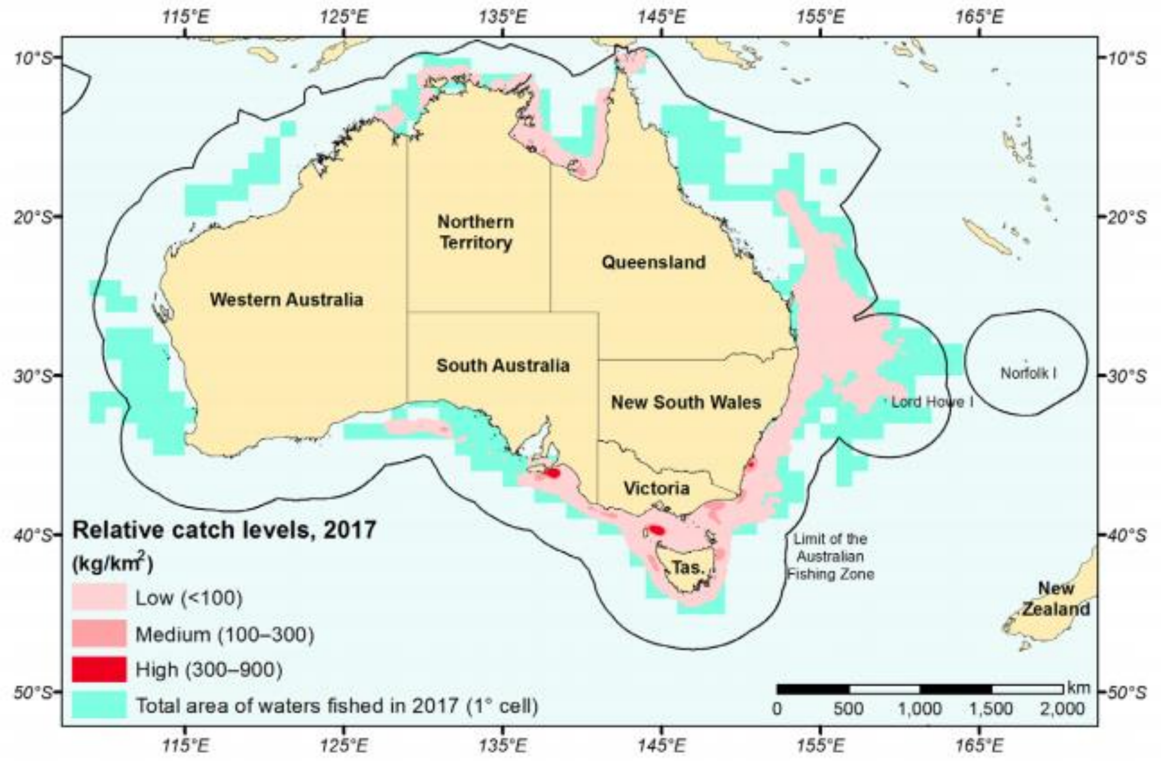


Figure 2-48 Relative catch levels of Commonwealth-managed fisheries, 2017 (ABARES, 2018)

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 2-49) (Patterson et al., 2018).

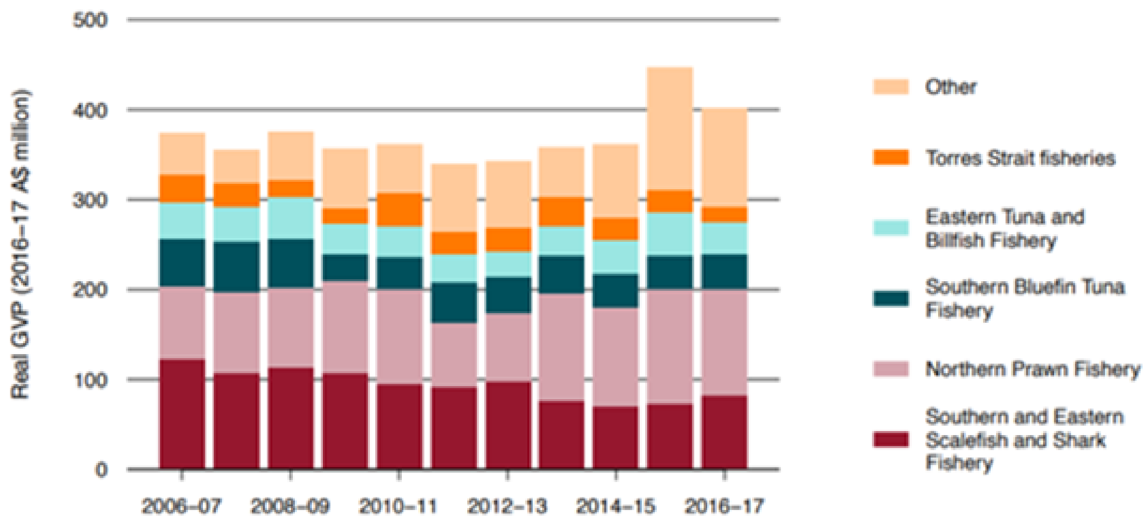


Figure 2-49 Gross Value of Production of Commonwealth Fisheries for 2016-2017 (Patterson et al., 2018).

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

2.4.1.3 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 2-50 shows the jurisdictional allocation of the Bass Strait scallop fisheries. Refer to Section 2.4.1.9, Table 2-43 for information on the Victorian and Tasmanian scallop fisheries.

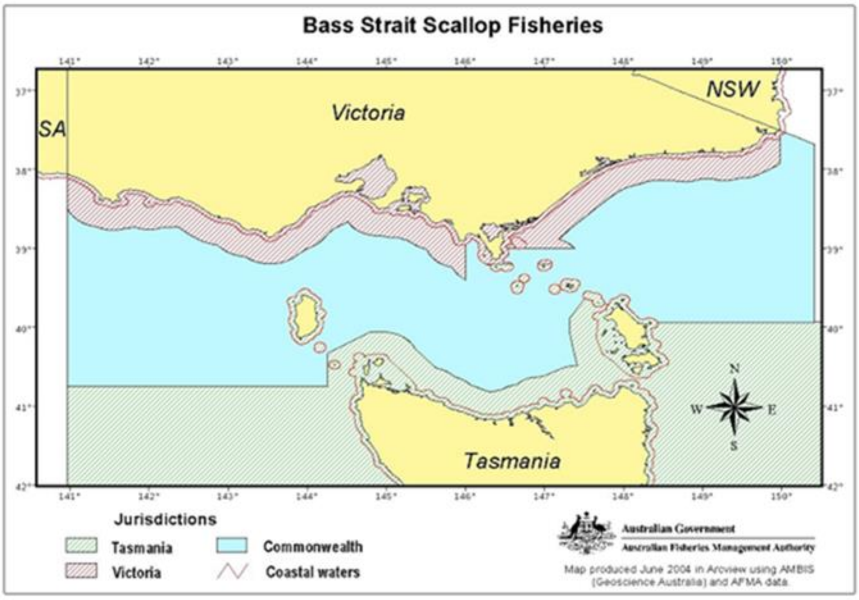


Figure 2-50 Bass Strait Scallop Fisheries (VFA, 2019)

The Bass Strait Central Zone Scallop Fishery operates in Commonwealth waters between Victoria and Tasmania (Figure 2-51). 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 2-51). 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).

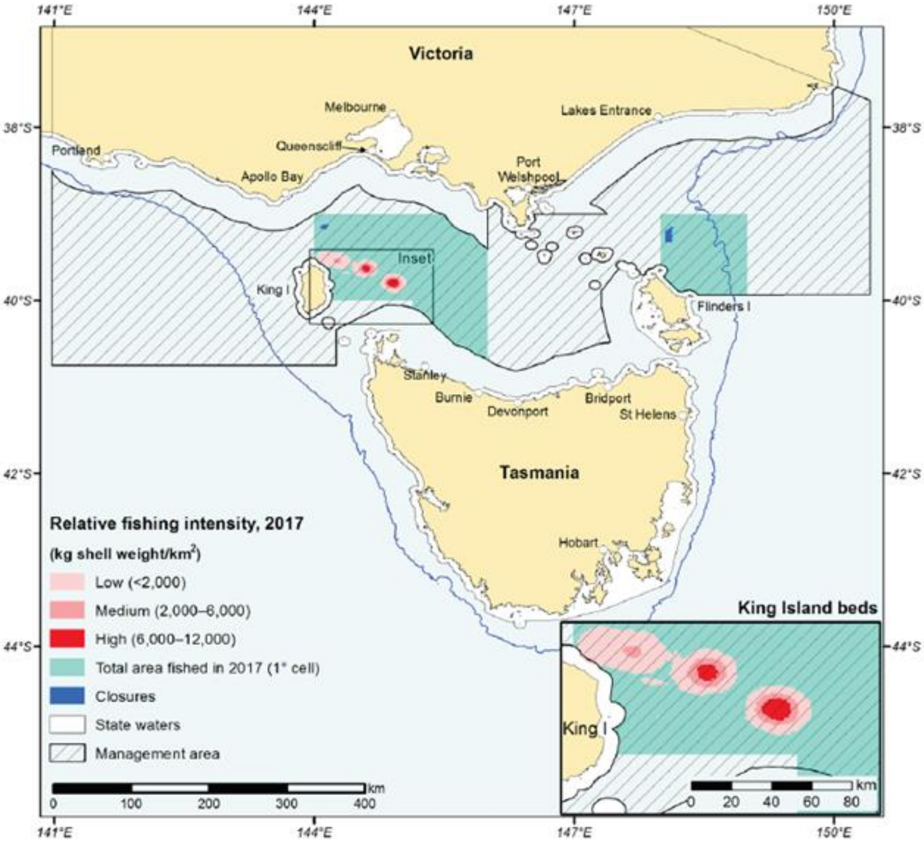


Figure 2-51 Bass Strait Central Zone Scallop Fishery Management Area and 2017 Relative Fishing Intensity (Patterson et al., 2018).

2.4.1.4 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 2-52 Eastern Tuna and Billfish Fishery Management Area and 2017 Relative Fishing Intensity (Patterson et al., 2018).

). 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 2-52). 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).

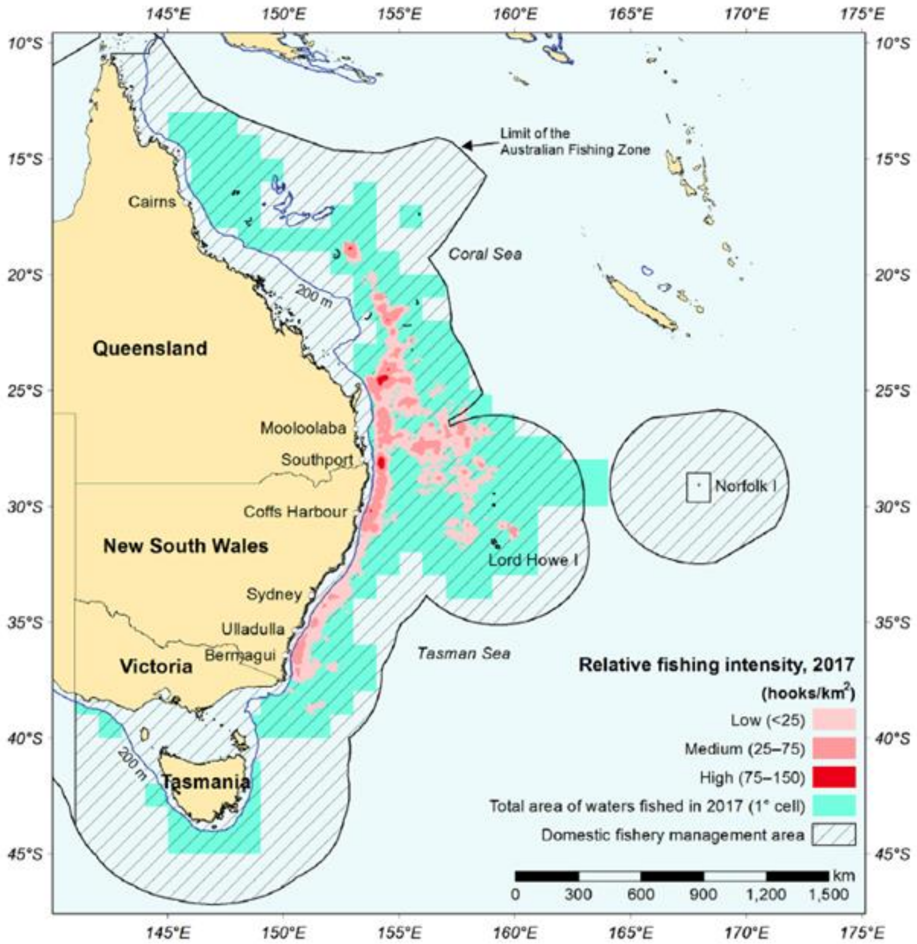


Figure 2-52 Eastern Tuna and Billfish Fishery Management Area and 2017 Relative Fishing Intensity (Patterson et al., 2018).

2.4.1.5 Small Pelagic Fishery

The Small Pelagic Fishery operates in Commonwealth waters from southern Queensland to southern Western Australia (Figure 2-53). 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).

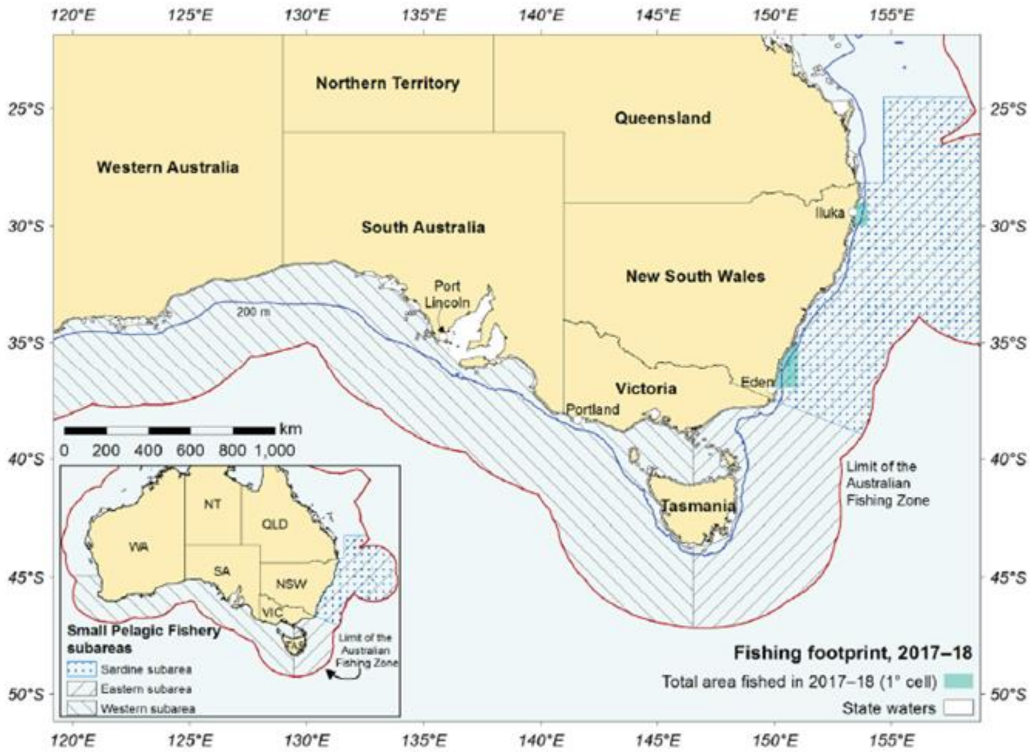


Figure 2-53 Small Pelagic Fishery Management Area and 2017-18 Fishing Footprint

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

2.4.1.6 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 2-54). 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 2-55). 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).

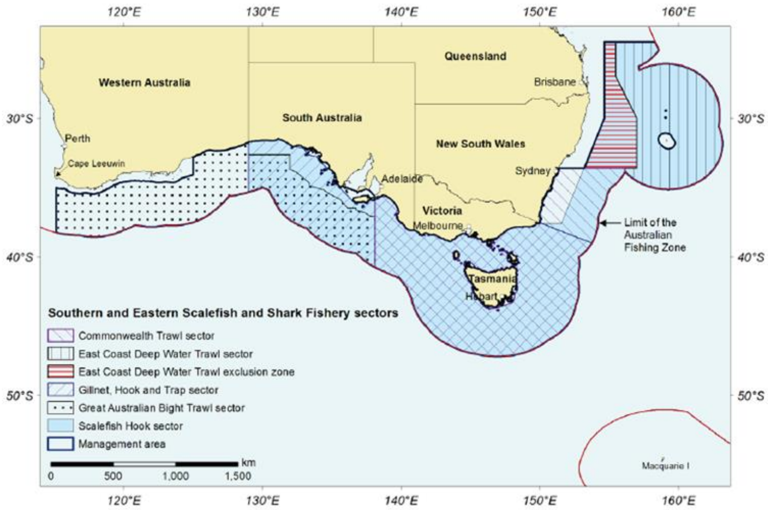
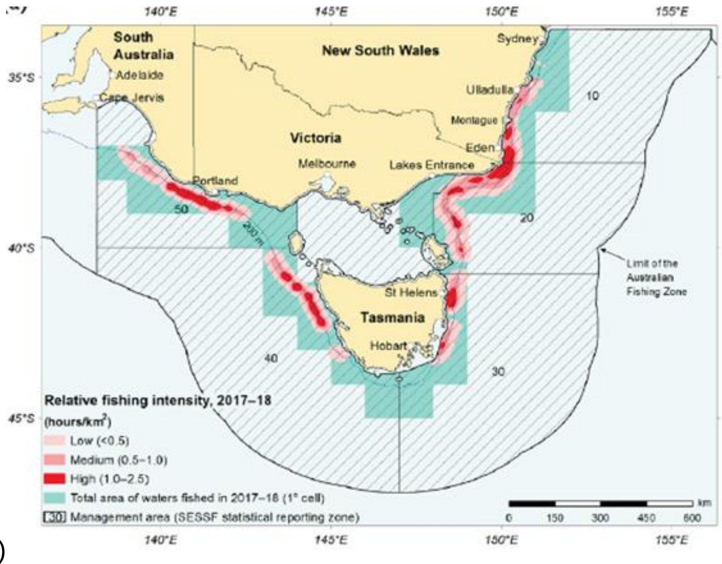
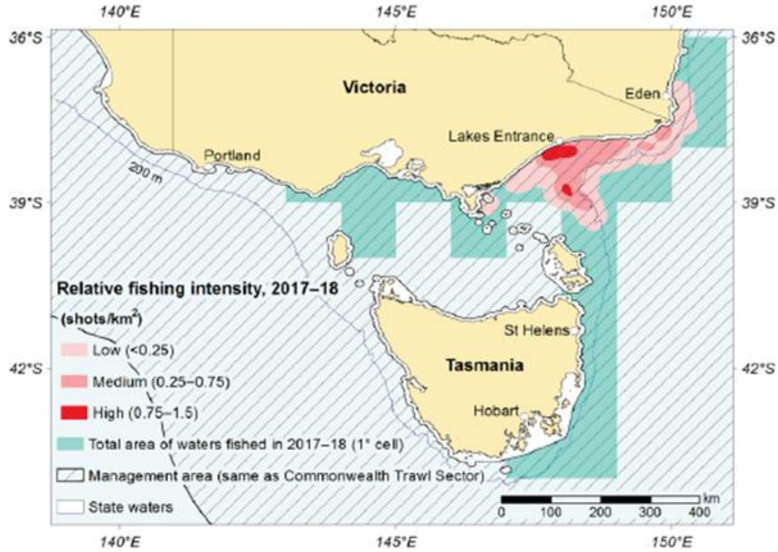


Figure 2-54 Southern and Eastern Scalefish and Shark Fishery Management Area (Patterson et al., 2018)



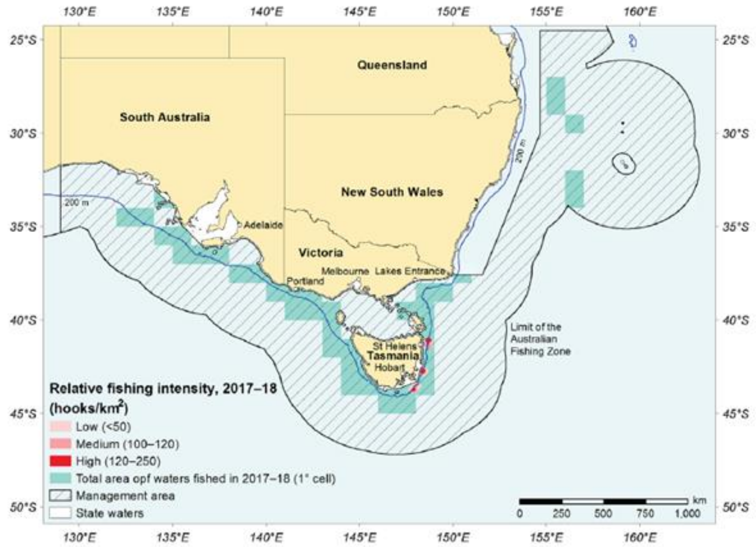
140°E
145°E
150°E
155°E
35°S
40°S
45°S
South Australia
Adelaide
Cape Jervis
New South Wales
Sydney
Ulladulla
Montague I
Eden
Victoria
Melbourne
Lakes Entrance
Portland
St Helens
Tasmania
Hobart
10
20
30
40
50
200 m
Limit of the Australian Fishing Zone
Relative fishing intensity, 2017–18 (hours/km²)
Low (<0.5)
Medium (0.5–1.0)
High (1.0–2.5)
Total area of waters fished in 2017–18 (1° cell)
30 Management area (SESSF statistical reporting zone)
0 150 300 450 600 km

(a)



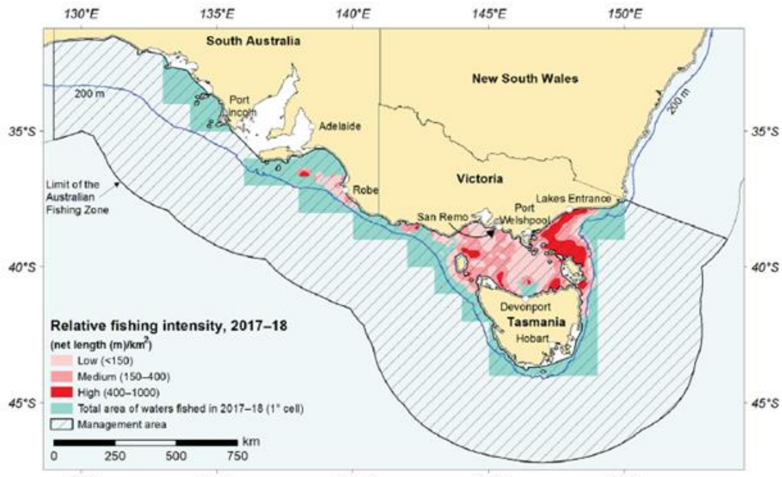
140°E
145°E
150°E
36°S
39°S
42°S
Victoria
Eden
Lakes Entrance
Portland
200 m
St Helens
Tasmania
Hobart
Relative fishing intensity, 2017–18 (shots/km²)
Low (<0.25)
Medium (0.25–0.75)
High (0.75–1.5)
Total area of waters fished in 2017–18 (1° cell)
Management area (same as Commonwealth Trawl Sector)
State waters
0 100 200 300 400 km

(b)

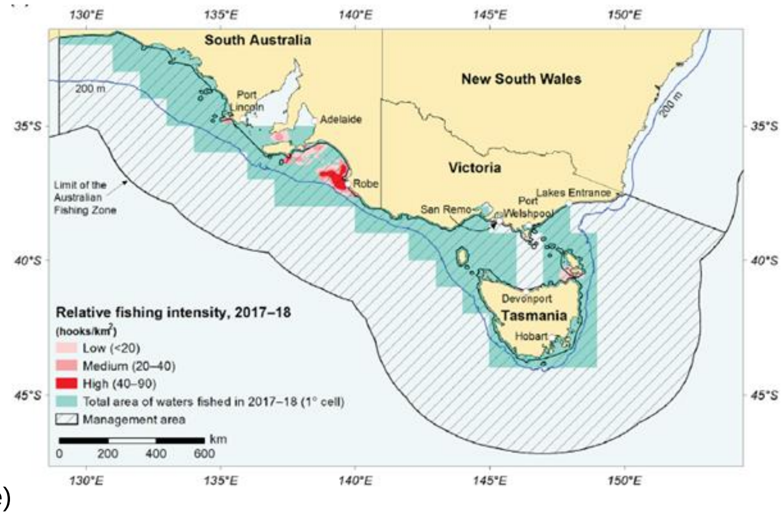


130°E
135°E
140°E
145°E
150°E
155°E
160°E
25°S
30°S
35°S
40°S
45°S
50°S
Queensland
South Australia
New South Wales
Adelaide
Victoria
Melbourne
Lakes Entrance
Portland
St Helens
Tasmania
Hobart
200 m
Limit of the Australian Fishing Zone
Relative fishing intensity, 2017–18 (hooks/km²)
Low (<50)
Medium (100–120)
High (120–250)
Total area opf waters fished in 2017–18 (1° cell)
Management area
State waters
0 250 500 750 1,000 km

(c)



(d)



(e)

Figure 2-55 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)

2.4.1.7 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 2-56). The value of the fishery during 2016-2017 financial year was $38.54 million (Patterson et al., 2018).

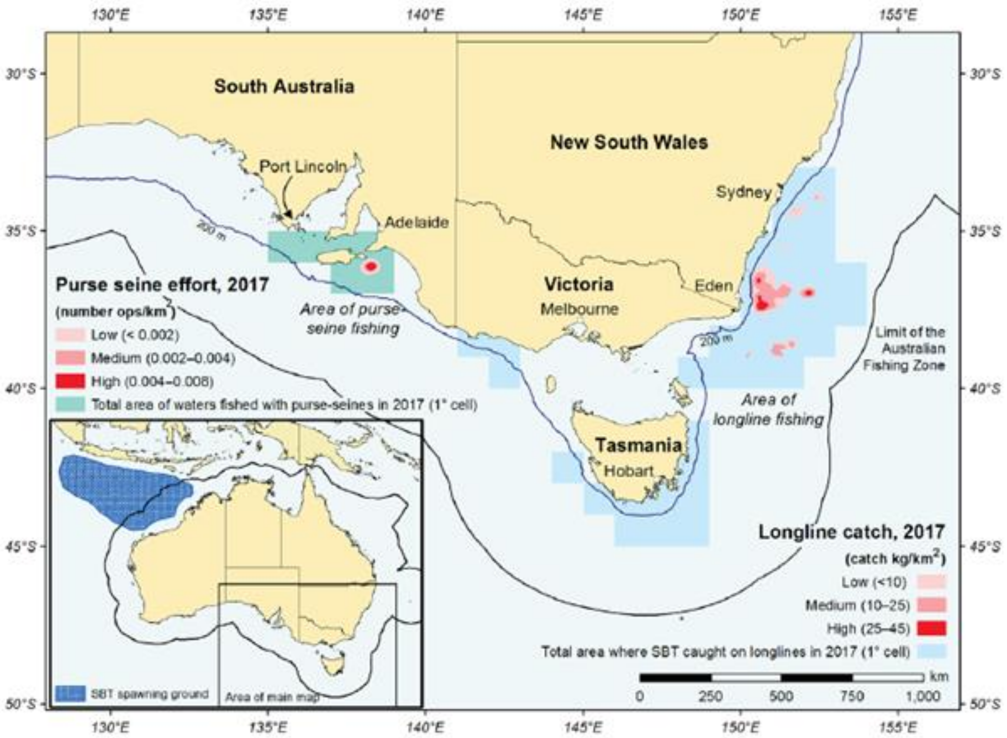
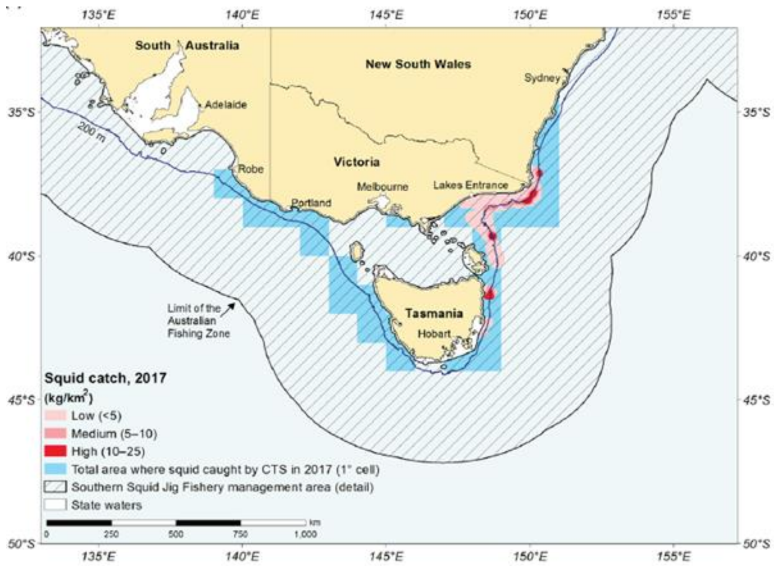


Figure 2-56 Southern Bluefin Tuna Management Area and 2017 Fishing Intensity (Patterson et al., 2018)

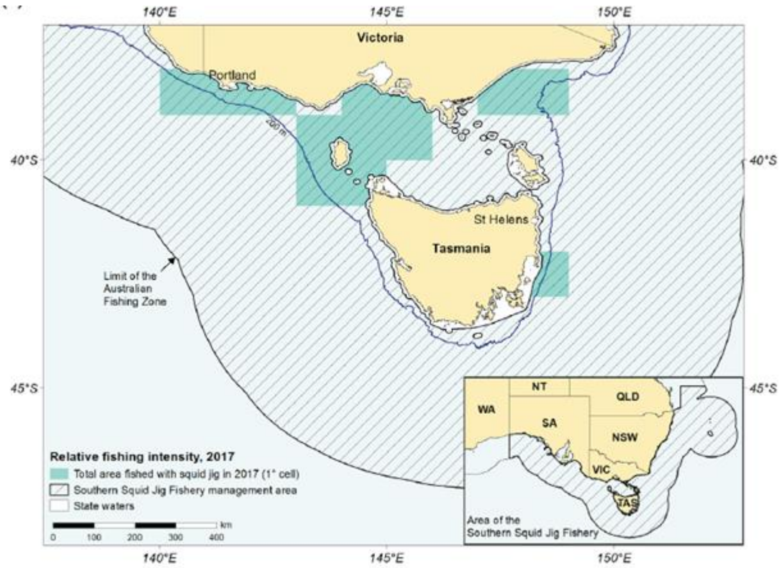
2.4.1.8 Southern Squid Jig Fishery

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 2-57) (a)), however in recent years a greater catch has come from the Trawl Sectors (Figure 2-57(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 2-57 (a) Squid Catch from the Commonwealth Trawl Sector 2017, and (b) 2017 Fishing Intensity in the Southern Squid Jig Fishery (Patterson et al., 2018)

2.4.1.9 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 2-43).

Table 2-43 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
			<u>Other</u>: 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*)

2.4.1.10 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 2-58). Information on the Production licences, Exploration Permits and Retention Leases within Gippsland Basin at the time of writing are presented in Table 2-44.

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 2-59). 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).

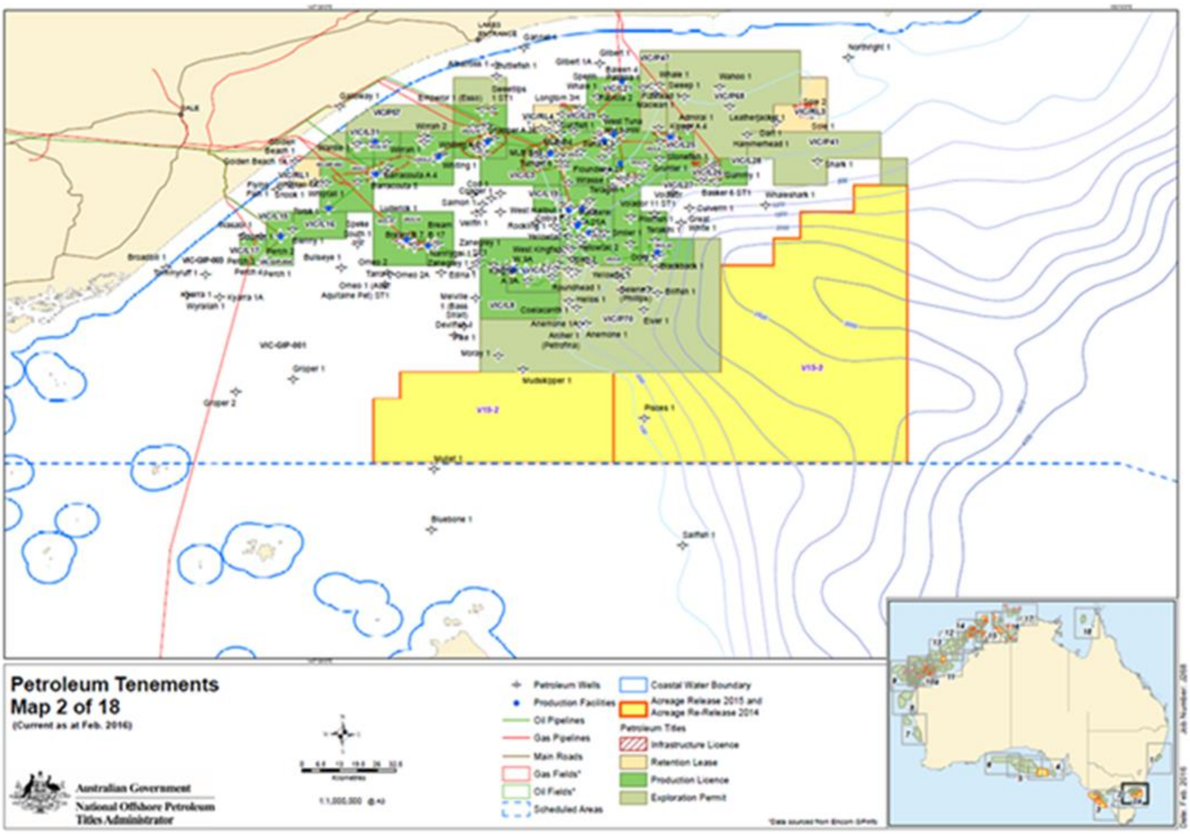


Figure 2-58 Gippsland Basin oil and gas fields (NOPTA, 2016)

Table 2-44 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

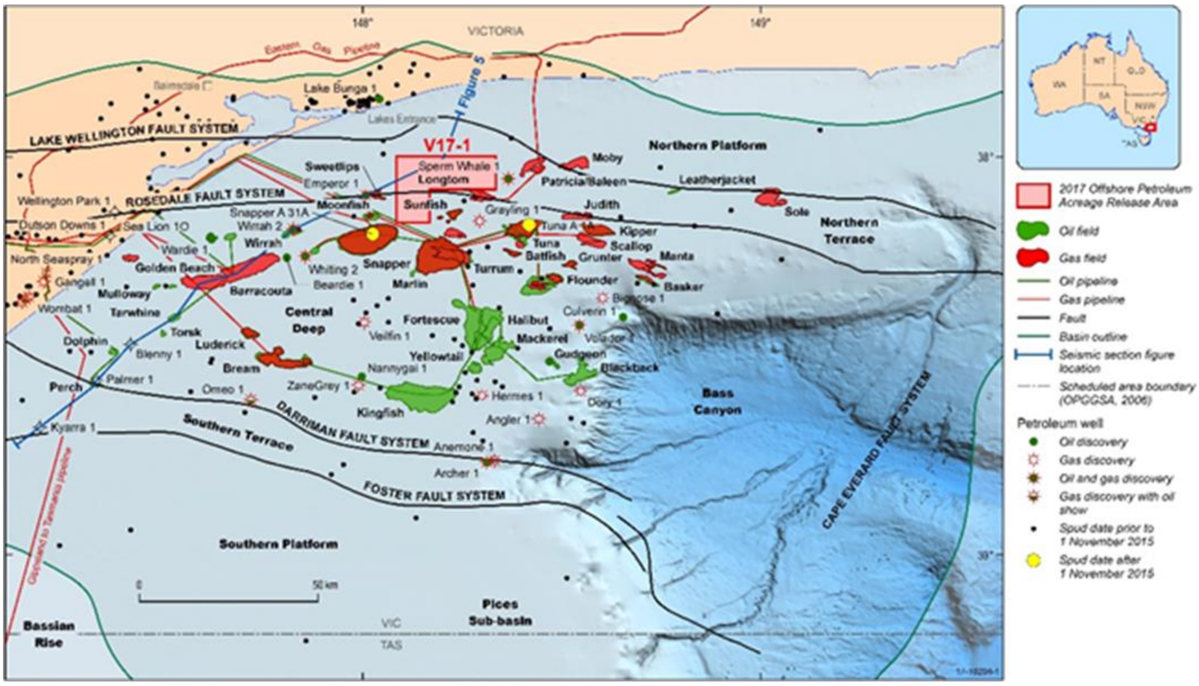


Figure 2-59 Gippsland Basin regional geology with petroleum fields and infrastructure (DIIS, 2017)

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 2-60). 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.

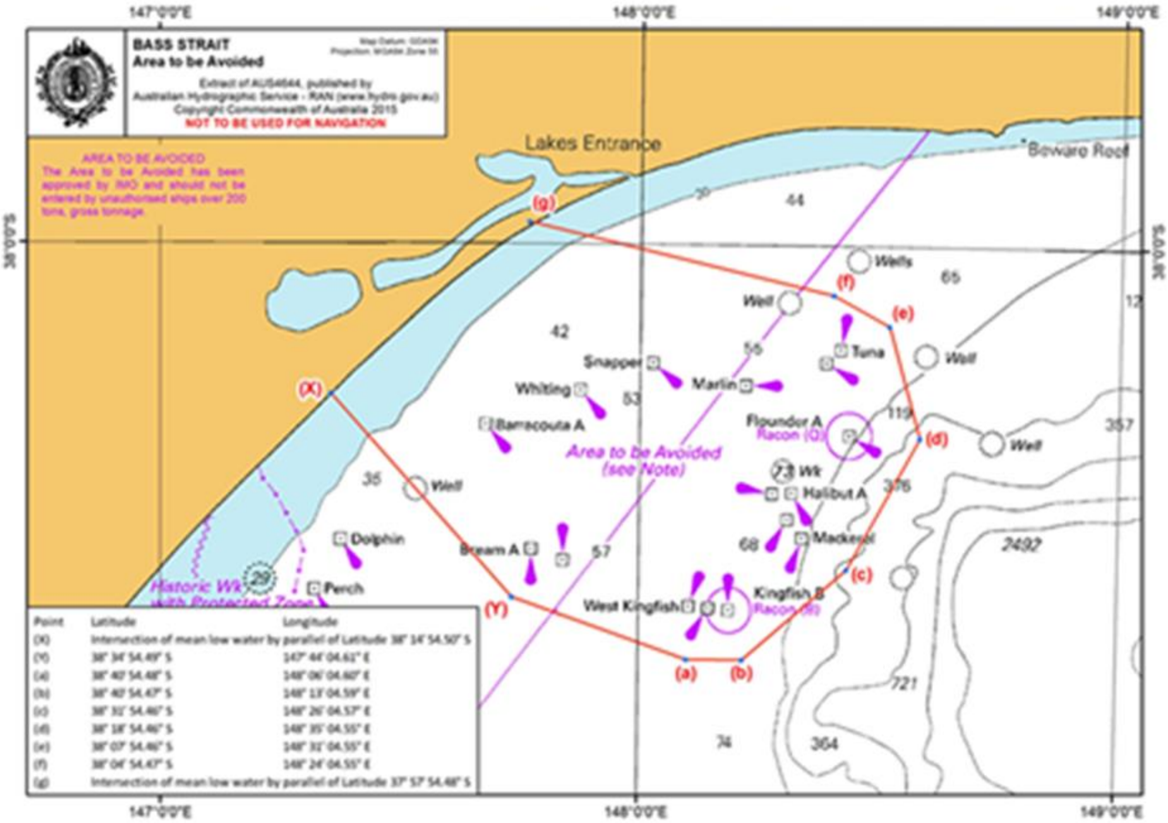


Figure 2-60 Shipping exclusion zones (Area to be Avoided) (ABF, 2017)

Figure 2-61 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 2-62 shows similar time vessel density map for the DA.

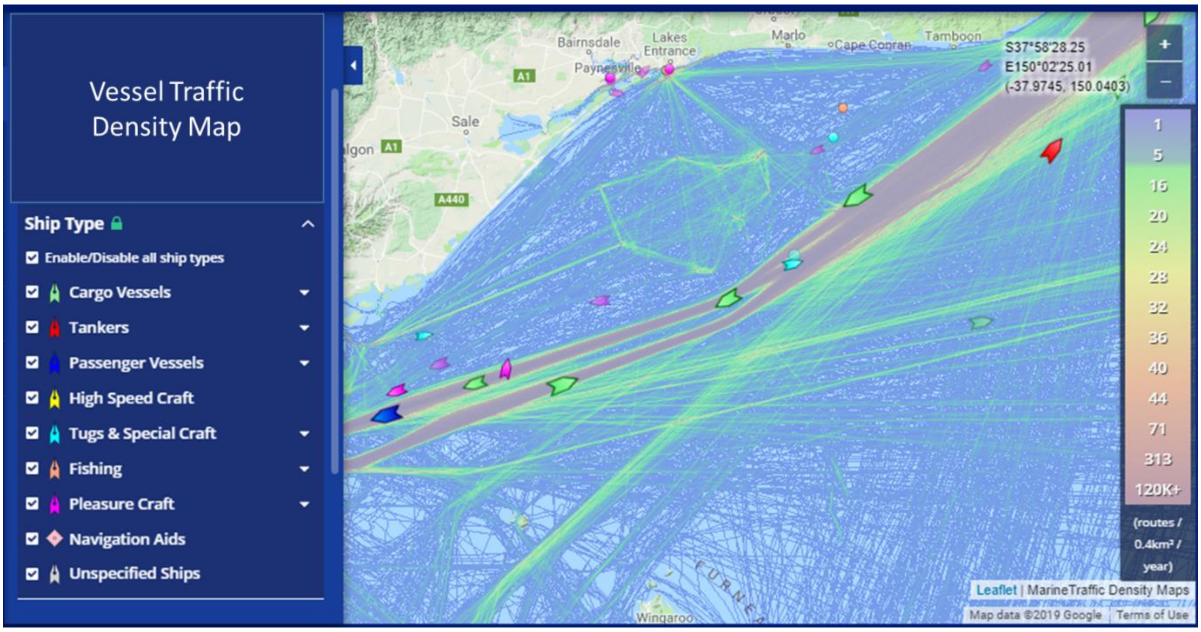


Figure 2-61 Shipping density around the Area to be Avoided real time data April, 2019 (VT, 2019)

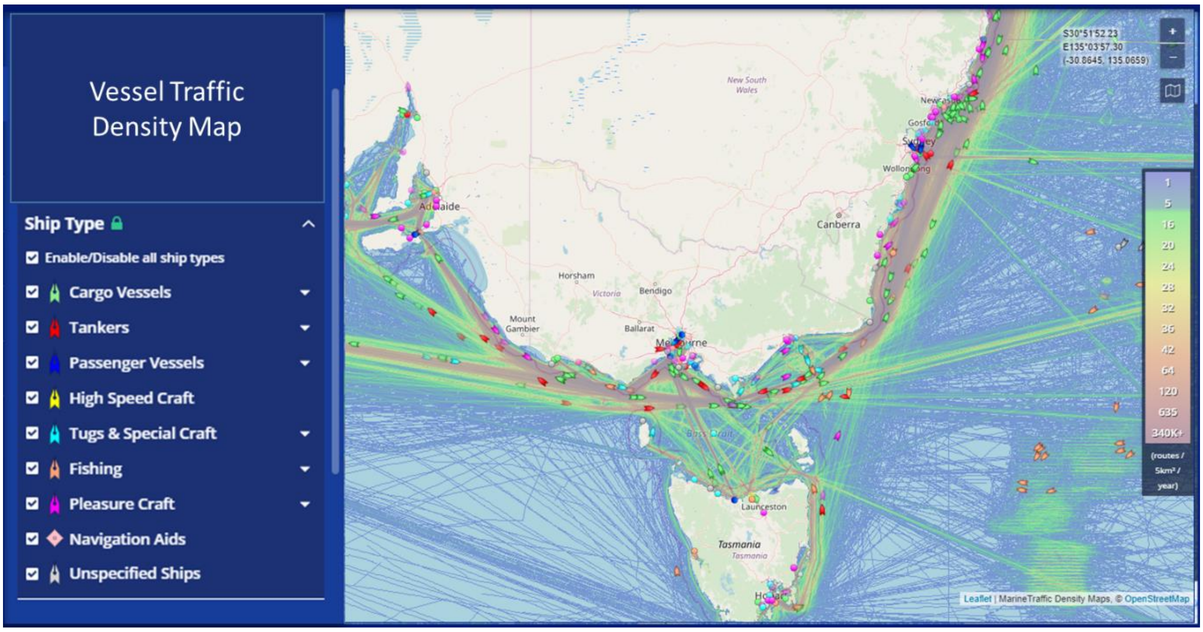


Figure 2-62 Shipping density in the DA real time data May, 2019 (VT, 2019)

2.4.4 Defence

The Australian Defence Force conducts a range of training, research activities, and preparatory operations in Australian waters (Figure 2-63). 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.

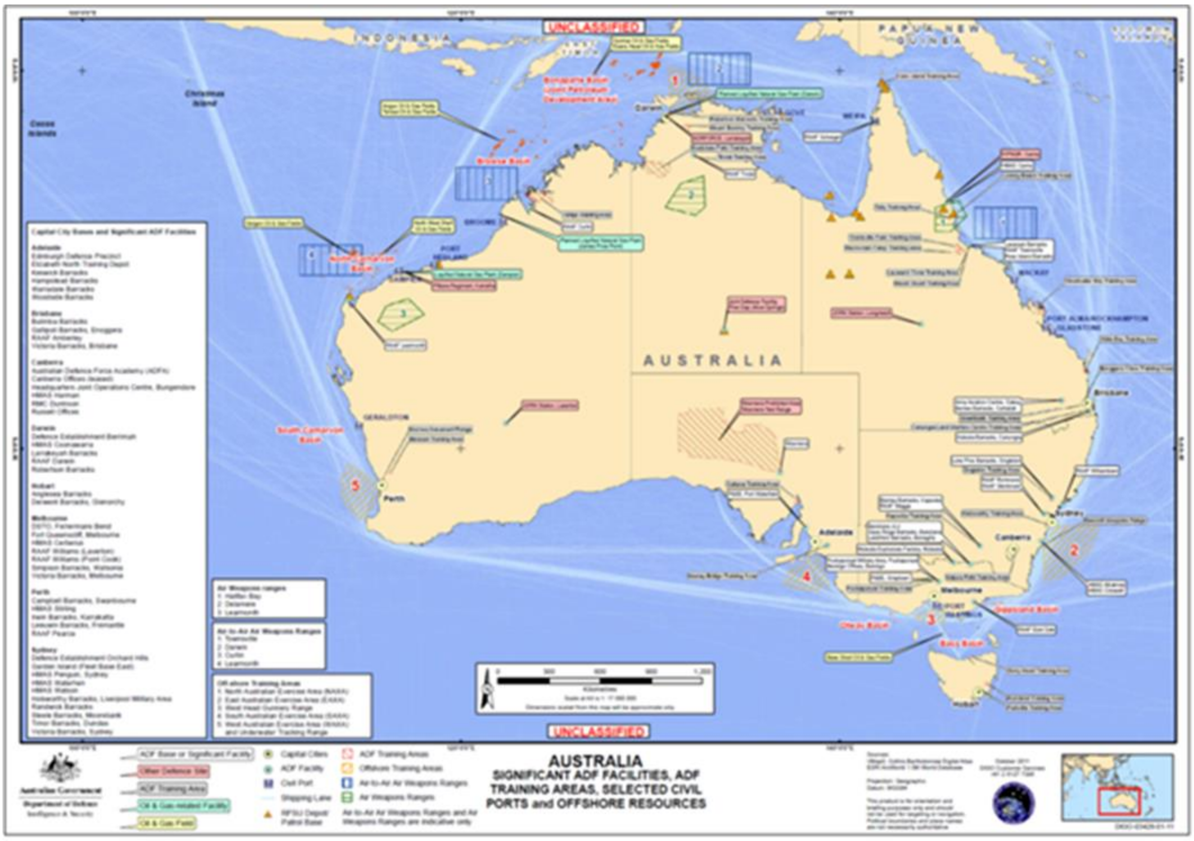


Figure 2-63 Significant Defence bases and facilities (Department of Defence, 2014)

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).

NSW has the highest expenditure and most domestic and international visitors in all of Australia, even excluding Sydney, regional NSW leads regional Australia in its share of visitors (Destination NSW, 2019). 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. The northern NSW regions, including Central, Hunter and North coast, collectively contributed approximately $9.3 billion to the economy (Destination NSW, 2019).

Tourism in Tasmania directly contributed $1.44 billion or about 4.9% 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% 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 2-64 and are all important rookeries for mutton birds and important cultural resource for Tasmanian Aboriginal people.

Figure 2-64 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 2-65). 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).

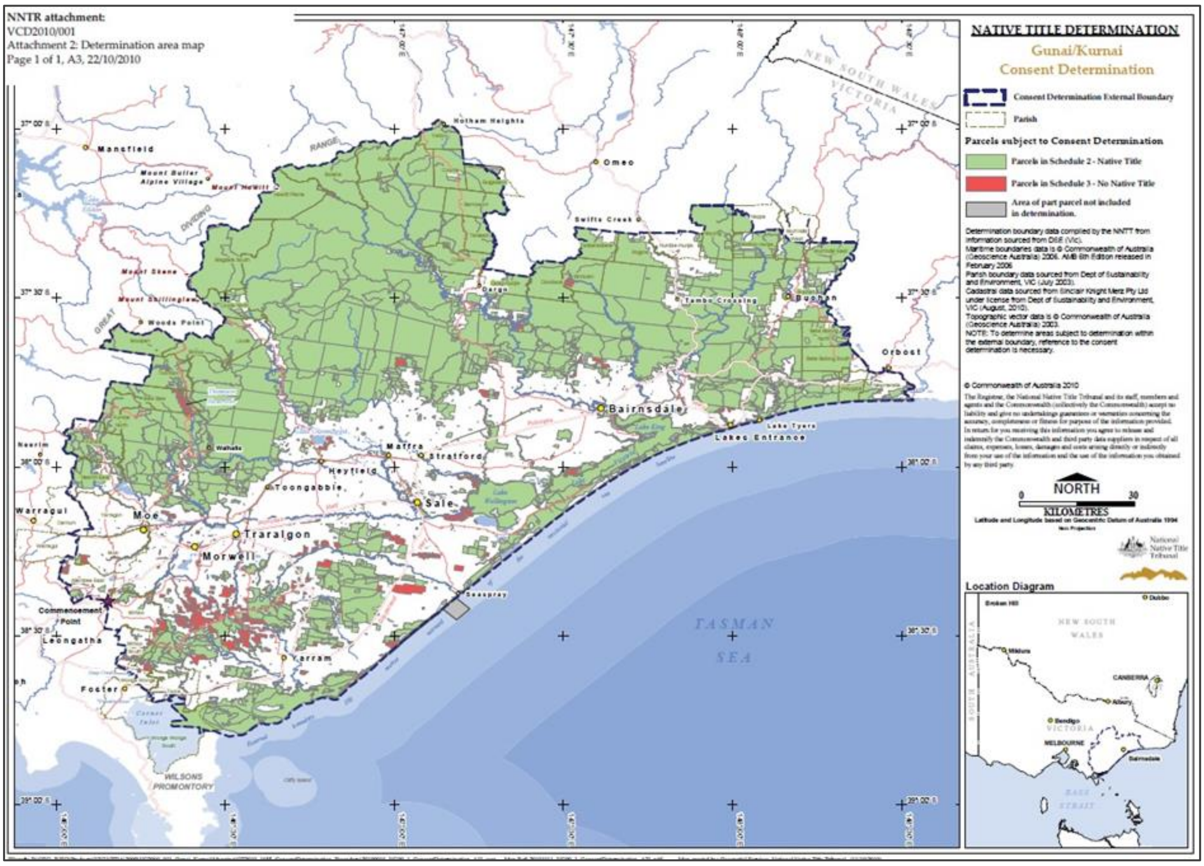


Figure 2-65 Gunai-Kurnai Native Title Determination Area (VCD2010/01)

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).

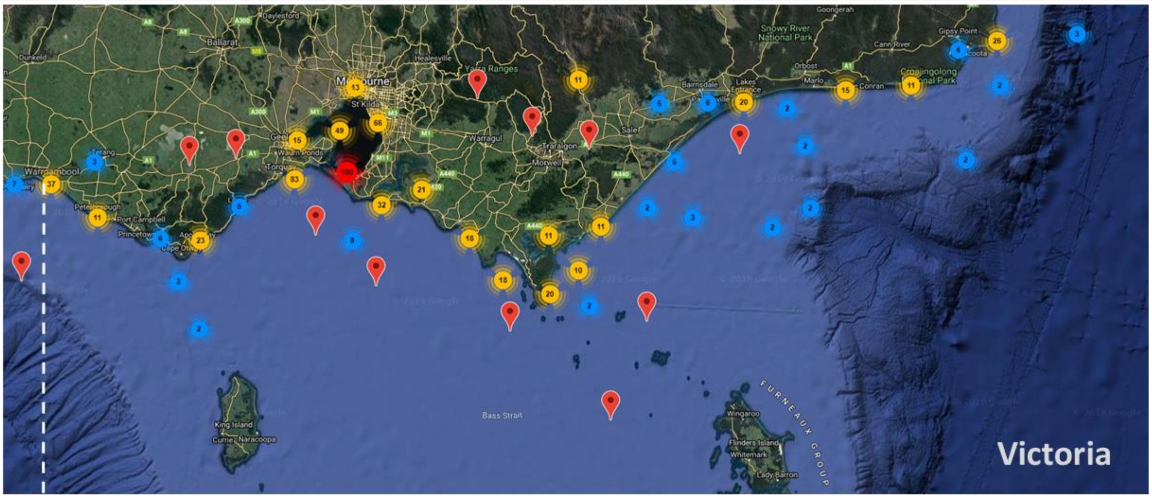
2.5.3.1 Historic – Maritime

A search of the National Shipwrecks Database which includes all known shipwrecks in Australian waters, identified 1160 historic 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 2-45 below summarises both the historic and other shipwrecks within the DA, by state.

Figure 2-66 maps the location of the shipwrecks.

Table 2-45 Shipwreck numbers within the DA by state

	Historic Shipwrecks	Other Shipwrecks
Victoria	417	126
Tasmania	415	167
New South Wales	328	76



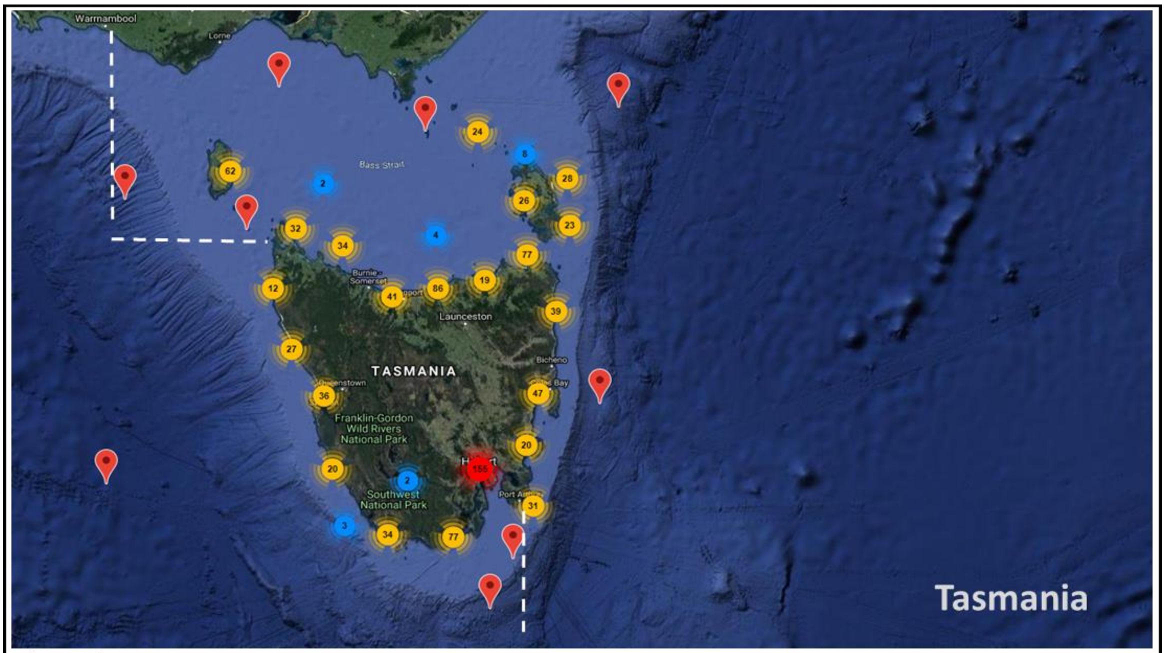
Legend

------ Limits of the DA

- red marker indicates location of an individual shipwreck
- numbered blue and yellow markers indicate the number of shipwrecks at 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 at that location

Shipwrecks within the Described Area

General guidance only from publically available sources. No liability is taken for inaccuracies of data.

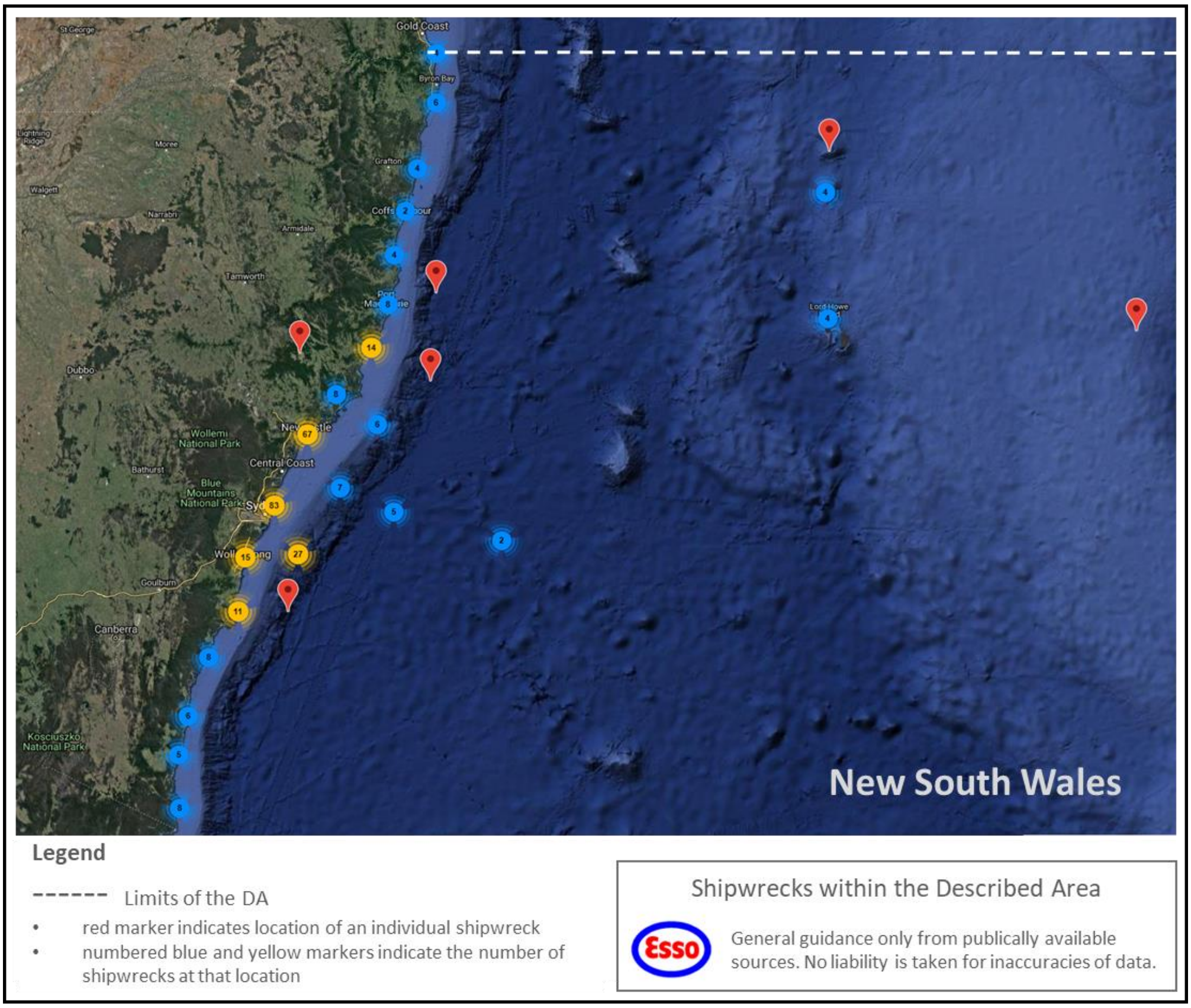

Figure 2-66 Shipwreck sites in the DA as listed in the National Shipwrecks Database (DoEE, 2019)

Table 2-46 lists the shipwrecks within the ATBA; five of these are along the coastline and none occur within the exclusion zones of the production facilities.

Table 2-46 Shipwrecks within the Area to Be Avoided.

Vessel Name	Year wrecked	Location Latitude	Location Longitude
Struan Sailing vessel	1856	-38.5	147.75
Rembrandt Sailing vessel	1861	-38.67	148.2
Talark	unknown	-38.37	148.3
Favourite Sailing Vessel	1852	-38.215	147.95
Unidentified (ID 6719)*	unknown	-37.98	147.79
Latrobe Sailing Vessel*	1978	-37.97	147.79
Pretty Jane*	1882	-38.045	147.64
Norfolk Screw Steamer*	1914	-38.055	147.61
Julius*	1892	-38.09	147.565
Leven Lass	1854	-38.165	148.46
Colleen Bawn	1913	-38.265	147.425

* *Coastal shipwrecks*

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.

Five of the historic shipwreck protected zones occur within nearshore coastal waters of the DA (Figure 2-67):

- SS Alert (1893)
- Clonmel (1841)
- SS Glenelg (1900),
- SS Federal (1901) and
- M24 (Japanese Midget Submarine) (1942)

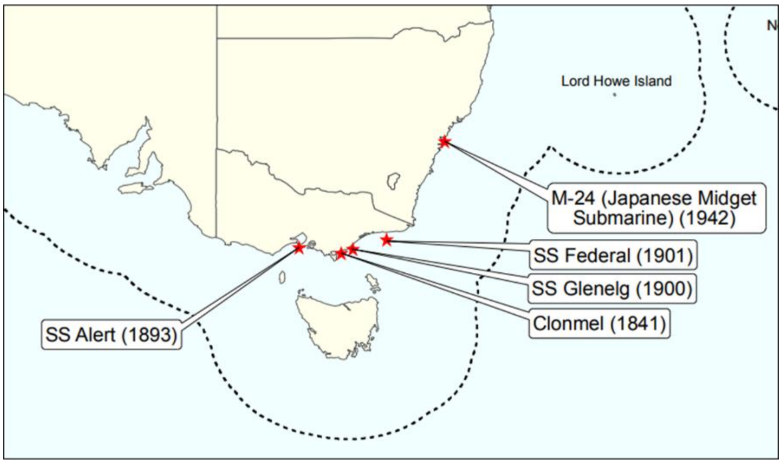

Figure 2-67 Historic Shipwreck Protected Zones within DA (ERIN, 2017)

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). Little is known about the SS Federal other than it was last seen in Cape Everand off Bass Strait. It was discovered during mine sweeping operations in World War I.

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 2-68; 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.

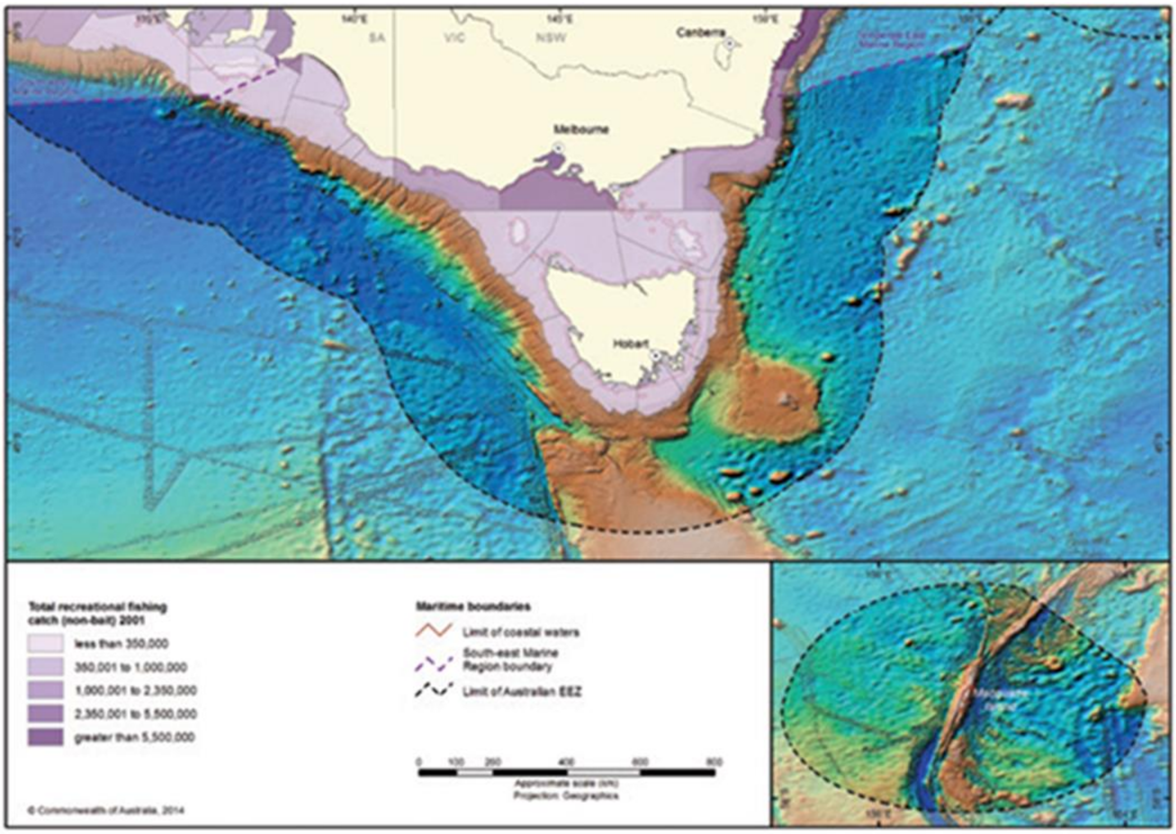

Figure 2-68 Recreational Fishing Catch in Temperate East (top) and South-eastern (bottom) Marine Region (DoEE, 2015a)

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 – Esso's Environmental 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 Search 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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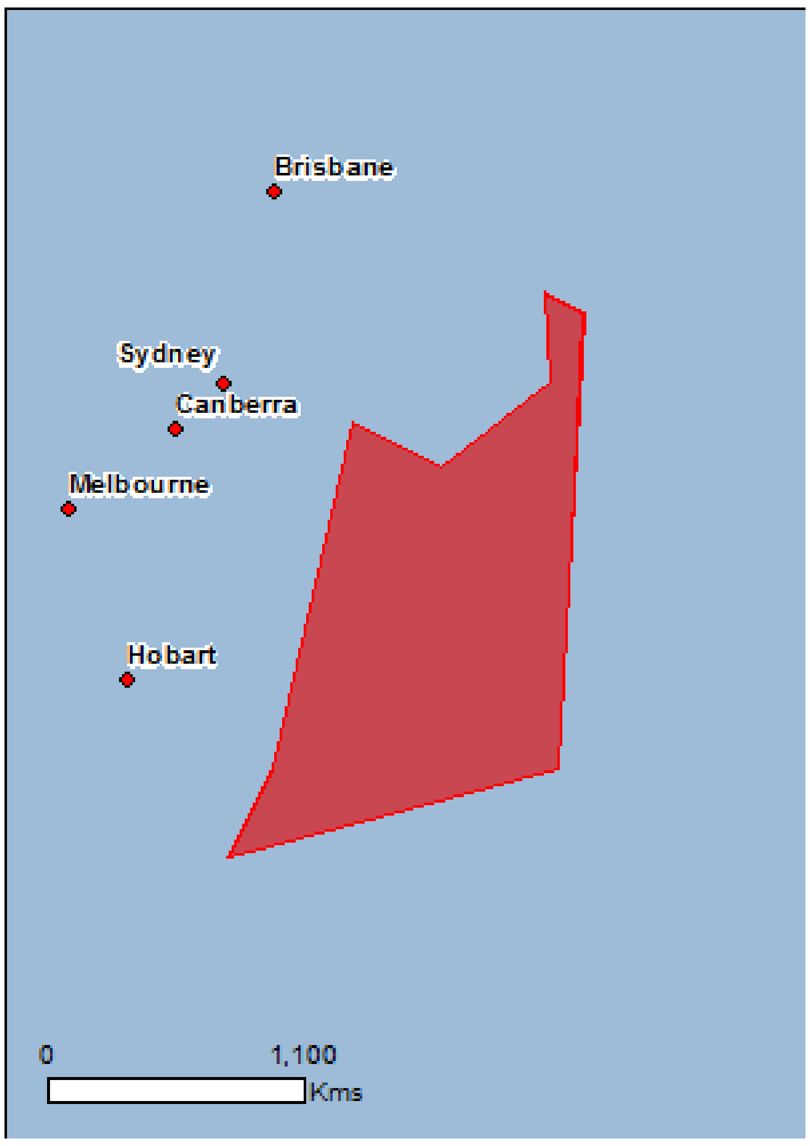

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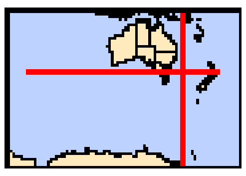

Summary

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

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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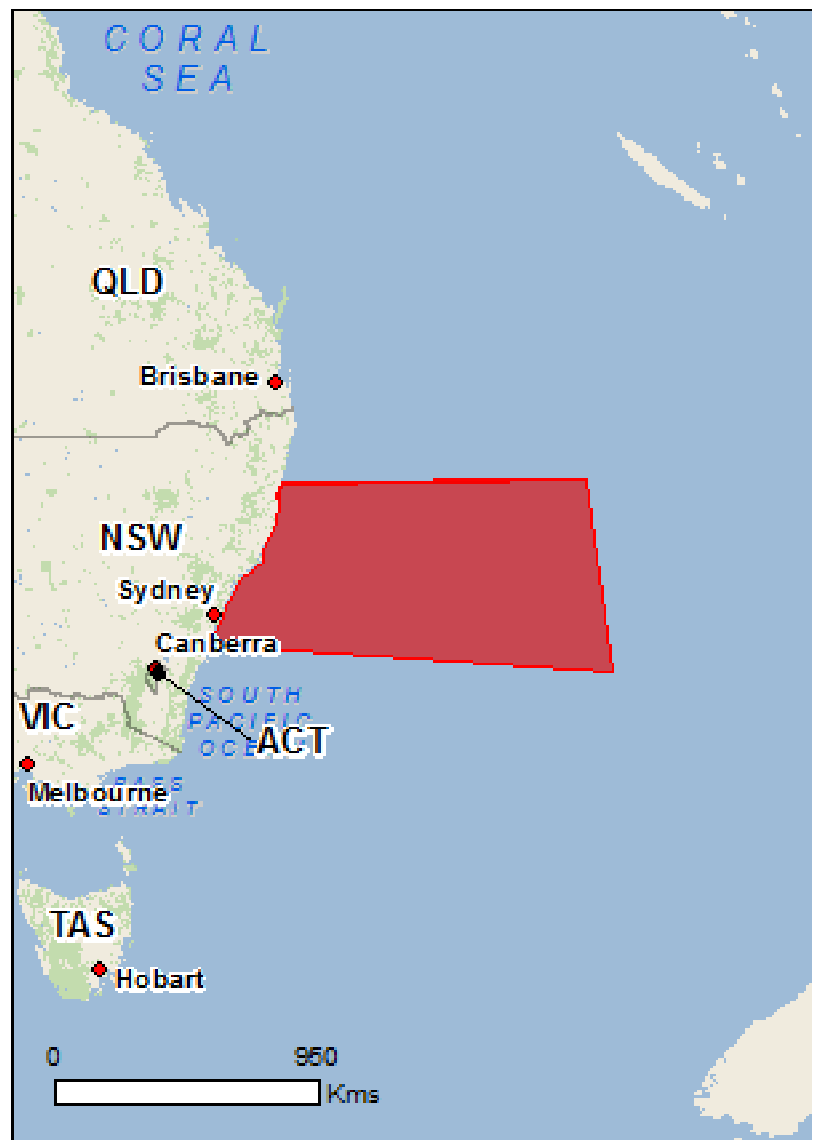

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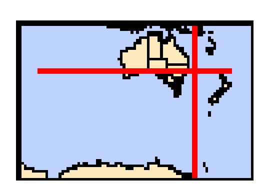


Summary

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

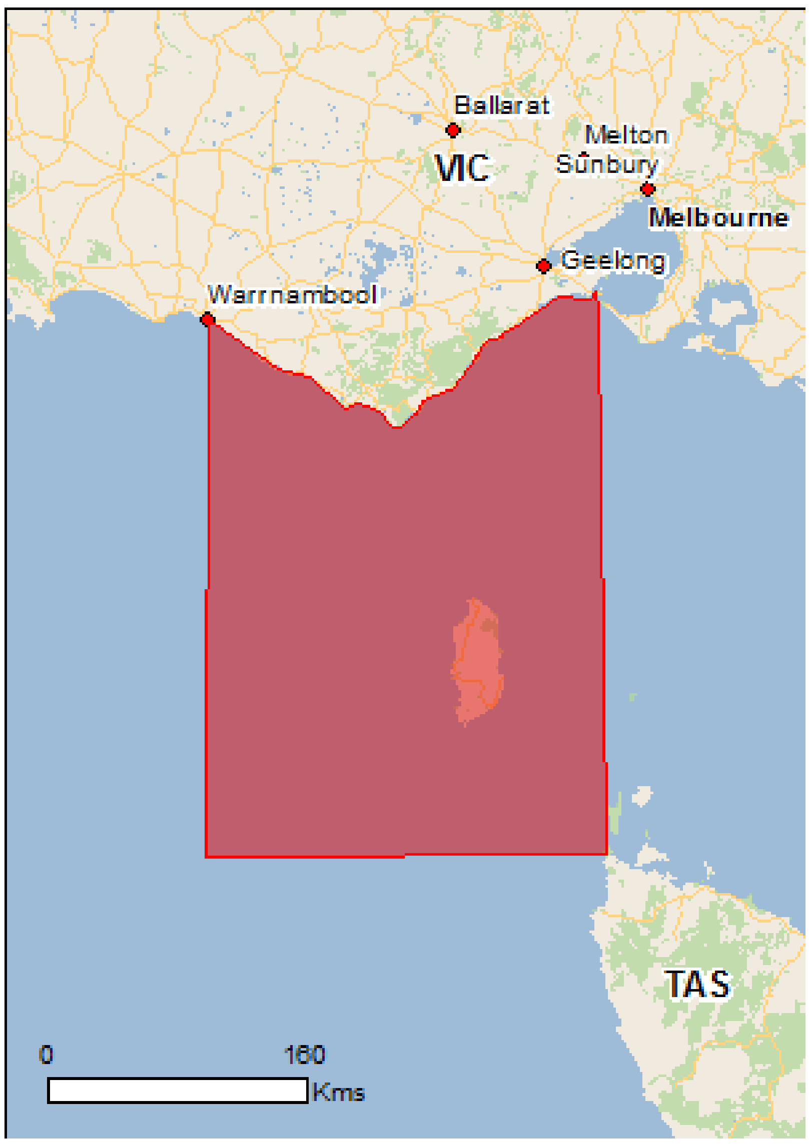
EPBC Act Protected Matters Report

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.

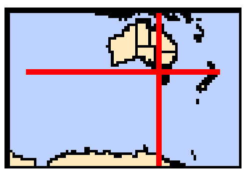
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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.

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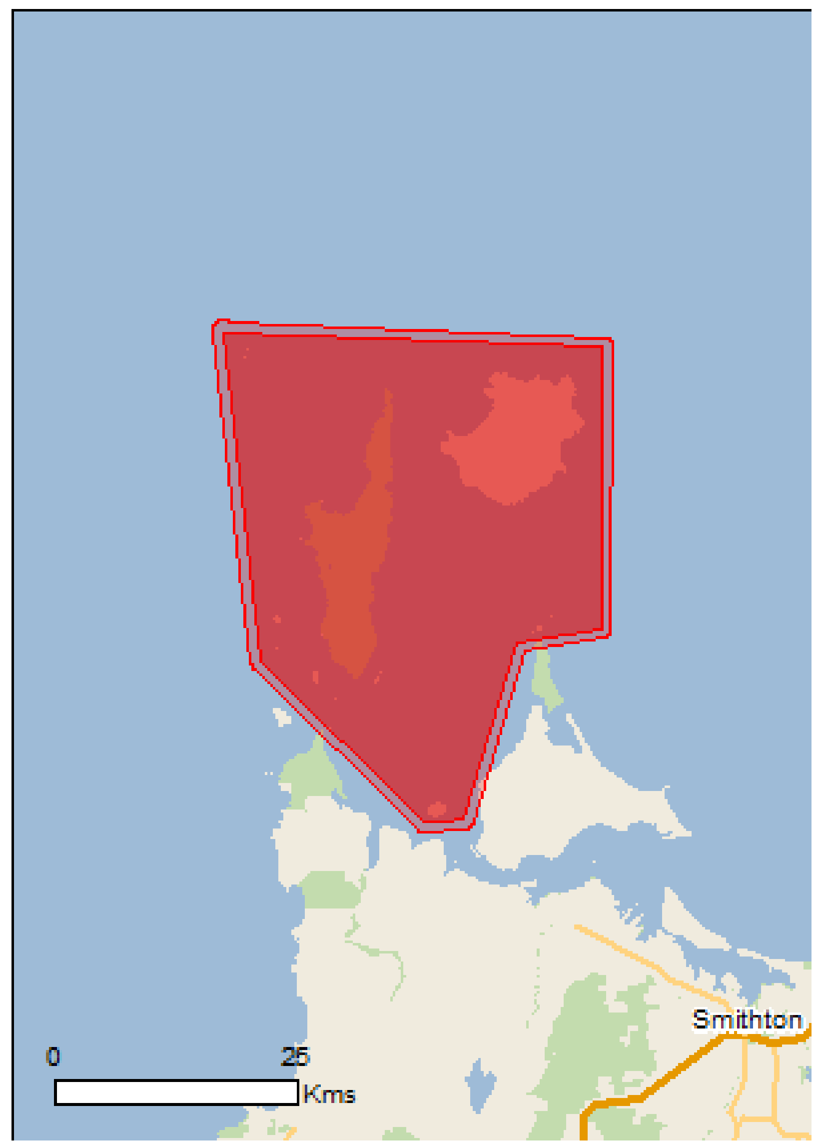

Coordinates
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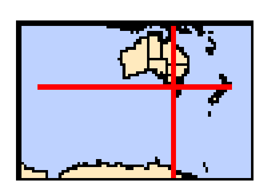

Summary

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:	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

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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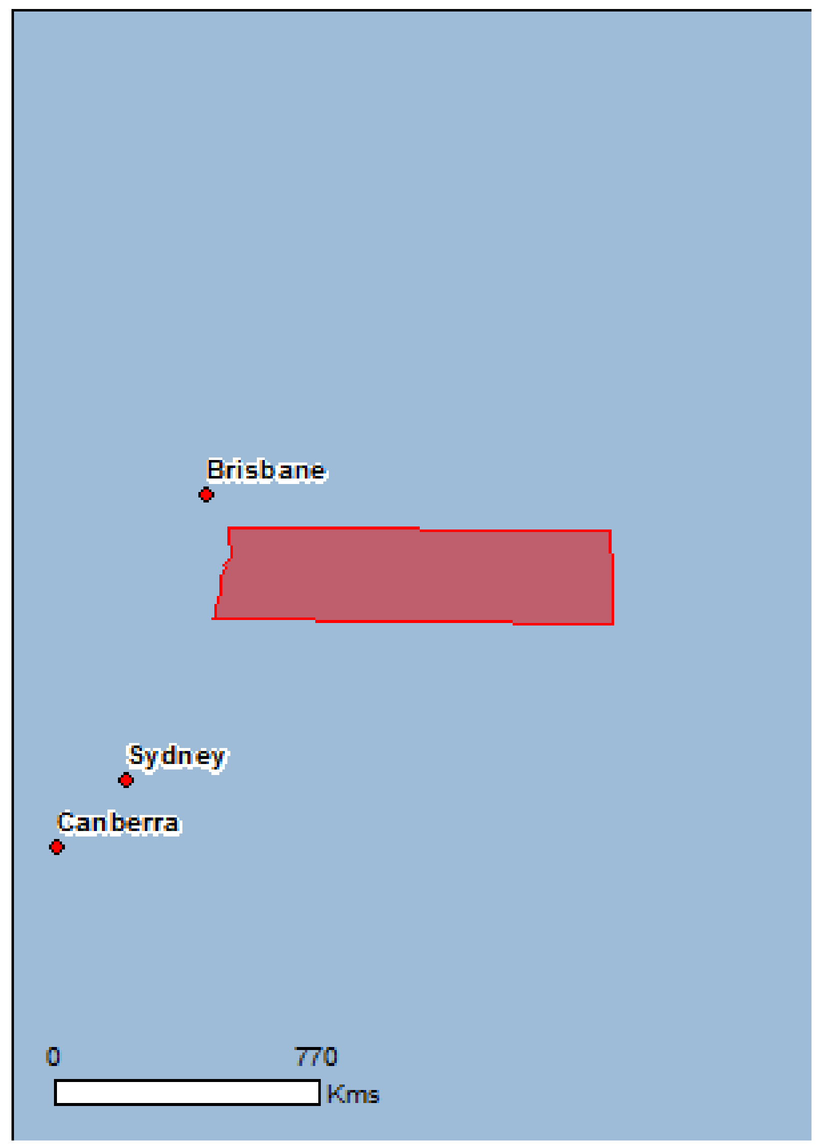

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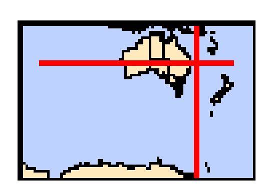

Summary

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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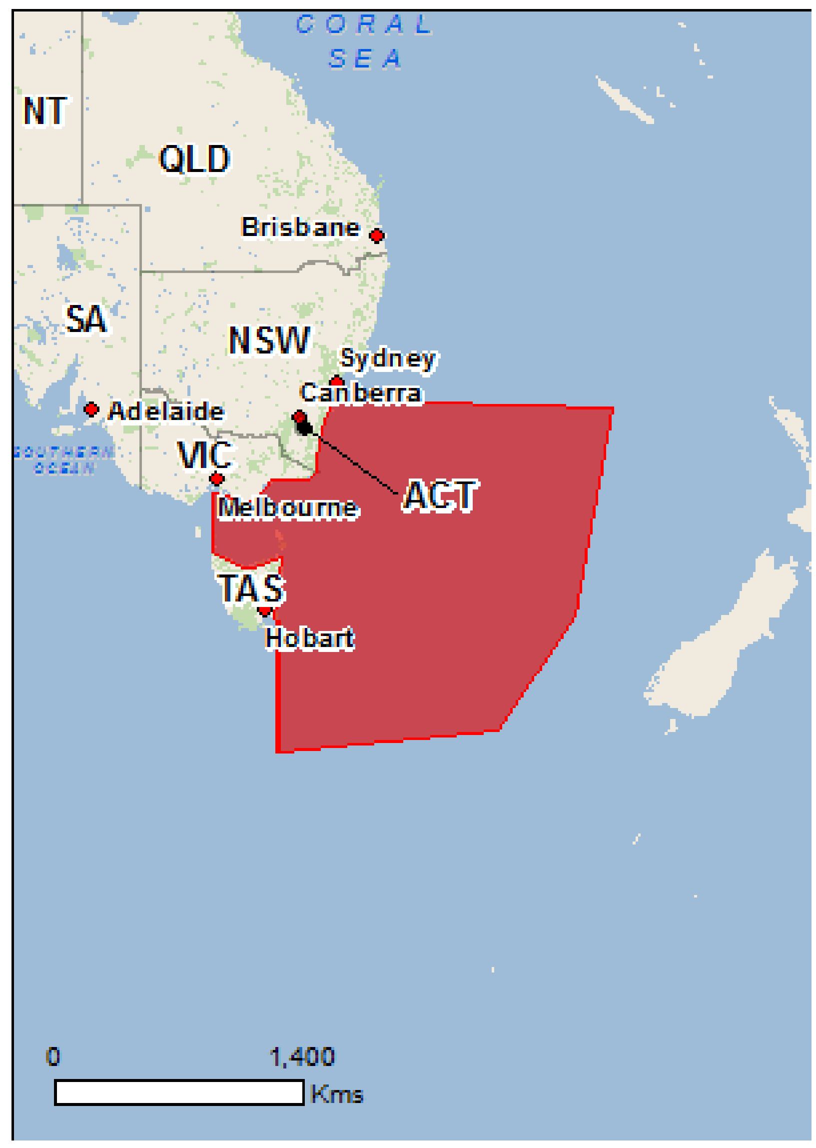

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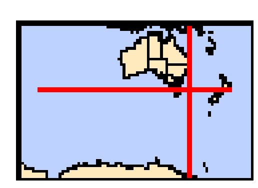
Coordinates

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 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

Esso Australia Resources Pty Ltd

OPERATIONS IMPACTS AND RISKS

BASS STRAIT ENVIRONMENT PLAN

Volume 2

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OIMS MANUAL - DOCUMENT CONTROL DETAILS

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Rev 0	Name	Position	Signature	Date
Endorsed By:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	6 Sept 19
Endorsed By	Tim Woods	Wellwork and Logistics Superintendent	On file	8 Sept 19
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	8 Sept 19
Approved By	Simon Kemp	Offshore Asset Manager	On file	8 Sept 19

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:

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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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Esso Australia Resources Pty Ltd (Esso), a wholly owned subsidiary of ExxonMobil Australia Pty Ltd, is the operator for the Gippsland Basin Joint Venture (GBJV) (Esso and BHP Billiton Petroleum (Bass Strait) Pty Ltd (BHP)) and the Kipper Unit Joint Venture (KUJV) (Esso, BHP, and MEPAU A Pty Ltd). Esso receives services, including personnel, from its wholly owned subsidiary, Esso Australia Pty Ltd, which is also a wholly owned subsidiary of ExxonMobil Australia Pty Ltd.

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- VIC/PL3 (MLA, MLB)
- VIC/PL4 (WTN)
- VIC/PL5 (HLA, FTA, CBA, MKA)
- VIC/PL7 (KFB, WKF, KFA)
- VIC/PL9 (TNA)
- VIC/PL10 (SNA)
- VIC/PL11 (FLA)
- VIC/PL13 (BMA)
- VIC/PL14 (BMB)
- VIC/PL15 (DPA)
- VIC/PL17 (PCA)
- VIC/PL18 (SHA)
- VIC/PL20 (BKA)

Petroleum Production Licenses that fall under the KUVK include:

- VIC/PL25 (KPA)

Pipeline Licenses include:

- VIC/PL6 (KFA – KFB)
- VIC/PL8 (MKA-HLA)
- VIC/PL16 (FTA – HLA)
- VIC/PL19 (SNA-MLA)

- VIC/PL21 (PCA – Shore)
- VIC/PL22 (SHA-BTA)
- VIC/PL23 (TWA – BTA)
- VIC/PL24 (WTA – SNA)
- VIC/PL26 (BMB – BMA)
- VIC/PL27 (TNA – WTN)
- VIC/PL28 (WTN – TNA)
- VIC/PL29 (BKA – MKA)
- VIC/PL32 (BMA – Shore)
- VIC/PL39 (KPA – WTN)
- VIC/PL40 (WTN – MLB)
- VIC/PL41 (MLB – SNA)

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 Offshore Petroleum and Greenhouse Gas (Environment) Regulations 2009 (OPGGS(E)R).

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Abbreviations

AFFF	Aqueous Film Forming Foam
AFI	Agreed for Implementation
AHS	Australian Hydrographic Society
ALARP	As Low as Reasonably Practicable
AMSA	Australian Maritime Safety Authority
AMP	Australian Marine Parks
ANZECC	Australian and New Zealand Environment and Conservation Council
API	American Petroleum Institute gravity
ASOG	Activity Specific Operating Guidelines
ATBA	Area to Be Avoided
BHPB	BHP Billiton Petroleum (Bass Strait) Pty Ltd
BIA	Biologically Important Area
BKA	Blackback Subsea Facility
BMA	Bream A Platform
BMB	Bream B Platform
BOD	Biochemical Oxygen Demand
BOP	Blow-out Preventor
BSPNSC	Bass Strait Pipeline Network Safety Case
BTA	Barracouta Platform
BTW	West Barracouta Planned Subsea Facility
BWMC	Ballast Water Management Certificate
BWMP	Ballast Water Management Plan
CAMO	Critical Activity Mode
CASA	Civil Aviation Safety Authority
CBA	Cobia Platform
CDSP	Closed Drain Skimmer Pile
CFSR	Climate Forecast System Reanalysis
DA	Described Area
DAWR	Department of Agriculture and Water Resources
Db	Decibels
DGF	Dissolved Gas Flotation
DP	Dynamic Positioning
DPA	Dolphin Monotower
EAPL	Esso Australia Pty Ltd
EARPL	Esso Australia Resources Pty Ltd
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation
EPO	Environmental Performance Objectives
ES	Equipment Strategies

ESD	Ecologically Sustainable Development
FIMS	Facility Integrity Management System
FLA	Flounder Platform
FLEM	Flowline End Manifold
FMEA	Failure Mode and Effects Analysis
FTA	Fortescue Platform
GBJVOA	Gippsland Basin Joint Venture Operational Agreement
GHG	Greenhouse Gases
GWP	Global Warming Potential
HFC	Hydrofluorocarbon
HLA	Halibut Platform
IBC	Intermediate Bulk Container
IMO	International Maritime Organisation
IMR	Inspection, Maintenance and Repair
IMS	Invasive Marine Species
JRCC	Joint Rescue Coordination Centre
JV	Joint Venture
KEF	Key Ecological Feature
KFA	Kingfish A Platform
KFB	Kingfish B Platform
Kg	Kilogram
KL	Kilolitre
KPa	Kilopascal
KPA	Kipper Subsea Facility
KUJV	Kipper Unit Joint Venture
KUJVOA	Kipper Unit Joint Venture Operational Agreement
L	Litre
LOC	Loss of Control
LWD	Logging While Drilling
m	Metres
MARPOL	International Convention for the Prevention of Pollution from Ships
MARS	Maritime Arrivals Reporting System
MC	Measurement Criteria
MDO	Marine Diesel Oil
MEG	Monoethylene Glycol
MEPAU A	Mitsui E&P Australia Pty Ltd
MKA	Mackerel Platform
MLA	Marlin A Platform
MLB	Marlin B Platform
MNES	Matters of National Environmental Significance
MODU	Mobile Offshore Drilling Unit

MOL	Main Oil Line
MSL	Mean Sea Level
NCEP	National Centre for Environment Prediction
NDT	Non-destructive Testing
NM	Nautical Mile
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Administration
NORM	Naturally Occurring Radioactive Material
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
ODSP	Open Drain Skimmer Pile
OGUK	Oil and Gas UK (previously UKOOA)
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
OPGGS(S)R	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009
OSMP	Oil Spill Monitoring Program
OWS	Oily water separator
PBT	Persistent, Bioaccumulative and Toxic
PCA	Perch Monotower
PEA	Potentially Exposed Area
PFAS	Per- and polyfluoroalkyl substances
PFC	Perfluorocarbons
PFP	Passive Fire Protection
PFW	Produced Formation Water
PMST	Protected Matters Search Tool
POB	Persons on Board
ppb	Parts per billion
PSZ	Petroleum Safety Zone
PTA	Pipeline Termination Assembly
RAMSAR	Convention on Wetlands of International Importance
RAT	Riser Access Tower
RMS	Root Mean Squared voltage
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle
SCM	Subsea Control Module
SDS	Safety Data Sheet (previously Material Safety Data Sheet, MSDS)
SEPP	State (VIC) Environment Protection Policy
SIMAP	Spill Impact Mapping and Analysis Program
SHA	Seahorse Subsea Facility

SMPEP	Shipboard Marine Pollution Emergency Plan
SNA	Snapper Platform
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SSHE	Safety, Security, Health, Environment
TEC	Threatened Ecological Community
TGB	Temporary Guide Base
TMS	Tether Management System
TNA	Tuna Platform
TOFD	Time of Flight Detection
TTS	Temporary Threshold Shift
TWA	Tarwhine Subsea Facility
UAV	Unmanned Aerial Vehicle
US	United States
UTA	Umbilical Termination Assembly
VIC	Victoria
VOC	Volatile Organic Compounds
WCDS	Worst Case Discharge Scenario
WKF	West Kingfish Platform
WOMP	Well Operations Management Plan
WTA	Whiting Platform
WTN	West Tuna Platform

1 Introduction

1.1 Overview

Esso Australia Resources Pty Ltd (Esso) is the operator of joint ventures for the exploration, development and production of oil and gas from Bass Strait, Victoria. Bass Strait operations consist of 19 platforms and five subsea facilities (four existing and one proposed) located within Commonwealth waters, and ~600 km of subsea pipeline.

1.2 Scope

Esso has developed this Environment Plan (EP) to identify, evaluate and manage the environmental impacts and risks associated with operation and maintenance of its oil and gas production facilities in Bass Strait.

This EP is submitted as a revision to the following EPs, and will cover a period of 5 years from the date of acceptance:

- Barracouta Whiting Environment Plan (AUGO-PO-EMP-033) NOPSEMA Reference: A384170 ID2787
- Bream Environment Plan (AUGO-PO-EMP-036) NOPSEMA Reference: A398118 ID2956
- Central Fields Environment Plan (AUGO-PO-EMP-034) NOPSEMA Reference: A398121 ID2957
- Flounder Environment Plan (AUGO-PO-EMP-035) NOPSEMA Reference: A387094 ID2893
- Kingfish Environment Plan (AUGO-PO-EMP-037) NOPSEMA Reference: A402033 ID2996
- Marlin Complex Environment Plan (AUGO-PO-EMP-031) NOPSEMA Reference: A401973 ID2999
- Perch Dolphin Environment Plan (AUGO-PO-EMP-032) NOPSEMA Reference: A384504 IDRMS2791
- Snapper Environment Plan (AUGO-PO-EMP-038) NOPSEMA Reference: A401990 ID2997
- Tuna Environment Plan (AUGO-PO-EMP-039) NOPSEMA Reference: A387092 ID2894
- West Tuna Environment Plan (AUGO-PO-EMP-030) NOPSEMA Reference: A384187 ID2357

This EP also includes the start-up, operations and maintenance of the West Barracouta subsea facility, which will be installed in 2020. Installation of the facility will be covered under a separate EP.

The Operational Area applicable to the scope of this EP includes the area within a 500 m Petroleum Safety Zone (PSZ) around the platforms and subsea facilities listed in Table 2-1, and a 200m operational zone around the petroleum pipelines and secondary lines within Commonwealth waters (>3NM from shore), as defined in the "Bass Strait Pipeline Network Safety Case" (BSPNSC).

Activities included in the scope of this EP are described in Section 2, and include Platform Operations, Support Operations, Inspection Maintenance and Repair (IMR), and Wellwork.

Activities excluded from the scope of this EP include:

- Activities in State waters, such as operation of export pipelines. These are managed under the Bass Strait State Waters Environment Plan (AUGO-PO-EMP-059) under the Victorian Offshore Petroleum and Greenhouse Gas Storage Act 2010 and associated regulations.

- Management of onshore activities.
- Vessels 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.
- Decommissioning activities.
- Drilling with mobile offshore drilling units or platform-based drilling rigs.
- Some workovers which improve Moonfish production rates. Due to the unique properties of Moonfish crude oil, each workover will need to be individually assessed to confirm whether sufficient oil spill response capability is available under this EP.

2 Description of the Activity

2.1 Operations history

In 1965 the Esso/BHP Billiton joint venture under the GBJV operating agreement drilled Australia's first offshore well and discovered the Barracouta gas field in Bass Strait. Two years later Kingfish was discovered, the first offshore oil field, which to this day remains the largest oil field ever discovered in Australia.

The GBJV invested in the continued exploration, development and production of oil and gas in the Bass Strait which has been used to power industry, fuel vehicles, heat homes and manufacture products in Australia and overseas for the last 50 years.

The offshore activities in Bass Strait are supported by up to 350 people who live and work offshore at any one time. They are supported by many more onshore, who process the oil and gas at our plants at Longford and Long Island Point before sending to customers.

Platform operations are also supported by helicopters and supply vessels. The helicopter fleet operates regular flights to transfer personnel to and from platforms, and supply vessels operate out of Barry Beach Marine Terminal, moving between platforms to load and unload cargo.

Since establishment, the Bass Strait operations have produced over 50% of Australia's crude oil and liquids production and supplied over 40% of all Eastern Australia's natural gas consumption.

2.2 Location of the Activity

The Gippsland Basin is located in the Bass Strait, offshore Victoria's southern coast. Facilities and permit areas are shown in Figure 2-1.

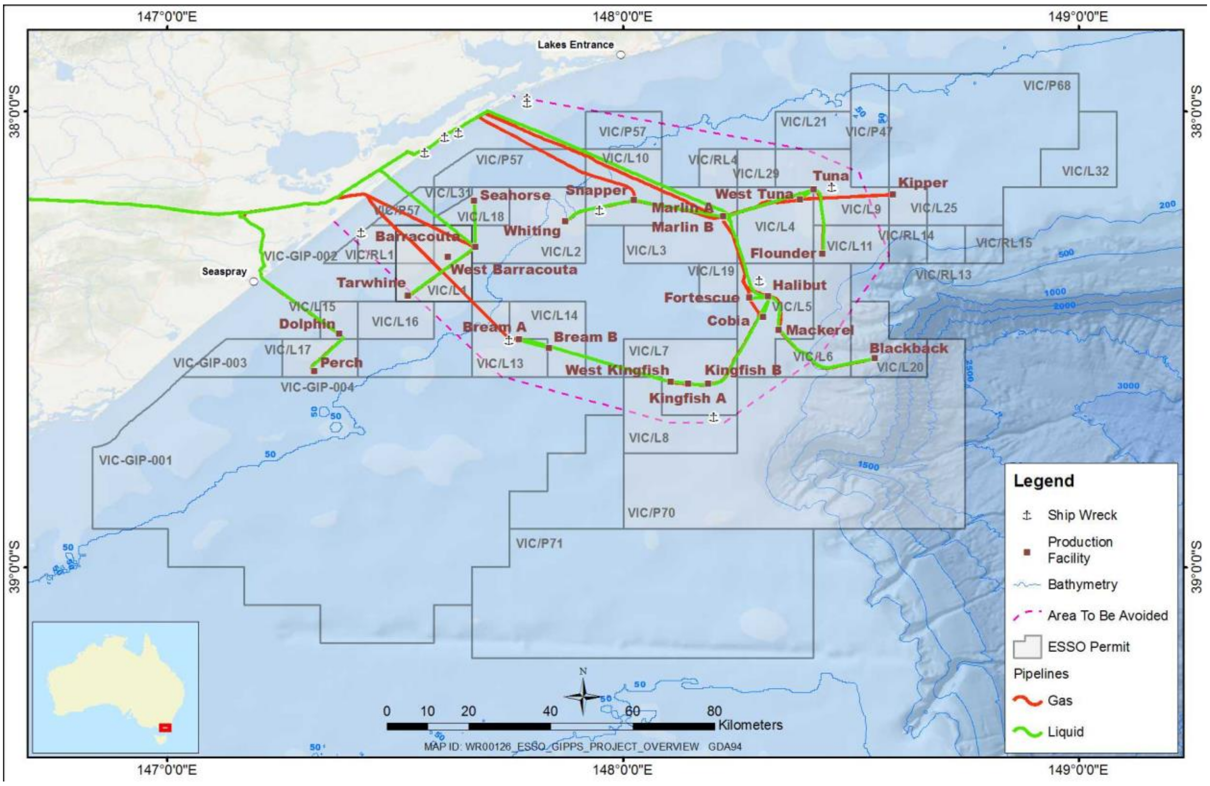

Figure 2-1 Esso Production Facilities in Bass Strait

The infrastructure includes 19 platforms, 5 subsea facilities (including the planned BTW Subsea Facility), and a network of subsea pipelines. This infrastructure is listed and grouped by Permit title in Table 2-1. The location and status of all facilities is summarised in Appendix A. Water depths at each facility range from 38 m (DPA) to 95 m (KPA).

An Area To Be Avoided (ATBA) excludes unauthorised vessels greater than 200 tonnes or 24 m length from entering the area around the Bass Strait platforms. The ATBA is defined in Schedule 2 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) and administered by NOPSEMA. A traffic separation scheme operates to the south of the ATBA to control coastal shipping.

All the Esso operated Bass Strait Platforms (with the exception of PCA and DPA) are located within the ATBA. The BTW, SHA and TWA subsea facilities are located within the ATBA, whilst KPA and BKA are located outside. All pipelines (with the exception of part of the WTN350 (North & South), MKA-BKA65 and BKA – MKA200, and the PCA – Shore300 and Shore – PCA100) are located within the ATBA.

Table 2-1 Bass Strait Operations Titles and Facilities

Title	Facility
Barracouta / Whiting / Seahorse / Tarwhine / West Barracouta (VIC/L01, VIC/L02, VIC/L18)	Barracouta platform (BTA) Whiting platform (WTA) Seahorse subsea facility (SHA) Tarwhine subsea facility (TWA) West Barracouta planned subsea facility (BTW)
Marlin A & B (VIC/L03)	Marlin A platform (MLA) Marlin B bridge linked platform (MLB)
West Tuna & Kipper (VIC/L04, VIC/L25)	West Tuna platform (WTN) Kipper subsea facility (KPA)
Central Field Facilities (VIC/L05)	Halibut platform (HLA) Fortescue platform (FTA) Cobia platform (CBA) Mackerel platform (MKA)
Kingfish Facilities (VIC/L07)	Kingfish A (KFA) Kingfish B (KFB) West Kingfish (WKF)
Tuna (VIC/L09)	Tuna platform (TNA)
Snapper (VIC/L10)	Snapper platform (SNA)
Flounder (VIC/L11)	Flounder platform (FLA)
Bream A & B (VIC/L13 & VIC/L14)	Bream A platform (BMA) Bream B platform (BMB)
Dolphin / Perch (VIC/L15 7 VIC/L17)	Dolphin monotower (DPA) Perch monotower (PCA)
Blackback (VIC/L20)	Blackback subsea facility (BKA)

2.3 Gippsland Basin Facilities Description

The Bass Strait Oil and Gas Production Systems consist of staffed and unstaffed facilities and subsea systems as described in Appendix A, with interconnecting pipelines and umbilicals.

2.3.1 Platforms

Most of Esso's platforms have a tubular steel base structure (or jacket) which is fastened to the sea floor by piles. The jackets support the 'topsides' which include the production facilities, living quarters for the personnel working on the platform and a helicopter landing pad. Each platform typically consists of the following elements:

- Conductors, connecting the wellheads to the seabed.
- Pipeline risers connecting the platform to pipelines.
- Processing Equipment / Production facilities which typically include –
- Gas separators/scrubbers, oil separators, test separators, slug catcher/receivers
- Open and closed drain systems
- Potable water systems
- Produced water processing facilities
- Diesel/methanol/glycol storage & injection systems
- LPG/condensate reinjection facilities
- Instrument air systems
- Workover/wireline rig
- Living quarters, including
- Control room, radio room, offices
- Ablutions, laundry and galley
- Macerators for disposal of food scraps and sewage treatment
- Helideck
- Safety features including evacuation capsules
- Variable number of decks, including sea deck and cellar deck
- Laydown area and one or more cranes
- Pumps, compressors and electricity generators
- Maintenance workshop
- Flare/vent boom & scrubbers

Figure 2-2 shows a schematic of a typical Bass Strait oil and gas platform.

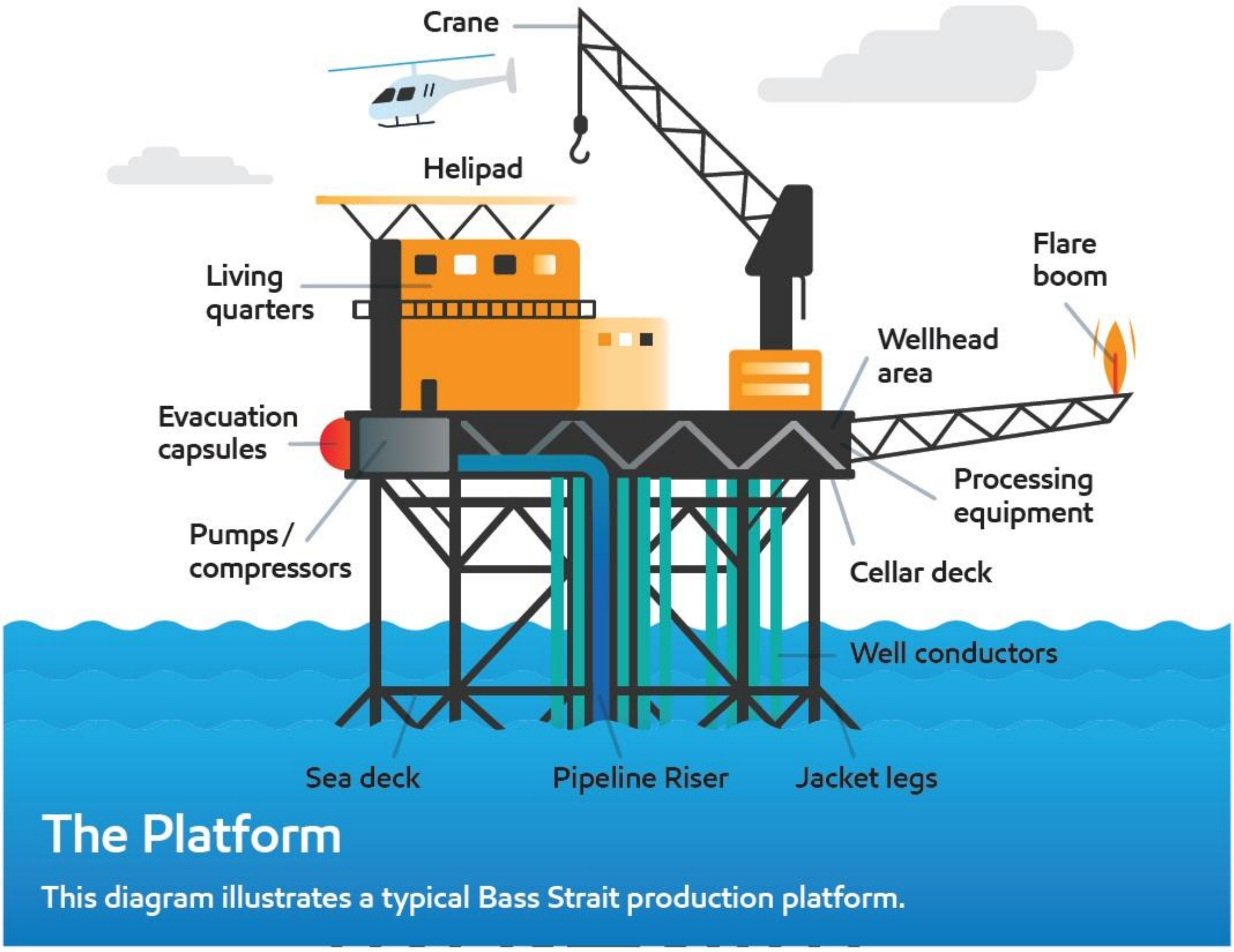

Figure 2-2 Schematic - Bass Strait Oil and Gas Platform

2.3.2 Subsea Facilities

2.3.2.1 Kipper Subsea Facility

The Kipper Subsea Facility (KPA) consists of four subsea trees with trawl protection frames and four subsea coolers, designed to reduce the temperature of the produced hydrocarbons, connected via flowlines/jumpers and flying leads to a production manifold. KPA is connected to the WTN platform via two 350 mm pipelines, designed to allow round trip pigging, and an electrical and chemical (MEG, methanol and hydraulic fluid) umbilical.

2.3.2.2 West Barracouta Subsea Facility

The West Barracouta Subsea Facility (BTW) is scheduled to be installed in 2020. The installation activity is the subject of a separate EP however operation and start up is to be covered under this EP. BTW will consist of two subsea trees with trawl-protection frames connected via jumpers and flying leads to a flowline end manifold (FLEM) and umbilical termination assembly (UTA). BTW will be connected via an electrical and chemical umbilical to BTA platform, and via subsea hot tap into the existing BTA-Shore 450 mm pipeline.

2.3.2.3 Blackback Subsea Facility

The Blackback Subsea Facility (BKA) was permanently plugged and abandoned in 2019 and the subsea trees were removed. The disconnected flowlines and electrical and chemical connections remain on the seabed. The UTA, umbilical, pipeline termination assembly (PTA) and 200 mm production pipeline and associated gaslift line connected to MKA platform also remain on the seabed.

2.3.2.4 Seahorse and Tarwhine Subsea Facilities

The Seahorse (SHA) and Tarwhine (TWA) Subsea Facilities are currently shut-in and are scheduled to be permanently plugged and abandoned in 2021. This activity will be the subject of a separate EP. It is planned that the subsea trees will be removed during permanent plug and abandonment.

2.3.3 Pipelines

Crude oil and gas produced offshore are transported to Longford Plants for processing, via a network of pipelines. Crude oil is collected offshore at three points (Halibut, Barracouta and Perch-Dolphin) and then piped to Longford Plants via dedicated pipelines. Gas is transported from the four major gas-producing offshore platforms (Marlin, Barracouta, Bream A and Snapper) to Longford Plants through dedicated gas pipelines. There are 31 licensed pipelines and eight secondary (gaslift and fuel gas) lines, as listed in Appendix A. For pipelines to shore, this EP covers the portion of these pipelines in Commonwealth Waters up to the 3 NM Victorian waters boundary only.

2.4 Description of Activities resulting in Environmental Aspects

This section describes the activities within the scope of this EP that have the potential to result in environmental aspects leading to impacts on, or risks to the environment. The activities included are:

- Operations (including platform, subsea facility and pipelines)
- Wellwork
- Inspection, maintenance and repair
- Support operations (including vessels, ROV and Helicopters)

2.4.1 Operations

2.4.1.1 Platform Operations

All Esso platforms (with the exception of PCA and DPA) are located within the Area to Be Avoided (ATBA). Petroleum Safety Zones (PSZ) extending 500 m from each of the platforms and subsea facilities have also been established under the OPGGS Act. Vessels are prohibited from unauthorised entry into, or presence in, a PSZ.

All platforms are equipped with navigation lighting but also have a variety of other light sources including crane clearance lights, helipad lights and radio tower lights. Where facilities are staffed there is also lighting for accommodation and related infrastructure.

Gas compression turbines and the turbine power generators on platforms produce continuous noise. Fuel combustion equipment on platforms burn fuel gas and diesel. Equipment includes standby generators and compressors, and normally-operating turbines, compressors, generators and pumps, as well as other smaller equipment.

Platforms usually generate potable water by reverse osmosis (RO) desalination of sea water. However, supply vessels may supply additional potable water, if required.

Platforms that have overnight accommodation discharge food and sewage / greywater. Platforms without overnight accommodation discharge sewage / greywater only when staffed. Domestic wastes generated on platforms are primarily sewage and liquid wastes from the kitchens, bathrooms and laundries. The grey water is comprised of potable water, soap and detergents. Persons on Board (POB) and staffing status at each platform is provided in Table 2-2.

Platform operation generates both general wastes (solid inert materials including plastics, paper, glass and metal) and hazardous wastes (such as waste oil and chemicals, laboratory wastes, separator sludge and sand, oily filters, oily rags and empty drums containing oil or chemical residues). Solid and hazardous wastes are temporarily stored on the platform, then transported onshore and appropriately disposed.

Table 2-2 Bass Strait Operations - POB and Staffing Status

Platform	Normal staffing status*	Maximum POB	Normal Operations	During construction, wellwork or maintenance campaign
BTA	Staffed	31	8-14	25-31
WTA	Normally unstaffed	n/a	Normally unstaffed	It is not expected that WTA will host personnel for activities described in this EP.
MLA /MLB	Staffed	96	20-25	90+
WTN	Staffed	82	8-14	25-50
HLA	Staffed	44	8-14	Max. 25
FTA	Staffed	60	8-14	Max. 25
CBA	Staffed	58	15	Max. 58
MKA	Normally unstaffed	n/a	Normally unstaffed	May be staffed during C&P maintenance or wellwork campaigns. Maximum POB during these activities is 50.
KFA	Normally unstaffed	n/a	Normally unstaffed	May be staffed during C&P maintenance or wellwork campaigns. There is overnight accommodation for 42 people.
KFB	Staffed	41	8-14	25-40
WKF	Staffed	56	8-14	25-40
TNA	Staffed	51	25-35	Max. 51
SNA	Staffed	79	8-14	25-79
FLA	Staffed	73	8-14	25-50
BMA	Staffed	80	8-14	25-40
BMB	Normally unstaffed	No accommodation facilities. Day trips only.	Normally unstaffed	n/a
PCA /DPA	Normally unstaffed	No accommodation facilities. Day trips only.	Normally unstaffed	n/a

* *Staffing levels assume normal operations. A number of platforms may be suspended over the life of this EP, depending on production outlook, which would result in reduced staffing levels, or complete de-staffing.*

Oils and Chemicals Storage and Handling

Oils and chemicals are used as part of the daily operation of the platform (e.g. cleaning decks, fuelling crane, striping and painting handrails etc.) and in the platform process (e.g. corrosion inhibitors, water handling chemicals, well workover base fluid and chemical additives), and are bulk stored on the platform. Oils and chemicals are transferred via crane and stored as either packaged goods, in drums or in intermediate bulk containers (IBCs). If larger volumes are required (such as for diesel, glycol or methanol) they can be transferred to the platform via hose into a tank.

Bulk stored volumes vary between platforms, with the greatest volumes stored on WTN (582,000 L of glycol stored), SNA (diesel tank has a maximum capacity of 80,000 L) and TNA (220,000 L of methanol stored in TNA jacket leg). There is no storage of large volumes of glycol, methanol or diesel on FLA, HLA, KFA, KFB, WFK, MKA, MLA, MLB, PCA or DPA. Volumes of glycol at WTN will increase during the 5 year period for which this EP is in place, however volumes are not expected to be larger than those stored at other platforms. Some fuels or chemicals in equipment (e.g. coolers, turbines and fire pumps) are required to be changed out or topped-up and the excess or replaced fluids removed. These fluids are discharged to the open drain system. Oils going to the open pile are recovered and reinjected into the production system.

Drain and pile system

There are two distinct drain systems on the platform:

Open drain and deluge systems that handle:

- Chemicals, oils and waste from bunded areas or designated containment areas.
- Residual chemicals and hydrocarbons from process equipment draining
- Rainwater or sea spray runoff on decks
- Deluge drains that dispose of excess deluge water directly overboard.

Closed drain systems:

- Drain process equipment at higher than atmospheric pressure such as wellheads, separators and flowlines, process equipment and instrument bridles.
- Handle oils, chemicals and water in process streams, such as drainage from pressured equipment such as pig launchers/receivers and separators.

Skimmer piles are used to separate hydrocarbons from water in liquids directed to the open and closed drain. The open and closed drain systems each have their own skimmer pile caisson that interfaces with the sea via the pile window (open drain skimmer pile is a low-pressure skimmer pile and the closed drain skimmer pile is a high-pressure pile). Hydrocarbon vapours and liquids migrate to the top of the pile and settle out on top of the water (Figure 2-3). Hydrocarbon liquids from the open drain system are pumped to the closed drain skimmer pile. Hydrocarbon liquids from the closed drain skimmer pile are returned to the process.

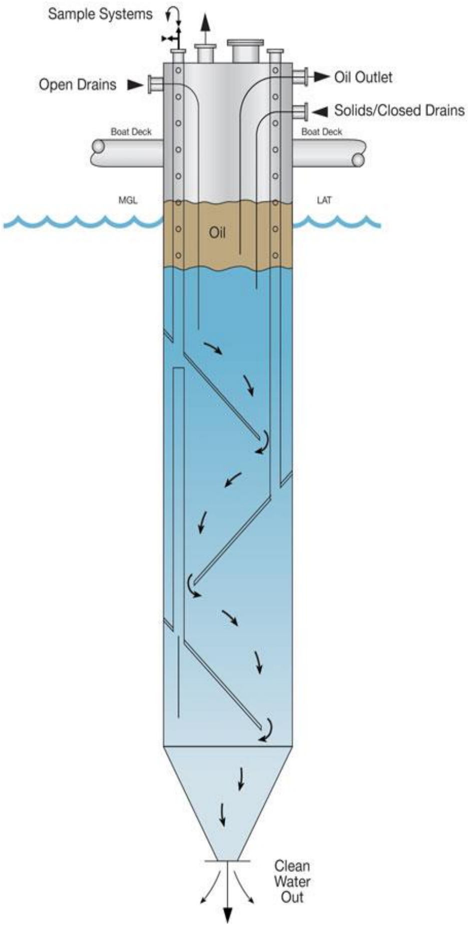

Figure 2-3 Generic diagram of pile system

The volume of oil in each skimmer pile is determined from the position of the oil/water interface. This is detected by measuring the differential pressure across two bubbler tubes positioned at different depths in the pile, e.g. WTN CDSP has these at 4m below MSL and 35m below MSL. The position of this interface can be measured directly as long as the interface sits between these levels. Purge gas is used to operate the bubbler tubes (nitrogen gas may be used if purge gas is not available).

Signals from level interface transmitters are used to:

- Start and stop the submersible skimmer pump(s) automatically, although a manual mode is used at times to suit operational requirements;
- Shutdown the pump(s) on low oil volume level to protect the pump(s) from damage;
- Trigger low / high oil volume alarm(s), and / or;
- Trigger a surface shutdown on high oil volume (typically CDSP only).

Open Drain Skimmer Pile (ODSP)

The open drain skimmer pile is used to collect all liquids from the atmospheric drains and to separate the hydrocarbons from the water by allowing water to flow out to sea via the sub-sea window, typically more than 35 metres below sea level. Hydrocarbons are then pumped to the closed drain skimmer pile by the open drain skimmer pile pump(s) and then to the skimmer vessel by the closed drain skimmer pile pump.

All open drains connected to the open drain skimmer pile have an atmospheric break between the equipment and the open drain header to avoid the possibility of pressuring up the open drains or open drain skimmer pile system. The only connection to the closed drain skimmer pile is via the open pile pump discharge line, which is protected against backflow by check valves and a shutdown valve.

The open drain skimmer piles on the MLB and WTN are fed by a non-hazardous drain header and a hazardous drain header from the process areas.

The non-hazardous drain header has a water-seal loop to prevent back flow of vapours to non-hazardous areas.

Closed Drain Skimmer Pile (CDSP)

The closed drain skimmer pile is used to collect all liquids from the closed drain system, and to separate the hydrocarbons from water by allowing the water to flow out to sea via the subsea window, e.g. at minus 44 metres on WTN. Hydrocarbons are then pumped to the skimmer vessel by the closed drain skimmer pile pumps.

Details of the open and closed drain skimmer piles for all platforms are included in Table 2-3.

Table 2-3 Bass Strait Operations - Open and Closed Drain Skimmer Piles

Platform	Closed Drain Skimmer Pile (CDSP)	Open Drain Skimmer Pile (ODSP)
BTA	• The CDSP is dosed with biocides, emulsion breakers, and other process chemicals. • Liquid originates from the production system • CDSP volume – 12.5 KL • Subsea window depth (MSL) – 43m • No mercury discharge	• Liquid originates from open drain system, hydrocarbon liquids from fuel gas system • ODSP volume – 12.5 kL • ODSP subsea window – 43 m
WTA	• The CDSP is dosed with biocides, emulsion breakers, and other process chemicals • Liquid originates from the ODSP • CDSP volume – 113 kL • Subsea window depth (MSL) – 50 m • No mercury discharge	• Liquid originates from open drain system • ODSP volume – 55 kL • ODSP subsea window – 50 m

MLA /MLB	• The CDSP is dosed with biocides, emulsion breakers, and other process chemicals
	• Liquid originates from:
	  ○ MLA: production system, ODSP, fuel gas scrubber
	  ○ MLB: production system, flare scrubber
	• CDSP volume – 14.5 KL
	• Subsea window depth (MSL)
	  ○ MLA: 47 m
	  ○ MLB: 16.9 m
	• Infrequent mercury discharge
		• Liquid originates from open drain system
		• ODSP volume – 14.5 kL
		• ODSP subsea window:
		  ○ MLA: 47 m
		  ○ MLB: 16.9 m

WTN	• The CDSP is dosed with biocides, emulsion breakers, and other process chemicals. • Liquids originate from the skimmer vessel, HP closed drain system flare scrubber, ODSP. • CDSP volume – 150 KL • Subsea window depth (MSL) – 44m • Infrequent mercury discharge	• Liquid originates from the open drain system, hydrocarbon liquids from fuel gas system • ODSP volume – 130 kL • ODSP subsea window – 44 m

<table>
<tr><th>Platform</th><th>Closed Drain Skimmer Pile (CDSP)</th><th>Open Drain Skimmer Pile (ODSP)</th></tr>
<tr><td>HLA</td><td>The CDSP is dosed with biocides and demulsifier.
Liquid originates from the production system and the flare scrubber
CDSP volume – 17.9 KL
Subsea window depth (MSL) – 50 m
No mercury discharge</td><td>Liquid originates from open drain system
ODSP volume – 5.5 kL
ODSP subsea window – 46.5 m</td></tr>
<tr><td>FTA</td><td>The CDSP is dosed with biocides, emulsion breakers, and other process chemicals.
Liquid originates from the production system and the ODSP
CDSP volume – 164 KL (at 18 m)
Subsea window depth (MSL) – 60 m
No mercury discharge</td><td>Liquid originates from open drain system
ODSP volume – 38 kL (35 m)
ODSP subsea window – 40 m</td></tr>
<tr><td>CBA</td><td>The CDSP is dosed with biocides, emulsion breakers, and other process chemicals.
Liquid originates from the production system
CDSP volume – 240 KL (at 35 m)
Subsea window depth (MSL) – 55.7 – 57.7 m
No mercury discharge</td><td>Liquid originates from open drain system
ODSP volume – 38 kL (38 m)
ODSP subsea window – 55.7 – 57.7 m</td></tr>
<tr><td>MKA</td><td>The CDSP is dosed with biocides and demulsifier.
Liquid originates from the production system and the ODSP
CDSP volume – 235 KL
Subsea window depth (MSL) – 84m, 85m, 86m, 87m (4 windows)
No mercury discharge</td><td>Liquid originates from open drain system
ODSP volume – 38 kL
ODSP subsea window – 56.5 m</td></tr>
<tr><td>KFA /KFB /WKF</td><td>The CDSP is dosed with biocides, emulsion breakers, and other process chemicals.
Liquids originate from the production system, flare scrubber and ODSP.
CDSP volume:
WKF: 240 KL (at 35 m)
KFA & KFB: 25.5 KL (at 35 m)
Subsea window depth (MSL):
WKF: 69.5 m
KFA & KFB: 50 m
No mercury discharge</td><td>Liquid originates from open drain system
ODSP volume:
WKF – 55 kL (35 m)
KFA & KFB – 35.5 kL (35 m)
ODSP subsea window:
WKF – 67 m
KFA & KFB – 46 m</td></tr>
<tr><td>TNA</td><td>The CDSP is dosed with biocides, emulsion breakers, and other process chemicals
Liquid originates from the production system
CDSP volume – 215 kL (at 21.4 m)
Subsea window depth (MSL) – 52.1 m
No mercury discharge</td><td>Liquid originates from open drain system, fuel gas system
ODSP volume – 38 kL (35 m)
ODSP subsea window – 38.5 m</td></tr>
<tr><td>SNA</td><td>The CDSP is dosed with biocides, emulsion breakers, and other process chemicals
Liquid originates from the Low pressure drain systems, and the ODSP</td><td>Liquid originates from open drain system, fuel gas system
ODSP volume – 38 kL</td></tr>
</table>

Platform	Closed Drain Skimmer Pile (CDSP)	Open Drain Skimmer Pile (ODSP)
	• CDSP volume – 240 KL • Subsea window depth (MSL) – 49 m • No mercury discharge	• ODSP subsea window – 35.8 m
FLA	• The CDSP is dosed with biocides, emulsion breakers, and other process chemicals. • Liquid originates from the production system and the ODSP • CDSP volume – 200 KL (at 25 m) • Subsea window depth (MSL) – 49.6 m • No mercury discharge	• Liquid originates from open drain system • ODSP volume – 35 kL (32 m) • ODSP subsea window – 40 m

BMA/ BMB	• The CDSP is dosed with biocides (BMB only). There is no CDSP at BMA.
	• Liquid originates from the production system
	• CDSP volume – 200 KL (at 23 m)
	• Subsea window depth (MSL) – 50.9m
	• No mercury discharge
		• Liquid originates from:
		  ○ BMA: open drain systems
		  ○ BMB: sump tank
		• ODSP volume – 23 kL (23 m)
		• ODSP subsea window – 34.2 m

PCA /DPA	• PCA and DPA have a drain sump that is used to drain process fluids when preparing equipment for maintenance. • The drain sump is dosed with biocides, emulsion breakers, and other process chemicals	N/A

Cranes and lifting

Each platform is equipped with cranes which undertake lifts for operation and maintenance activities.

Safety Systems

All platforms are equipped with a firefighting system in case of an emergency. Firewater pumps supply water to deluge and sprinkler systems upon detection of a fire.

Fire-fighting foam can be applied via the deluge system or hose reels. It is also used as a pile blanket when removing and replacing the skimmer pile pump(s).

All platforms (excluding PCA and DPA) have a foam deluge system. Operation of the foam deluge system could occur either as part of testing the system or as demanded during an actual fire event.

Flaring and Venting

A flare is present on all platforms apart from PCA, DPA and BMB. Non-routine and safety flaring is conducted for the safe disposal of hydrocarbons during process upset, maintenance, commissioning / start-up or emergency conditions. Flare systems are designed for a maximum flow rate capacity such that the entire platform is able to be blown down rapidly. No routine flaring is undertaken.

Use of flares to combust gas significantly reduces greenhouse gas emissions (CO_2-e levels) when compared to venting because gas (mainly methane, CH_4) is converted to CO_2 and H_2O. Methane has a global warming potential (GWP, or CO_2-e value) of 28 to 36 (i.e. releasing 1 kg of CH_4 into the atmosphere is equivalent to releasing 28 to 36 kg of CO_2). Flares can achieve 95% efficiency, so that flaring of excess gases – instead of cold venting - results in a significant reduction in GWP (over 95% reduction if gas stream is assumed to be 100% methane).

Flares are used to safely combust gases collected from process and emergency streams, ensuring that they are disposed of in a safe manner, minimising the risk to personnel or adverse environmental impact. The safe disposal of hydrocarbon that is unable to be processed is integral to the safe operation of an offshore processing facility. Despite this, the aim is to minimise flaring, both because it results in unnecessary GHG emissions, and it represents an economic loss.

During standard operation, the flare tip remains lit with a pilot light. The pilot light is maintained with a small amount of gas such that the flare normally stays alight. If the pilot light is blown out (e.g. due to high winds) the flare is relit as soon as practicable.

Each flare has a flare scrubber located at the base of the flare boom. The flare scrubber removes bulk liquid from the gas stream to minimise burning of liquids at the flare tip. Liquids removed from the flare scrubber are directed to the closed skimmer pile. Typical sources of flared gas are shown in Figure 2-4.

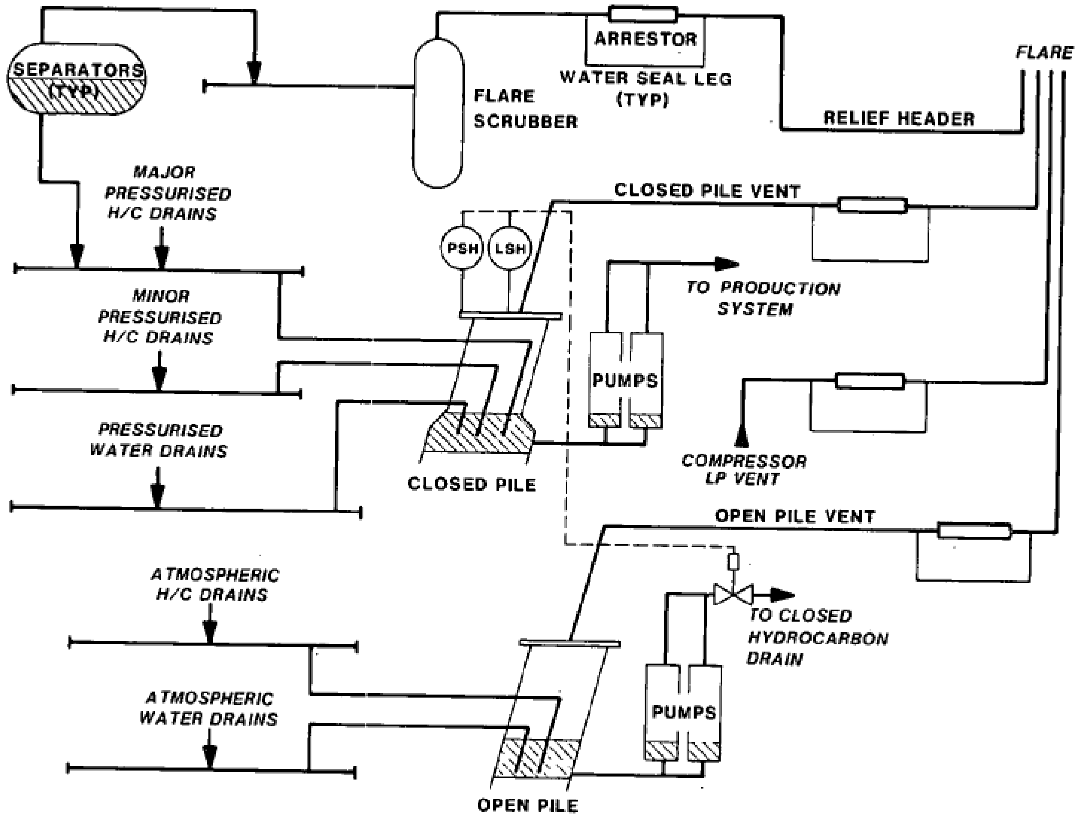

Figure 2-4 Generic Flare Vent & Drain Model

Flaring targets are set annually for all offshore facilities. The combined daily average target is typically 25-30 ksm^3/d. Elevated flaring rates are generally due to process upsets, during maintenance activities, or during start-ups. Flaring guidelines detail the approval process required where flaring is anticipated to be sustained above normal levels for >12 hours. In maintenance planned activities, the preference will be to send gas to flare rather than vent.

For low pressure systems, such as open and closed drains, there are small volumes of gas that are vented via dedicated lines up the flare boom. These vent sources include low pressure compressor vents, seal gas vents and flexible pipeline gas vents. An annual review is undertaken of all identified venting events via these sources across the offshore platforms. The quantity of venting is typically ~350 tonnes per year.

Produced Formation Water

Produced Formation Water (PFW) is generated throughout the Bass Strait Operations. PFW is either treated offshore before discharge or transported back to shore. Platforms which are shut in and do not produce PFW include: MKA, KFA, WTA. Water produced on the MLA and BTA platform is transported to shore for treatment. There is currently no PFW water treatment or discharge at MLB, however any water generated in the future will be treated and discharged at the platform.

Produced water is separated from crude in production separators. Chemical additives are injected at various points to assist oil/water separation and when warranted, dye may be injected to assist with monitoring of the produced water plume. Oily water from separators is drawn off and directed to a secondary separation stage. This could be dissolved gas flotation units, hydrocyclones, degasser vessels or a combination. Details of PFW treatment systems on each platform are described in Table 2-4.

Reject oil from the secondary separation stage is returned to the process. 'De-oiled' water is discharged. Oil content in PFW being discharged overboard is monitored. In the event that oil in water content of PFW being discharged exceeds accepted limits, the water handling system has an alarm with associated procedures for corrective actions.

Table 2-4 Bass Strait Operations - PFW Process Descriptions

Platform	Produced Water Primary Separation	Produced Water Secondary Separation
WTN	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to hydrocyclone skids. Chemicals are injected into the water outlet stream of the production separators to aid oil/water separation. Treated water generated from the hydrocyclones is processed through a DGF and subsequently discharged overboard.	Reject streams generated from the hydrocyclones are directed to a degasser to allow further separation to occur. Gas evolved from the degasser is directed to the flare header whilst oil generated is returned upstream in the production process.
HLA	Primary separation of bulk fluids is achieved by the production separators with chemicals being injected at varying rates at the inlet of each separator to assist with oil/water separation.	Post primary separation, the water stream is passed either through Dissolved Gas Flotation (DGF) vessels or a hydrocyclone unit. Reject streams generated from the DGFs and the hydrocyclone will be further processed in the degasser vessel or the skimmer vessel before being reinjected into the oil pipeline. Treated water from the DGFs and hydrocyclone is discharged to sea.
FTA	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to hydrocyclone skids. Treated water generated from the hydrocyclones is discharged overboard through the water overboard line.	Chemicals are injected at the inlets of the production separators to aid oil/water separation. Reject oily water generated from the hydrocyclones flows to the degasser vessels where it is directed to the closed pile.
CBA	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to hydrocyclone skids. Treated water generated from the hydrocyclones is discharged overboard through the water overboard line.	Chemicals are injected at the inlets of the production separators to aid oil/water separation. The reject oily water generated from the hydrocyclones flows to degasser vessels and is subsequently pumped back into the main oil line or is automatically directed to the closed skimmer pile.
KFB	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to two DGF vessels that are in parallel.	Treated water post treatment in the DGF vessels is discharged to sea while oil goes to the skimmer vessel.

Platform	Produced Water Primary Separation	Produced Water Secondary Separation
WKF	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to hydrocyclones. Treated water generated from the hydrocyclones is discharged overboard through the water overboard line.	Reject streams generated from the hydrocyclones are fed to the degasser vessel for further treatment. The gas from the degasser vessel feeds into the relief header, which the liquids are pumped back into the production separators.
TNA	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to deoiler hydrocyclones.	Treated water generated from the hydrocyclones is either passed through a degasser vessel or discharged overboard through the water overboard line. Reject oily water from the deoiler hydrocyclones is sent to the skimmer vessel for further separation
SNA	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to deoiler hydrocyclones. Chemicals are then injected into the water stream to aid with oil/water separation.	Treated water generated from the hydrocyclones is then passed through a DGF vessel and discharged overboard through the water overboard line. Reject streams generated from the hydrocyclones and the DGF vessel combine and pass through a subsequent DGF vessel. Gas evolved from this is directed to the relief headers whilst oil generated is returned to the suction end of the MOL pump through oily water pumps.
FLA	Primary separation of bulk fluids is achieved by the production separators with the water stream generated being directed to hydrocyclone skids. Treated water generated from the hydrocyclones is discharged overboard through the water overboard line.	Reject streams generated from the hydrocyclones are directed to a degasser to allow further separation to occur. Gas evolved from the degasser is directed to the flare header whilst oil generated is returned upstream in the production process.
BMA	Primary separation of bulk fluids is achieved by the production separators or slug receiver with the water stream generated being directed to hydrocyclones. Treated water generated from the hydrocyclones is discharged overboard through the water overboard line.	Reject streams generated from the hydrocyclones are directed to a degasser to allow further separation to occur. Gas evolved from the degasser is directed to the flare header whilst oil generated is returned to the production header via oily water pumps.

2.4.1.2 Subsea Facility Operation

The BTW, SHA and TWA Seahorse and Tarwhine subsea facilities are located within the ATBA, whilst Kipper KPA and Blackback BKA are located outside. In lieu of AMSA approval to extend the ATBA, subsea coolers are positioned at KPA to assist in protecting the manifold and flowbases from fishing snag loads. Locations and details of subsea facilities are described in Appendix A and are shown in the schematic in Figure 2-2.

Subsea facilities are complex systems designed to transfer hydrocarbons from subsea wells to the platform or pipeline. The subsea facilities are typically made up of a combination of the following infrastructure:

- Subsea Trees: used to control well conditions temperature/ pressure and supply chemicals if required
- Subsea Control Modules (SCMs): electrical and hydraulic systems that control the flow of hydrocarbons and chemicals through the subsea facility
- Electric and hydraulic jumpers: connect the subsea infrastructure and used to communicate hydraulic and electric communications
- Flowlines/ spools: Transport hydrocarbons from wells to the pipelines or platform risers
- Flowline End Manifolds (FLEM) that connect flowlines to jumpers

- Pipeline Terminal Assemblies (PTA) – again for connecting flowlines or pipelines to jumper
- Flowbases: where well heads and trees are located
- Subsea coolers: Cooling systems on the subsea floor to cool down process fluids
- Umbilicals: Transport electric and hydraulic signals between the platform and the SCM/subsea trees. May also have chemical lines to supply chemicals to the wells and pipelines.
- Risers: Transport hydrocarbons for the seabed to the platforms

The subsea facilities are ‘hosted’ from a platform and controlled via hydraulic and electrical umbilicals. Hydraulically actuated subsea tree, wellhead and subsurface safety valves are remotely operated from the host platform. A small volume of hydraulic fluid (approx. 1000 L per week) is released to the marine environment at each subsea tree valve operation.

Chemicals for corrosion inhibition and hydrate inhibition (e.g. Monoethylene Glycol (MEG) and methanol) are injected into the subsea wells via a chemical umbilical from the host platform.

2.4.1.3 Pipeline Operation

All pipelines (with the exception of part of the WTN350 (North & South), MKA-BKA65 and BKA – MKA200, and the PCA – Shore300 and Shore – PCA100) are located within the ATBA.

Locations and details of pipelines are described in Appendix A. Offshore pipelines are laid on the seabed between platforms, between platforms and subsea facilities and between platforms and shore, as shown in the schematic in Figure 2-2. Many pipelines are either fully or partially self-buried. In addition to having concrete weight coating some are stabilised with concrete or grout mattresses to provide resistance to pipeline movement.

External pipeline surfaces are coated to prevent corrosion and external corrosion protection is further augmented via cathodic protection (impressed current local to the host platform and sacrificial anodes along the pipe). Both oil and gas pipelines are pigged to remove potential obstructions and pooled water and injected with corrosion inhibitor. MEG and/or methanol is injected into the gas streams at each platform to inhibit the formation of hydrates.

The only routine planned discharge from pipelines is from valve actuation and involves small (<10 L) intermittent discharges of hydraulic fluid.

2.4.2 Wellwork

2.4.2.1 Wireline / Workover Activities (general)

Wellwork activities include any work performed on or in the subsurface part of an existing wellbore.

Wellwork activities can include completions, productivity improvement workovers, well servicing workovers and plug and abandon workovers. Wellwork can be completed via conventional workovers, concentric workovers, wireline workovers or rigless workovers.

- Conventional workovers: When the production Christmas tree is removed and BOP equipment is installed on top of the tubing head or wellhead flange.
- Concentric workovers: When small diameter pipe is used, with or without removing the Christmas tree. BOP equipment is installed above the Christmas tree. This also applies to wellwork involving coiled tubing equipment.

- Wireline workovers: When slick, braided, or conductor line is used through the tubing string, with or without removing the Christmas tree. Wireline BOP equipment is installed above the existing Christmas tree.
- Rigless workovers: When WellWork Execution operations are being conducted without the use of any type of rig. These could involve high pressure pumping operations (acidizing), well circulations, and so forth.

Conventional and concentric workovers require a workover rig to be assembled on the platform. Workover rigs used on Bass Strait platforms sit on the platform main deck. All rigs have a power generation source and pumps with the ability to pump fluids into the well. Wireline workovers use a workover spread which consists of an A-frame, BOP/pressure-control equipment, line units, and pump.

Prior to completing wellwork activities, the well and topsides must be depressured. Returns during depressuring are directed to the platform's production system as far as practicable (until at equal pressure with the system). Final depressuring to atmospheric pressure requires residual gas to be vented and liquids directed to the drain system.

All workovers use workover fluids as part of the workover operations. This includes brines, barite, and additives such as baracarb and other salts, corrosion inhibitor, biocide, oxygen scavenger, friction reducers, viscosifying agents, solvent and/or surfactant spacers, gels, polymer and cement. Fluid returns are directed to tanks or shakers prior to discharge to allow for settling of solids and/or monitoring of hydrocarbons. If hydrocarbon liquids are detected, returns are diverted to the platform's pipeline without discharge to the environment.

In some cases, milling is required to cut and remove material from equipment or tools located in the wellbore. Following milling, circulated fluids may bring up milled material from the wellbore, which is captured and disposed on shore.

In some cases, wellwork can include the removal and replacement of the production tubing string after the well has been killed and a workover rig has been placed on location.

Well logging is undertaken to determine rock and fluid properties of the targets. The well may be evaluated using Logging While Drilling (LWD) techniques and mud logging. Nuclear, Electric or Acoustic measurement tools can be used to identify different rock types down the well.

As part of Wellwork operations, formation samples can be collected to determine the presence of oil or gas. At the same time, reservoir pressure can be measured, using a down-hole pressure gauge to determine aquifer and hydrocarbon pressures.

2.4.2.2 Well Decommissioning

Esso has an ongoing well abandonment programme. The Esso Bass Strait Well Operations Management Plan (WOMP) includes a current list of wells within the Gippsland Basin and their status. Where a suspended well is P&A'd and/or fully abandoned, the WOMP is updated to reflect the revised well status. In order to avoid discrepancies in this EP, we refer to the most current version of the NOPSEMA approved WOMP for a well status overview.

2.4.2.3 Cementing

Remedial cementing consists of operations performed to repair a well or to alter its configuration. This usually involves the placement of small volumes of cement to seal perforations or defects in the primary cement sheath or to set cement plugs to isolate all or part of the wellbore.

The type of cement, cement additives and volume required for cementing operations is dependent on a number of factors such as the type of completion, the age of the well, the type of fluid in the wellbore, and the depth of the workover operation. Additives may be added to cement to alter the characteristics to meet technical requirements. Key considerations for cement type are the weighting and the time to set.

2.4.2.4 Conductor cutting and pulling

Conductor cutting and pulling will occur when well casing is removed. Wells are plugged and abandoned prior to cutting and pulling conductors. Flowback between the flowline and casing annulus will occur, with limited discharge of interface fluids to the marine environment during the final cut.

2.4.2.5 Conductor clean out

Conductor clean-out operations involve cleaning the conductor of seabed sediment before a hole is cased. A pump transports mobilised sand and brine inside the conductor up-hole and overflows the conductor directly to sea.

2.4.2.6 Sandwash

Sandwash operations involve cleaning of the casing inside the cased hole to gain access to reservoir zones deeper than the well hang-up depth. The well will be killed prior to sandwash operations, meaning that there will be no hydrocarbons in the well. A pump transports mobilised sand and brine inside the casing up-hole to a hose that discharges into a drum that collects the sand deposits and allows the fluid to overflow the drum and overboard. The sand is captured and sent onshore for disposal. In some cases, a gel pill will be used to provide additional mobilisation / flow of sand.

2.4.3 Inspection, Maintenance and Repair (IMR)

Inspection, maintenance and repair is undertaken regularly on all platforms (Facility IMR – 2.4.3) and on pipelines and subsea structures (Pipeline and Subsea IMR – Section 2.4.3.2). Subsea is the term used for all infrastructure found below the waterline, e.g. riser, platform legs, pipelines and subsea components.

Equipment may be wet stored on the seabed on a temporary or long-term basis as part of IMR or during an emergency situation. This could include equipment which has become redundant including well head infrastructure and pipelines.

2.4.3.1 Facility IMR

Facility IMR activities are required to ensure platform wells and topside equipment are maintained and working correctly. An inspection regime as defined by the relevant Facility Integrity Management System (FIMS) program is in place to identify faults before they become health, safety or environmental issues. Facility IMR consists of a wide variety of mechanical, electrical and structural activities which fall into two categories:

- Preventative maintenance, which is planned, and;
- Repairs as a result of an unplanned failure of equipment or identification through inspection.

A number of activities may be undertaken to prepare equipment for IMR, including:

- Air freeing;
- Hydrocarbon freeing (potential small volumes of venting);
- Breaking containment;
- Isolation and depressuring; and
- Cleaning and the removal of residual hydrocarbons.

Full platform facility shutdowns may be required during IMR activities. Once maintenance and repair activities are completed the platform is re-started.

Inspection Methods

The primary inspection methods during Facility IMR are listed in Table 2-5.

Table 2-5 Inspection methods during Facility IMR

Activity	Purpose
Non-destructive testing	Non-destructive testing (NDT) is a non-invasive technique for evaluating the properties of a material. Various FIMS programs complete extensive NDT across platforms to evaluate fitness for service.
Leak and pressure testing	Leak and pressure testing can be completed prior to or following maintenance work to test the integrity of equipment and identify required maintenance.
Deluge testing	The deluge system is designed to supply firewater simultaneously to one deluge area and two hose reels, using one firewater pump.

Note: This table is not an exhaustive list of inspection activities. Activities may be adapted or added to accommodate specific scope requirements.

Maintenance and Repair Activities

Periodic preventative maintenance activities are undertaken regularly on all platforms. Maintenance intervals are defined in Equipment Strategies, and are based on a predetermined schedule which is updated based on the outcome of inspections.

Abrasive blasting involves the use of sand, grit or hydro gritting/ultra-high pressure water for surface preparation including rust and paint removal, can be undertaken on surface pipework and production vessels (internal and external). Blasting is also undertaken during recoating programs during which the original coating/paint is removed to ensure a clean surface remains for the new protective coating, such as passive fire protection (PFP).

Hot work may be required to complete maintenance activities. Hot Work includes; welding, cutting, burning, use of open flame, grinding, and any work activity generating sparks or slag.

Maintenance may involve regular activities such as:

- Maintenance and calibration of instrumentation;
- Function testing;
- De-sanding;
- Pump, compressor and generator servicing;
- Greasing of equipment; and
- Structural maintenance.

For larger turbine equipment, maintenance could involve:

- Filter changes (oil filters, fuel gas filters) which involves draining oil/diesel from turbine generators;
- Oil changes which involves draining of old oil and replacement with new oil;
- Washing of engines which involves pumping water (sometimes with a cleaning agent) into engines to assist in cleaning;

Platform well maintenance activities may include:

- Valve maintenance: Consists of greasing and functioning the valves to ensure integrity and working correctly;
- Well interventions, which are undertaken if a well is not functioning correctly and may include the following activities: change out of valves, trees and chokes; chemical squeezes, as well as slickline interventions, installation of valves, perforating wells; and
- Well unloading and clean up. Well clean-up and unloading may be required for either maintenance of wells to handle oil in water or to clean the remaining fluid from a newly drilled or perforated well.

Repairs may be identified through an inspection or surveillance program. Repair activities may include:

- Spooling wraps, clamps or replacements;
- Repair of valves;
- Pump repair and replacement;
- Electrical repairs; and
- Repairs to turbine equipment such as generators, MOL pumps, gas compressors.

2.4.3.2 Pipeline and Subsea Facility IMR

Inspection, Maintenance and Repair is completed on subsea assets including pipelines, piled steel jackets, concrete gravity base structures and subsea facilities.

Inspection methods

Inspection is the process of physical verification to detect differences from previous or baseline inspections. Inspections are undertaken throughout the life of field and can be used to determine changes in subsea infrastructure or existing environment. Results of inspection are used to inform FIMS assessments and prioritise subsea and pipeline maintenance and repair activities.

The primary inspections methods during pipeline and subsea facility IMR are listed in Table 2-6.

Table 2-6 Inspection Methods during Pipeline and Subsea IMR

Activity	Purpose
Visual Inspections	Inspect infrastructure for integrity and for corrosion
Side Scan Sonar / Multibeam Sonar	Used to identify pipeline alignment and location (freespans, pipeline crossings, supports exposure/burial) and subsea features (debris etc.).
Sub bottom profiling	Generates visual profile of the seabed
Non-destructive Testing	Use of technologies (e.g. ultra-sonic, eddy current, time of flight detection (TOFD), x-ray, radioactive) to evaluate material properties and test for defects
Flooded member Detection	Used to inspect subsea platform structural members for through wall defects
Environmental Surveys	Sediment, water and environmental sampling
Pigging / intelligent pigging	Internal integrity inspection and / or cleaning of pipelines
Cathodic Protection Potentials Measurement	Verification of cathodic protection effectiveness of structures and pipelines using a CP probe

Note: This table is not an exhaustive list of inspection activities. Activities may be adapted or added to accommodate specific scope requirements.

Scope of and frequency of inspections are determined by the ‘Facility Integrity Management Systems (FIMS) requirements as detailed in specific Equipment Strategies (ES) and applicable Integrity Program Manuals (i.e. Pipeline Program Manual and the Structural Equipment Integrity Program Manual’).

Maintenance Activities

Maintenance activities (Table 2-7) are undertaken at regular scheduled intervals to prevent deterioration and maintain performance of subsea equipment.

Table 2-7 Typical Maintenance Activities

Activity	Purpose	Methods
Debris clearance	Access subsea infrastructure	ROV / divers
Marine growth removal	To remove excess marine growth to allow access to subsea infrastructure	Water jetting, brush systems or acid to dissolve calcium deposits.
Sediment relocation	Access subsea infrastructure	Suction pump / dredging unit typically mounted on an ROV.
Cleaning	To remove both internal and external obstructions from subsea infrastructure	Internal pigging of pipelines, water jetting, marine growth removal from infrastructure.
Hydrate inhibition	To prevent formation of hydrates in gas pipelines.	Glycol or methanol injected into gas pipelines to inhibit formation of hydrates in pipework, pipelines and associated fittings. Pipelines may require depressurisation.
Leak detection	To identify location of the leak.	Flush infrastructure with dye to detect leak.
Installation of sleeves / clamps	Protect pipeline, prevent corrosion, prevent leaks	Installation of sleeves/clamps on subsea infrastructure by ROVs
Grinding	To remove rusted bolts/materials from subsea infrastructure	Grinder tool typically mounted on ROV
Installation of grout bags / mattresses	Span rectification, protection and stabilisation	Bags are placed on the seabed and filled with grout or rocks installed on the seabed through a downline from a vessel.
Installation of concrete mattresses	Scour control, span rectification, protection and stabilisation	Installed on the seabed from a vessel.
Rock placement	Span rectification, protection and stabilisation	Placement of rock on the seabed from a vessel.
Wet store	Store subsea infrastructure and/equipment on the seabed	Placement of equipment /infrastructure on the seabed using ROV /divers
Corrosion protection	Protect subsea infrastructure from corrosion	Installation of anodes or corrosion resistant material. Injection of corrosion inhibitor.
Installation of subsea rigging	Temporary dropped object mitigations	Manipulation and installation of subsea rigging using ROV friendly slings/tools

Note: This table is not an exhaustive list of maintenance activities. Activities may be adapted or added to accommodate specific scope requirements.

Note: A number of these maintenance activities may occur together as part of a repair / replacement / suspension scope

Repair / Replacement Activities

Repair or replacement activities are required when infrastructure is damaged or deteriorated to a level outside acceptance limits and poses an elevated risk to safety, health or production reliability. These activities require the use of specialist vessels, equipment (ROVs) and potentially divers. The following subsea infrastructure may require repairs and/or replacements: Subsea valves, spools, subsea control modules, caisson, electric / chemical / hydraulic jumpers, umbilicals, subsea trees, trawl-protection frames, concrete mattresses, pipeline crossings, pipelines and risers.

The IMR activities required to replace subsea infrastructure typically follow the same general sequence:

- As found inspection: Using ROVs to take video footage of the infrastructure and surrounding area.
- Cleaning and removing any marine growth: Generally undertaken using ROV with specialist equipment such as brushes or jetting equipment. Chemicals (e.g. acids) may be used to aid the cleaning process
- Sediment relocation: Generally undertaken with ROV with specialist equipment to allow access to subsea infrastructure (pipelines)
- Flushing: Typically flushing cleans the infrastructure using chemicals (such as corrosion inhibitors and oxygen scavengers) at high pressures to clear the lines of more toxic chemicals or hydrocarbons.
- Isolation: To ensure equipment is safely isolated from the remaining subsea infrastructure and can be done through mechanically (ROV) or hydraulically.
- Repair or replacement/ installation: using a specialist vessel with ROVs with specialist tools, such as cutting tools to either repair or perform lifts and installation.
- Leak/ Pressure Tests: Are performed to ensure equipment is correctly installed and are sealed prior to commissioning. Dye may be used.

Suspension and Preservation

If the equipment has deteriorated outside acceptable limits and is not required to be repaired or replaced, it may be preserved and suspended until the end of field life.

The suspension of equipment involves similar activities as repair or replacement activities: inspection / as found survey; cleaning and removing any marine growth (if required); sediment relocation (if required); and isolation (typically by flushing using chemicals, hydraulics or mechanical means). In addition, to ensure the infrastructure is sealed and safe to be left suspended, caps may be installed at the end and it may be moved to a safe location on the seabed.

2.4.4 Support Operations

2.4.4.1 Vessel Operations

Vessels are used to support various offshore activities. Types of vessels include: platform supply vessels; support vessels; installation support vessels; and dive support vessels.

Platform supply vessels are used for loading and unloading of a variety of materials to and from the platform. This includes moving materials via the platform crane, bulk transfer of fluids, such as glycol, methanol, drilling fluids, brine, and some solid powders (such as cement, barite), and waste transfer.

Other vessels are used for underwater inspections, drilling, and specialised services. These vessels operate on an as-needs basis from onshore terminals.

Vessels are operated in accordance with International and Australian regulatory requirements and are subject to a marine assurance program.

2.4.4.2 Helicopter Operations

A fleet of aircraft operate out of the Longford heliport on a scheduled basis to support operations. In addition to transporting personnel, the helicopters carry urgent freight and critical spares for the operation of the facilities in Bass Strait. The number, type, and frequency of helicopters available depends upon the planned operations.

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. Non-emergency helicopter flights are limited to daylight hours.

2.4.4.3 ROV Operations

Subsea inspection, maintenance and repair may be undertaken by ROV or divers (either platform or vessel-based deployment).

ROVs and divers are linked to the vessel typically by umbilical cable and a tether management system (TMS). Most ROVs and divers are equipped with at least a video camera and lights. Additional equipment may include sonars, magnetometers, a still camera, a manipulator or cutting arm, water samplers, and instruments that measure water clarity, water temperature, water density, sound velocity, light penetration and temperature.

3 Environmental Impact and Risk Assessment Methodology

3.1 Overview

Environmental Impact Assessment is concerned with assessing the impacts resulting from activities that are reasonably certain to occur (such as planned discharges to the air or water), while Environmental Risk Assessment is concerned with assessing the risks resulting from 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 petroleum activity and will result in a change to the environment or a component of the environment, whether adverse or beneficial. For example, discharge of produced formation water to the marine environment 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 petroleum activity have been identified in accordance with ExxonMobil’s Environmental Aspects Guide (2012). This ExxonMobil Guide is designed to support the implementation of environmental management expectations of OIMS with special emphasis on, and linkage with ISO 14001 Environmental Management System specification.

3.2 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.
Direct impact	A direct impact occurs through direct interaction of an activity with the existing environment.
Indirect impact	An indirect impact is those which are not a direct impact but are the result of a complex impact pathway. These are often referred to as secondary impacts or risks.
Cumulative impact	Cumulative impacts occur when the incremental impact of the activity is combined with the cumulative effects of other past, present and reasonably foreseeable future projects.
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.

3.3 Identification and Characterisation of Environmental Aspects

In order to undertake meaningful impact and risk assessment, a clear understanding of the context of the assessment is required, through defining the activity and the receiving environment, and understanding any requirements (legislative or other) which are relevant to either the activity or the environment.

All components of the petroleum activity have been identified and described in Section 2 of this EP. The existing environment in the region is described in Volume 1, and a summary of environmental receptors in the receiving environment within the Operational Area and Potentially Exposed Area (PEA) is provided in Section 4 of this Volume (Volume 2).

In order to assess cumulative impacts, the spatial and temporal boundaries of the assessment must be set. For this EP, the following have been considered:

- Spatial – this is designed to capture all possible aspect interactions. The spatial boundaries for the assessment are described in Section 4.1.
- Temporal – this considered past, present and future activities and environments. The temporal boundary for this assessment is the duration of this EP validity i.e. 5 years.

3.4 Impact and Risk Identification

Once the context was established, an assessment was carried out to identify potential interactions between the petroleum activity and the receiving environment by considering impact pathways, known as environmental aspects. The relationships between activities and aspects is 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 a series of risk workshops (11 – 17 December 2018, 6 and 11 – 12 February 2019) focussed on validating the petroleum activity-specific impacts and risks and associated control measures.

Table 3-2 Activity – Aspect Relationships

	Physical Presence - Interference with Other Marine Users	Seabed Disturbance	Underwater Sound Emissions	Light Emissions	Emissions to Air	Planned Discharge - Brine	Planned Discharge - Cooling Water	Planned Discharge - Deck Drainage & Bilge	Planned Discharge - Sewage and Greywater	Planned Discharge - Food waste	Planned Discharge - Operational Fluids	Planned Release – Gas (subsea)	Planned Discharge - Cement	Planned Discharge – Solids	Physical Presence - NORM	Produced Water Discharge	Unplanned Interaction with Fauna	Unplanned Introduction of IMS	Accidental Release - Dropped Objects	Accidental Release - Cement	Accidental Release - LOC (chemicals / hydraulic fluids)	Accidental Release - Waste	Accidental Release - Bulk Transfer	Accidental Release - LOC (pipelines)	Accidental Release - LOC (bulk storage)	Accidental Release - LOC (vessels)	Accidental Release - Hydrocarbon from the piles	Accidental Release - Loss of Well Integrity / Loss of Well Control
Operations																												
Platform Operations	✓		✓	✓	✓	✓			✓	✓	✓					✓			✓		✓	✓	✓		✓		✓	✓
Subsea facilities operation											✓										✓							✓
Pipeline Operations	✓																				✓			✓				
Wellwork																												
Wireline / Workover Activities (general)					✓						✓								✓		✓							✓
Cementing													✓							✓								
Conductor cutting and pulling		✓									✓								✓									
Conductor Clean-out											✓			✓														
Sandwash											✓			✓														
Inspection, Maintenance and Repair (IMR)																												
Facility IMR					✓						✓			✓			✓		✓		✓							
Pipeline and Subsea IMR	✓	✓									✓	✓		✓	✓				✓	✓	✓							
Support Operations																												
Vessel Operations	✓		✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓		✓	✓				✓		
ROV Operations		✓		✓															✓		✓							
Helicopter Operations	✓		✓																									

3.5 Define Acceptable Levels

One of the objects of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (regulations) is to ensure that any petroleum activity carried out in an offshore area is carried out in a manner by which the environmental impacts and risks of the activity will be of an acceptable level. This is also one of the key criteria for acceptance of an environment plan.

The acceptable level of environmental impact and risk for each receptor needs to be defined before the environmental performance outcomes (EPOs) can be decided and the evaluation of those impacts and risks can take place.

An 'Acceptable level' is the specified amount of environmental impact and risk that the activity may have which would not be inconsistent with relevant principles, and not compromise management / conservation / protection objectives or the attainment of stakeholder / wider-community views in defining acceptable levels.

Table 3-3 presents the acceptable levels of impact for key values or sensitivities and the source used to develop the acceptable level statement.

Table 3-3 Acceptable Levels

Receptor / Value and Sensitivity	Acceptable Level	Source
Commonwealth marine area	Undertake the activity in a manner that will not result in a known or potential pest species becoming established.	MNES Significant guidelines for Commonwealth Marine Waters
Physical Conditions		
Ambient water quality	<u>Normal discharges:</u> Undertake the activity in a manner that will not result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. <u>Persistent or harmful chemicals:</u> Undertake the activity in a manner that will not result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.	MNES Significant guidelines for Commonwealth Marine Waters
Ambient sediment quality	Undertake the activity in a manner that will not result in a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	MNES Significant guidelines for Commonwealth Marine Waters
Air quality	Undertake the activity in a manner that will not result in a substantial change in air quality which may adversely impact on biodiversity, ecological integrity; social amenity or human health.	MNES Significant guidelines for Commonwealth Marine Waters
Climate	Undertake the activity in a manner that will not result in a substantial change in climate which may adversely impact on biodiversity, ecological integrity; social amenity or human health.	MNES Significant guidelines for Commonwealth Marine Waters
Ambient noise	Undertake the activity in a manner that will not result in a substantial change in ambient noise which may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results.	MNES Significant guidelines for Commonwealth Marine Waters
Ambient light	Undertake the activity in a manner that will not result in a substantial change in ambient light which may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results.	MNES Significant guidelines for Commonwealth Marine Waters

Receptor / Value and Sensitivity	Acceptable Level	Source
Ecological Receptors		
Listed threatened and migratory Species	Undertake the activity in a manner that will not lead to a long-term decrease in the size of a threatened or migratory listed species population.	For listed threatened and migratory species, EPBC Significant Impact Guideline 1.1 has been used to identify the relevant significant impact criteria.
Threatened albatross and giant petrel species	Undertake the activity in a manner that will not impact the long term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction.	National Recovery Plan for threatened albatrosses and giant petrels 2011 – 2016
White Shark	Undertake the activity in a manner that will not hinder the recovery of white shark in the near future, or impact on the conservation status of the species in the future.	Recovery Plan for the White Shark (*Carcharodon carcharias*) (2013)
Benthic habitats and communities Coastal habitats and communities	Undertake the activity in a manner that will not modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results.	MNES Significant guidelines for Commonwealth Marine Waters
Marine species that are not protected (i.e. not listed threatened or migratory species	Undertake the activity in a manner that will not have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	MNES Significant guidelines for Commonwealth Marine Waters
Wetlands	Undertake the activity in a manner that will not result in a substantial and measurable change in the water quality of the wetland which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Significant impact criteria for Wetlands of International Importance relevant to water quality.
Key Ecological Feature	Undertake the activity in a manner that will not result in modification, destruction, fragmentation, isolation or disturbance of an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area.	MNES Significant guidelines for Commonwealth Marine Waters
Economic, Cultural and Social Receptors		
Commercial fisheries Recreational users Commercial users Shipping Oil and Gas Activities	Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	The OPGGS Act Section 280

3.6 Environmental Impact Assessment

The severity of an impact from a planned event, referred to as environmental consequence, can be evaluated in terms of the degree of the effects and the sensitivity of the environment. Esso evaluates three effect dimensions (scale, duration, and intensity) and three environmental sensitivity dimensions (irreplaceability, vulnerability, and influence).

The determination of impact severity involves evaluating each dimension as lower, moderate, or higher based on qualitative descriptions. Once each dimension is evaluated, results for effect and sensitivity are compared against interpretive criteria to define the overall environmental consequence level (Table 3-4).

Table 3-4 Determination of environmental consequence

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.

3.7 Environmental Risk Assessment

3.7.1 Determination of Consequence

When assessing the consequence of an unplanned event, the same methodology is used as for determining the consequence of a planned event (as described in Section 3.6 Environmental Impact Assessment).

3.7.1.1 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 3-5.

Table 3-5 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' considering 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.

3.7.2 Determination of Probability

Once the most severe environmental consequence of an unplanned event is assessed, the probability of the unplanned event occurring is assessed. This is done by assessing the probability for each failure, event, or condition necessary to produce the impact.

In order to ensure that the highest possible risk is identified, scenarios with a lower severity consequence but higher probability and potentially a higher overall risk are also considered.

The five categories of probability are as shown in Table 3-6.

Table 3-6 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
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

3.7.3 Determining Significance of 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 categories 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.

3.8 Demonstration of ALARP

Control measures are selected to reduce either the consequence of an impact or risk, or the likelihood of an unplanned event occurring. Control measures that are required by legislation are considered 'Good Practice' within the oil and gas or offshore industry and are therefore adopted regardless of the evaluated impact or risk level. In some cases, the risk or impact level will be so low that no control measures will be identified which can reduce the consequence or likelihood.

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. Where good practice controls measures do not sufficiently reduce the risk or impact level, consideration of additional control measures may be required, including undertaking a comparative assessment of impacts or risks, costs and environmental benefits for identified control measures.

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.

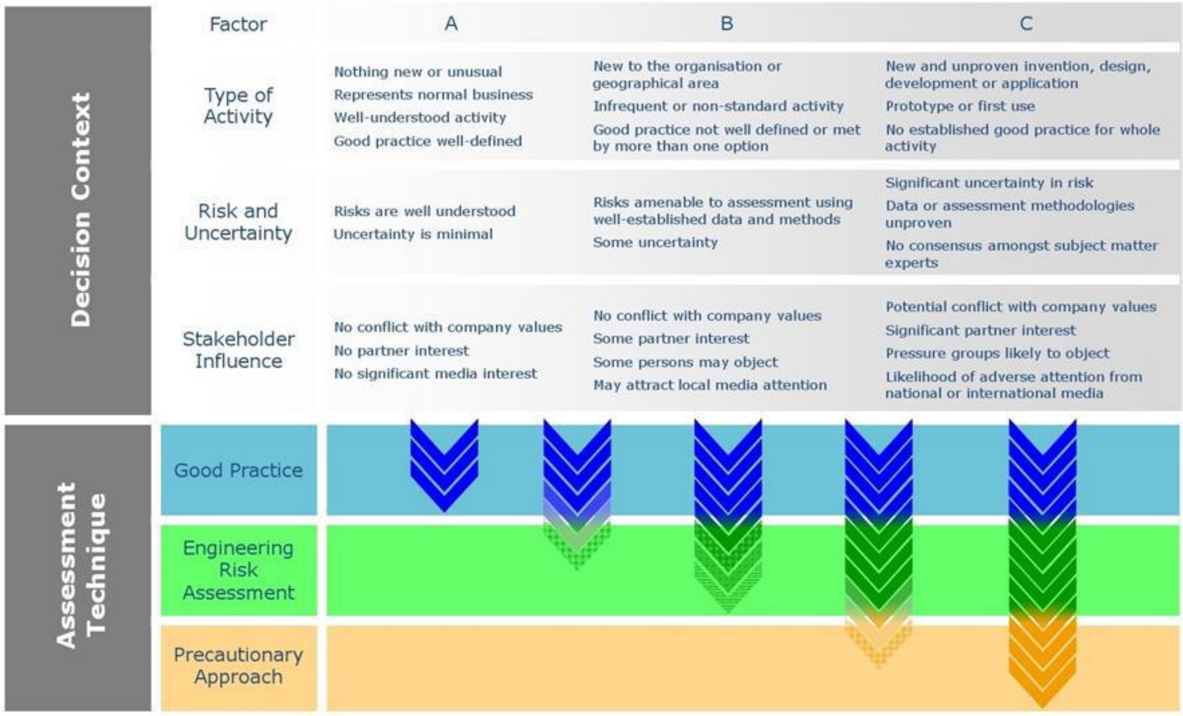

Figure 3-1 ALARP Decision Support Framework

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.

3.8.1.1 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.

3.8.1.2 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.

3.8.1.3 Precautionary Approach

OGUK (2014) states that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to 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.

3.9 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 is based on several factors, as outlined in Table 3-7 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 B, Nov 2016). The acceptability evaluation for each aspect associated with this activity is undertaken in accordance with Table 3-7. These factors are used to demonstrate acceptability in Section 5.

Table 3-7 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. [Note that this is only relevant for unplanned risks, not planned impacts]

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 undertaken 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 the Environment

4.1 Project Areas

Project Areas relevant to this EP include:

- Operational Area – the area where petroleum activities will take place. The Operational Area for this EP is defined as the area within a 500 m PSZ around the facilities listed in Table 2-1, and a 200m operational zone along the secondary lines connecting the facilities and the petroleum pipelines in Commonwealth waters (>3 NM from shore), as defined in the "Bass Strait Pipeline Network Safety Case" (BSPNSC).
- Potentially Exposed Area (PEA) - the outer edge of all simulations in stochastic modelling, using all worst case discharge scenarios (WCDSs) and the lowest relevant thresholds for the furthest reaching fate of hydrocarbons. While modelling carries some inherent uncertainty, the PEA 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.

4.2 Receptors within the Operational and Potentially Exposed Areas

In order to set the environmental context required to assess impacts and risks associated with the Esso Bass Strait Operations, receptors found within both the Operational Area and PEA need to be described. Volume 1 of this Environment Plan includes a detailed description of the existing environment within the Described Area, which encompasses the Operational Area and the PEA. Presence / absence of receptors within the Operational Area and PEA are provided in Table 4-1, with detailed descriptions of receptors found in Volume 1 of the EP.

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

- Presence of listed threatened or migratory species or threatened ecological communities identified in the EPBC Protected Matter searches.
- Presence of BIAs and habitats critical to the survival of the species.
- Presence of important behaviours (e.g. foraging, roosting or breeding) by fauna, including those identified in the EPBC Protected Matter searches.
- The link they provide to other receptors (e.g. nursery habitat, food source, commercial species).
- The human benefit they provide (e.g. recreation and tourism, aesthetics, economic benefit).

The EPBC Protected Matters Search Tool results are presented in Appendix B.

Table 4-1 Summary of the Existing Environment within the Operational Area and PEA related to the EP

Receptor Group	Receptor	Receptor Description	Values and Sensitivities		Operational Area		Potentially Exposed Area (PEA)
Regional							
Regional Context	Commonwealth Marine Region	Marine bioregion	• South-west Marine Region • Temperate East Marine Region	✓	**Present** The Operational Area lies entirely within the South-west Marine Region.	✓	**Present** The PEA lies within the South-west Marine Region and the Temperate East Marine Region.
Ecological Environment							
Marine Fauna	Fish	Fish (bony)	• Commercial and recreational species	✓	**Present** Commercial and recreational fish species occur within the Operational Area. Commercial fishing effort occurs in Commonwealth waters along the continental shelf and the upper continental slope. Most recreational fishing occurs in nearshore coastal waters & within bay and estuaries.	✓	**Present** The main commercial Commonwealth fisheries in the PEA are the Southern and Eastern Scalefish and Shark Fishery. Primary target species include Blue grenadier, Tiger flathead, Silver warehou, Gummy shark, Pink ling. Moderate to high recreational use along the majority of the coast. Common recreational fish species include Tiger flathead, bream, snapper, Australian Salmon, and lobster. Offshore catches can include mackerel, tuna, groper and shark.
			• Listed Marine Species • BIA	✓	**Present** 26 listed marine species (or species habitat) of fish may be found in the Operational Area. No important behaviours or BIAs have been identified.	✓	**Present** 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, but usually at depths of between 5 and 25 m

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
							55 syngnathid species (or species habitat) may occur within the PEA. No important behaviours or BIAs have been identified.
			• Threatened Species	-	**Not Present** One listed threatened species (or species habitat), the Australian Grayling, may occur within the Operational Area. The Australian Grayling typically inhibits estuarine waters and coastal seas and is therefore not expected to be present within the Operational Area.	✓	**Present** Two species listed as 'critically endangered', the Spotted handfish and the Red handfish, may occur within the PEA. Two other fish species potentially occurring within the PEA are listed as 'vulnerable' under the EPBC Act; the Australian grayling and the Black rock cod.
		Fish (cartilaginous)	• Threatened Species • Migratory Species • BIA	✓	**Present** Two listed threatened shark species (or species habitat) may occur within the Operational Area: • White shark (breeding known to occur within the area) • Whale shark Two additional listed migratory species (mako shark and porbeagle shark) may occur within the Operational Area. The Operational Area is within a distribution BIA for the great white shark.	✓	**Present** There are five shark and two ray species (or species habitat) that may occur within the PEA; this includes species classified as threatened and migratory. • Grey nurse shark • White shark • Mako shark • Porbeagle shark • Whale shark • Giant manta ray • Reef manta ray Only one species (great white shark) has an important behaviour (breeding) identified in the PEA. Habitat critical for

Receptor Group	Receptor	Receptor Description	Values and Sensitivities		Operational Area		Potentially Exposed Area (PEA)
							the survival of the grey nurse shark have been identified within the PEA.
	Birds	Seabirds and Shorebirds - live or frequent the coast or ocean	• Listed Marine Species • Threatened Species • Migratory Species • BIA	✓	**Present** 31 seabird and shorebird species (or species habitat), including 24 listed threatened species, may occur within the Operational Area. The Operational Area intersects foraging BIAs for: Antipodean albatross, black-browed albatross, Buller's albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross, white-capped albatross, common diving-petrel, white-faced storm-petrel, flesh-footed shearwater and short-tailed shearwaters. Anecdotally, short-tailed shearwaters are commonly seen on and around platforms. Other listed sea birds are not commonly observed.	✓	**Present** There are 114 seabird and shorebird species (or species habitat) that may occur within the PEA; this includes species classified as threatened and migratory. The type of presence varies between species, and includes important behaviours (e.g. foraging, roosting, breeding) for some species.
	Marine Mammals	Cetaceans	• Listed Marine Species • Threatened Species • Migratory species • BIA	✓	**Present** 27 cetacean species or species habitats, including 5 listed threatened, may occur within the Operational Area. Sei whale and fin whale are listed within the EPBC PMST as having foraging, feeding or related behaviours likely to occur within the Operational Area. The Operational Area intersects a distribution and a migration BIA for the southern right whale, a foraging and distribution BIA for the pygmy blue whale	✓	**Present** 25 whale and 12 dolphin species (or species habitat) that may occur within the PEA; this includes species classified as threatened and migratory. The type of presence varies between species, and includes important behaviours (e.g. foraging, breeding) for some species.

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
					and a migration BIA for the humpback whale. Esso's seaward platforms regularly observe migrating humpback whales with peak numbers seen in March and October. On occasion they have delivered playful displays close to the platforms and have even been observed rubbing / scratching themselves on the platform legs. Southern right whales and blue pygmy whales are rarely observed. Dolphins have also been observed from Esso platforms.		
		Pinnipeds	• Listed Marine Species • Threatened Species	✓	**Present** 2 pinniped species or species habitats may occur within the Operational Area: New Zealand fur-seal, Australian fur-seal. Seals are plentiful around Esso platforms and are often observed resting on platform structures and swimming in the surrounding sea. Anecdotal observation indicates that Australian fur seals appear to be the most common.	✓	**Present** 3 pinniped species (or species habitat) may occur within the PEA: New Zealand fur-seal, Australian fur-seal, Australian sealion (threatened). The type of presence varies between species and includes important behaviours (e.g. breeding) for some species. Breeding is restricted to islands in the Bass Strait – six in Victorian waters and four in Tasmanian waters.
			• BIA	-	**Not present**	-	**Not present**
		Sirenia	• Listed Marine Species • Migratory Species • BIA	-	**Not present** Dugongs primarily occur in coastal and inland waters and are not likely to occur in the Operational Area. No BIAs occur in the Operational Area.	✓	**Present** Dugongs (or species habitat) may occur in the north-eastern region of the PEA. No BIAs occur in the PEA.

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
	Marine Reptiles	Turtles	• Listed Marine Species • Threatened Species • Migratory Species • BIA or critical habitat	✓	**Present** 3 listed threatened marine reptiles have species (or species habitat) which may occur within the Operational Area: • Loggerhead turtle • Green turtle • Leatherback turtle. No BIAs or habitat critical to the survival of these species occur within the Operational Area. There have been no reports of turtle sightings near Esso's platforms throughout the history of operation.	✓	**Present** 5 marine turtle species (or species habitat) may occur within the PEA: • Loggerhead turtle • Green turtle • Leatherback turtle • Hawksbill turtle • Flatback turtle No BIAs or habitat critical to the survival of these species occur within the PEA.
		Snakes	• Listed Marine Species	-	**Not Present** Seasnakes are not expected to be found within the Operational Area and have not been listed within the EPBC PMST search results.	✓	**Present** 2 species of seasnakes (or species habitat) may occur within the PEA: • Elegant Seasnake • Yellow-bellied sea snake No BIAs occur within the PEA.
Plankton	Phytoplankton and zooplankton		• Food Source (e.g. fish, whales, turtles)	✓	**Present** Phytoplankton and zooplankton are widespread throughout oceanic environments and are expected to occur in the Operational Area.	✓	**Present** Phytoplankton and zooplankton are widespread throughout oceanic environments; however increased abundance and productivity can occur in areas of upwelling e.g. Upwelling East of Eden KEF (refer to KEFs below).

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
Benthic Habitat	Bare Substrate	Predominantly unvegetated soft sediment substrates	• Key habitat (e.g. benthic invertebrates)	✓	**Present** The Operational Area is located on the flat outer shelf plain of the Twofold Shelf and overlaps an area of inshore soft sediment habitat. The benthic habitat within the Operational Area is expected to include predominantly sandy substrate with occasional low-relief reef in nearshore waters only. Studies undertaken by Esso (Cardno, 2019) show small scale variation between platform locations, however the benthic community present remains mostly homogenous throughout the Operational Area.	✓	**Present** Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The Gippsland Basin is composed of a series of large sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment.
	Seagrass	Seagrass meadows in intertidal and shallow subtidal waters	• Nursery habitat (e.g. crustaceans, fish) • Food source (e.g. fish, turtles) • Trap and stabilise sediments	-	**Not present** The Operational Area does not include intertidal and shallow subtidal waters	✓	**Present** Areas of seagrass can be found within the PEA include Corner Inlet and Lakes Entrance in Victoria, and numerous inlets and estuaries along the NSW coast.
	Subtidal Rocky Reefs	Extensions of intertidal rocky shores or isolated offshore rocky reefs – substrate composed of rock, boulders,	• Provides habitat for a wide range of flora and fauna	-	**Not present** The Operational Area does not include intertidal waters. South-east Reef, an isolated offshore rocky reef, is thought to be located in the vicinity of VIC/L5, however the reef has not been detected in any of the survey	✓	**Present** Subtidal rocky reefs occur either as extensions of intertidal rocky shores or as isolated offshore reefs and are always submerged. Scattered along the Gippsland shore, including; Bastion Point, Quarry Beach,

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
		cobbles and patches of sand veneer			work conducted for the Gippsland activities.		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. An example of an isolated offshore reef is the South-east Reef, thought to be located in the vicinity of VIC/L5.
	Macroalgae	Rocky substrates within nearshore intertidal and shallow subtidal zones	• Nursery habitat (e.g. crustaceans, fish) • Food source (e.g. birds, fish)	-	**Not present** The Operational Area does not include nearshore intertidal and tidal zones where macroalgal communities may be present.	✓	**May Occur** Macroalgae are not a common dominant habitat within the PEA, however known areas include around Gabo Island and within the Bemm River estuary. The 'Giant Kelp Marine Forests of South East Australia' is listed as an endangered TEC under the EPBC Act and may occur within the PEA. The ecological community is characterised by a closed to semi-closed surface or subsurface canopy of *Macrocystis pyrifera*. This ecological community occurs on rocky substrate; some patches may occur in Victoria or northern Tasmania
	Coral	Hard coral communities generally <50m of water and soft coral at most depths (throughout the	• Nursery habitat (e.g. crustaceans, fish)	✓	**May Occur** The Operational Area includes deeper waters throughout the continental shelf, slope and off-slope regions where soft corals may occur. Soft corals (e.g. sea fans, sea whips) typically occur as part of	✓	**Present** Soft corals can be found at most depths throughout the continental shelf, slope and off the slope regions, to well below the limit of light penetration. Soft corals (e.g. sea fans, sea whips) occur as part

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
		continental shelf, slope and offslope regions)	• Breeding habitat (e.g. fish)		mixed reef environments in waters along the coast and are only expected to be near platforms closest to the shoreline.		of mixed reef environments in waters along the coast.
	Submarine Canyons	Abundant features along continental and oceanic island margins connecting continental shelves to deep ocean basins – variety of environmental and physical characteristics	• High productivity • Aggregations of marine life	-	**Not present** The Operational Area does not include water depths associated with submarine canyons	✓	**Present** Submarine canyons are abundant features along continental and oceanic island margins that connect continental shelves to deep ocean basins. The Bass Canyon System is located within the PEA. Refer to Bass Canyon System KEF below
	Seamounts	Key ecological feature – comprised hard and/or soft substrate	• Area of high productivity and aggregations of marine life	-	**Not present** Seamounts do not occur within the Operational Area.	✓	**Present** Seamounts of South and East Tasmania occur in the PEA.
Coastal Habitat	Shoreline (Sandy)	Beaches dominated by sand-sized (0.063–2 mm) particles	• Foraging habitat (e.g. birds) • Nesting or Breeding habitat (e.g. birds, pinnipeds, turtles) • Haul-out sites (e.g. pinnipeds)	-	**Not present** The Operational Area does not include coastal or nearshore environments.	✓	**Present** Sandy shorelines are the most common shoreline type along the entire Victorian coast, including popular locations such as Ninety Mile Beach (East Gippsland, Victoria) and Squeaky Beach (Wilsons Promontory, Victoria).

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
	Shoreline (Rocky)	Hard and soft rocky shores, including bedrock outcrops, platforms, low cliffs (less than five metres in height), and scarps	• Foraging habitat (e.g. birds) • Nesting or Breeding habitat (e.g. birds, pinnipeds, turtles) • Haul-out sites (e.g. pinnipeds)	-	**Not present** The Operational Area does not include coastal or nearshore environments.	✓	**Present** 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
	Shoreline (Cliff)	Steep (>300) slope, and narrow width within the intertidal zone	• Habitat for sessile invertebrates • Foraging habitat (e.g. birds)	-	**Not present** The Operational Area does not include the coastal or nearshore environment	✓	**Present** 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
	Muddy – Sheltered Intertidal Flats and Bare Sediment	Predominantly mud-sized (<0.063 mm) particles with mixed sediments (e.g. sands, shell or gravel) – associated with mangrove & saltmarsh environments	• Habitat for sessile invertebrates • Foraging habitat (e.g. birds) • Nursery habitat (e.g. crustaceans, fish)	-	**Not present** The Operational Area does not include the coastal or nearshore environment	✓	**Present** 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

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
			• Highly productive				
	Saltmarsh	Upper-intertidal zone comprised of dense stands of halophytic plants such as herbs, grasses and low shrubs	• Nursery habitat (e.g. crustaceans, fish) • Breeding habitat (e.g. fish)	-	**Not present** The Operational Area does not include coastal or nearshore environments.	✓	**Present** Saltmarshes occur along the coast throughout the Planning Area although is most extensive behind the sand dunes of Ninety Mile Beach in Gippsland. 'Subtropical and Temperate Coastal Saltmarsh' is listed as a vulnerable Threatened Ecological Community (TEC) and its known distribution includes the southern and eastern coasts of Australia
	Coastal Vine Thicket	Rainforest and coastal vine thickets	• Provides habitat for flora and fauna • Coastal buffer against erosion	-	**Not present** The Operational Area does not include coastal or nearshore environments.	✓	**Present** 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' is listed as a critically endangered TEC.
	Wetlands	Wetlands of International Importance	• Wetlands of international importance	-	**Not present** The Operational Area does not include coastal or nearshore environments.	✓	**Present** Two RAMSAR wetlands are located in the nearshore area directly adjacent to the Operational Area, and several others are located within the PEA. These include: • Gippsland Lakes Ramsar Site • Corner Inlet Ramsar Site • Logan Lagoon Ramsar Site

Receptor Group	Receptor	Receptor Description	Values and Sensitivities		Operational Area		Potentially Exposed Area (PEA)
							• East Coast Cape Barren Island Lagoons Ramsar Site • Floor Plain Lower Ringarooma • Moulting Lagoon Ramsar Site • Apsley Marshes Ramsar Site • Western Port Ramsar Site • Little Waterhouse Lake Ramsar Site • Lavinia Ramsar Site • Myall Lakes Ramsar Site • Hunter Estuary Wetlands Ramsar Site • Towra Point Nature Reserve Ramsar Site
Economic Environment							
Fishing	Commercial Fisheries	Commonwealth-managed	• Economic benefit	✓	**Present** Six Commonwealth-managed fisheries have management areas that intersect the Operational Area: • Bass Strait Central Zone Scallop • Eastern Tuna and Billfish Fishery • Small Pelagic Fishery • Southern and Easter Scalefish and Shark Fishery • Southern Bluefin Tuna Fishery, and	✓	**Present** Six Commonwealth-managed fisheries have management areas that intersect with the PEA: • Bass Strait Central Zone Scallop • Eastern Tuna and Billfish Fishery • Small Pelagic Fishery • Southern and Easter Scalefish and Shark Fishery

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
					• Southern Squid Jig Fishery		• Southern Bluefin Tuna Fishery, and • Southern Squid Jig Fishery
		State-managed	• Economic benefit	✓	**Present** There are three Victorian state-managed fisheries with management areas which extend into Commonwealth waters. Given the water depth in the Operational Area, the only commercial fisheries which may be present within the Operational Area are: • Giant crab fishery • Rock lobster fishery	✓	**Present** There are seven Victorian and eight New South Wales state-managed commercial fisheries with management areas that intersect with the PEA.
	Commercial Aquaculture	State-managed	• Economic benefit	-	**Not present** There are no state-managed aquaculture sites within the Operational Area.	✓	**Present** The Sydney rock oyster commercial aquaculture occurs in 41 estuaries between Eden in the south to the Tweed River in the north.
Industry	Oil & Gas	Offshore oil and gas exploration and production activities	• Economic benefit	-	**Not present** Esso facilities and activities are the only oil & gas activities undertaken within the Operational Area.	✓	**Present** Exploration and production activities are undertaken in the Otway and Gippsland Basins.
	Shipping	Commercial shipping	• Economic benefit	✓	**Present** 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.	✓	**Present** The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. Bass Strait is one of Australia's busiest shipping areas, with

Receptor Group	Receptor	Receptor Description	Values and Sensitivities		Operational Area		Potentially Exposed Area (PEA)
							more than 3,000 vessels passing through Bass Strait each year. 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. 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.
	Defence	Offshore defence activities	• Training and research activities	-	**Not present** No defence activities occur within the Operational Area.	✓	**Present** The Australian Defence Force conducts a range of training, research activities, and preparatory operations in Australian waters. Defence activities within the PEA include a defence base at Twofold Bay, and training within the East Australia Exercise Area. Mine fields are located south and east of Wilson's Promontory.
	Tourism	Offshore and nearshore tourism	• Economic benefit	-	**Not present** No tourism activities are expected within the Operational Area.	✓	**Present** The Australian coast and marine waters provide a diverse range of recreation and tourism opportunities, including scuba diving, charter boat cruises, cruise

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
							shipping, whale and wildlife watching, sailing, snorkelling, surfing, and kayaking.
Cultural Environment							
Commonwealth Heritage	World Heritage	World Heritage listings	• Cultural heritage	-	**Not Present** There are no World Heritage sites within the Operational Area.	✓	**Present** Three World Heritage listings are located within the PEA: • Darlington Probation Station • Port Arthur Historic Site • Lord Howe Island Group
	National and Commonwealth Heritage	Natural Heritage	• Natural heritage	-	**Not Present** There are no natural listed places or sites within the Operational Area.	✓	**Present** The following natural heritage sites are within the PEA: • Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves • Royal National Park and Garawarra State Conservation Area Four sites are listed for natural heritage on the Commonwealth Heritage List within the PEA: • Point Wilson • Beecrofy Peninsula • Malabar Headland • Tasmania Seamounts Area

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
		Indigenous Heritage	• Cultural heritage	-	**Not present** There are no indigenous listed places or sites within the Operational Area.	✓	**Present** No indigenous places are listed on the National Heritage List or Commonwealth Heritage List within the PEA. Indigenous Protected Areas occur on and around Flinders Island in Tasmania. • At the time of writing a Native Title Claimant Application was registered by the Gunai-Kurnai People for an area covering the Wilsons Promontory area.
		Historic Heritage	• Historic heritage • Shipwrecks	–	**Not present** There are no historic listed places or sites within the Operational Area.	✓	**Present** The following sites listed on the National Heritage List are within the PEA: • The Great Ocean Road and Scenic Environs • North Head • Bondi Beach • Kurnell Peninsula Headland • Kamay Botany Bay: botanical collection sites No historic places are listed on the Commonwealth Heritage List within the PEA. The National Shipwrecks Database records 969 shipwrecks within the PEA. The three World Heritage listings above are also listed on Australia's National

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
							Heritage List under the historic classification.
Conservation	Australian Marine Parks (AMPs)	Established in Commonwealth Waters	• Australian Marine Parks	-	**Not present** There are no AMPs within the Operational Area.	✓	**Present** The following AMPs are located within the PEA: • East Gippsland Marine Park • Beagle Marine Park • Flinders Marine Park • Freycinet Marine Park • Boags Marine Park • Apollo Marine Park • Zeehan Marine Park • Franklin Marine Park • Huon Marine Park • Lord Howe Marine Park • Central Eastern Marine Park • Hunter Marine Park • Jervis Marine Park • South Tasman Rise Marine Park
	Key Ecological Features (KEFs)	Elements of Commonwealth Marine environment of regional importance	• KEFs	-	**Not Present** There are no spatially defined KEFs located in the Operational Area. Three KEFs which are not spatially defined may be present within the	✓	**Present** The following spatially defined KEFs are found in the PEA: • Big Horseshoe Canyon

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
					Operational Area, however considering the oceanography and bathymetry of the Operational Area, none of them are expected to occur.		• Upwelling East of Eden • Seamounts south and east of Tasmania • West Tasmania Canyons • Tasmantid Seamount Chain • Lord Howe Seamount Chain • Tasman Front and eddy field • Shelf rocky reefs and hard substrates (Temperate East Marine Region) • Canyons on the eastern continental slope The following non-spatially defined KEFs may be found in the PEA: • Bass Cascade • East Tasmania subtropical convergence zone • Shelf rocky reefs and hard substrates (South East Marine Region)
	National Parks and Reserves	Protected under state legislation	• National Parks and Reserves	-	**Not present** There are no National Parks and Reserves within the Operational Area.	✓	**Present** National Parks and Reserves within the PEA are located in Victoria, Tasmania and NSW jurisdiction.
Social Environment							

Receptor Group	Receptor	Receptor Description	Values and Sensitivities	Operational Area		Potentially Exposed Area (PEA)	
Recreational Activities	Recreational Fisheries	State-managed	• Community • Recreation	✓	**Present** Recreational fishing may occur within the Operational Area. Most recreational fishing typically occurs in nearshore coastal waters (shore or inshore vessels) and within bays and estuaries. Recreational fishing activity is expected to be minimal in the Operational Area.	✓	**Present** Most recreational fishing typically occurs in nearshore coastal waters, and within bays and estuaries; offshore (>5 km) fishing only accounts for approximately 4% of recreational fishing activity in Australia. There is moderate to high recreational use along the whole coastline adjacent to the PEA.
	Recreational Boating and Leisure Activities	Various human activities and interaction	• Community • Recreation • Economic benefit	✓	**Present** Marine-based recreation and tourism is unlikely to occur within the Operational Area due to the distance from shore and lack of seabed features; however, presence is possible.	✓	**Present** Popular coastal destinations are located across the coastline of the DA

4.3 Recovery Plans, Threat Abatement Plans and Species Conservation Advice Relevant to the Operational Area

The Description of the Environment (Volume 1) describes the key threats and management actions relevant to species which may occur within the Described Area. Based on the EPBC PMST searches and the summary provided in Section 4.2, the conservation advice and recovery plans relevant to species or species habitats which may occur within the Operational Area include:

- Fish:
    - Recovery Plan for the White Shark (*Carcharodon carcharias*)
- Birds:
    - National Recovery Plan for Threatened Albatrosses and Giant Petrels, 2011-2016
    - Approved Conservation Advice for *Thalassarche chrysostoma* (Grey-headed Albatross)
    - Approved Conservation Advice for *Halobaena caerulea* (Blue Petrel)
    - Gould’s Petrel (*Pterodroma leucoptera leucoptera*) Recovery Plan
    - Approved Conservation Advice for *Calidris canutus* (Red Knot)
    - Wildlife conservation plan for migratory shorebirds
    - Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew)
    - Approved Conservation Advice for *Pachyptila turtur subantartica* (Fairy Prion Southern)
- Marine mammals:
    - Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale)
    - Conservation Management Plan for the Blue Whale, 2015-2025
    - Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale)
    - Conservation Management Plan for the Southern Right Whale, 2011-2021
    - Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale)
- Marine reptiles:
    - Recovery Plan for Marine Turtles in Australia, 2017-2027
    - Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle)

In addition, the following Threat Abatement Plans have been considered:

- Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia’s coasts and oceans (2018).

These plans and management actions have been considered in the definition of acceptable levels of impacts described in Section 3.5.

5 Environmental Impact Assessment

5.1 Overview

The purpose of the environmental impact assessment is to ensure that all impacts associated with the petroleum activity are identified and evaluated, and the resulting impacts are demonstrated to be ALARP and Acceptable according to the Esso impact and risk assessment methodology (Section 4.3).

The assessment of impacts has been undertaken in two stages:

1. Impact Scoping (Section 5.2)
2. Detailed Evaluation (Section 5.3)

5.2 Impact Scoping

Scoping of the impacts relevant to the activity ensures that a systematic assessment can be undertaken. The context of the impact assessment has been set through the description of the activity (Section 2.4) and identification of potential environmental receptors within the Operational Area and the PEA (Section 2.4.4.3). By considering the relationship between environmental aspects and the activity (Table 3-2), Esso has identified all impacts to receptors which could potentially occur as a result of the petroleum activity.

The assessment of planned impacts has considered direct, indirect and cumulative impacts, as defined in Section 3.2.

A series of workshops were held to identify environmental impacts and risks associated with the petroleum activity and assess controls to ensure impacts and risks are managed to ALARP and an acceptable level. The workshops were attended by environment and asset personnel. Impacts and risks were evaluated using the impact assessment methodology (Section 4.3) to determine consequence to receptors and ALARP decision context, and for risks to determine likelihood and residual level of risk. Control measures were identified, and an assessment of acceptability was undertaken against the Esso Acceptability Criteria and the defined acceptable levels of environmental performance (Table 3-3).

For most impacts identified, the workshop was able to determine that the adopted controls lowered impacts to ALARP and to an acceptable level. These impacts, and the outcomes of the assessment, are described in Table 5-1, Table 5-2, Table 5-3 and Table 5-4.

In some cases, it was not possible to finalise the impact evaluation during the workshops. This was typically due to the need for either modelling outcomes or an in-depth literature review to support the evaluation and assessment of potential impacts to receptors. In these cases, a detailed evaluation has been provided as follows:

- Produced Formation Water (Section 5.3)

For all impacts, control measures have been considered as described in Section 3.8. Controls are applied where a reduction in the consequence of the impact will occur as a result of their adoption. They may also be required by legislation, or by internal Esso requirements. Where the assessment of the impact identified that there were no suitable Good Practice control measures, and additional controls considered would not lower the impact assessment outcomes, no controls have been adopted. This is identified in the table and assessed as part of the demonstration of acceptability.

Environmental Performance Outcomes and Standards relevant to impacts associated with the petroleum activity are provided in Volume 4.

Table 5-1 Operations Activities – Impact Scoping

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
Platform Operations Pipeline Operations	Physical Presence - Interference with Other Marine Users Presence of platform and pipeline operations can lead to interference with other marine users.	Change to the function, interests or activities of other users Change to the function, interests or activities of other users could occur through disruption of commercial and recreational activities. Disruption to activities includes: • exclusion of vessels to areas around the activity; • damage to fishing equipment; and • loss of commercial fish catch.	Commercial Fisheries	There are six Commonwealth-managed fisheries and three Victorian State-managed fisheries which may undertake fishing activities within the Operational Area. Presence of fisheries varies between platforms, typically due to water depth determining the location of prey species. Fisheries effort data, however, shows that relatively small numbers of vessels are likely to be encountered within the Operational Area. The physical presence of the platform operations, specifically the 500m Petroleum Safety Zone (PSZ) around each facility, results in the exclusion of commercial fishing vessels from parts of the fisheries management area and may result in vessels making minor deviations around the PSZ while transiting through the area. Impacts are limited to the Operational Area and will have little to no adverse effects. Impacts are limited to the Operational Area and, given the extensive operating area utilised by Commonwealth and State fisheries, will have inconsequential or no adverse effects.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
			Shipping	With the exception of PCA and DPA, all platforms are located within the ATBA. Shipping activity is limited within the ATBA, as vessels in excess of 200 gross tonnage are prohibited from unauthorised entry. Given this, the presence of surface infrastructure within the established PSZs (500 m extending from each platform) will not result in further impacts to shipping. Physical presence of subsea facilities and pipelines will not impact shipping.	No impacts expected						
			Recreational Activities	Recreational activities may occur within the Operational Area such as recreational fishing, recreational boating and leisure activities. However, given the distance from shore and the existing PSZs, no interaction with recreational activities is expected.	No impacts expected						
Platform Operations	Underwater Sound Emissions Normal platform operations generate sound at 162 dB RMS (Hannay, et al. 2004).	Change in ambient noise Underwater sound emissions generated by normal platform operations will result in a change in ambient noise.	Ambient noise	Based on spherical spreading (Richardson et al., 1995), platform generated noise will reduce to background noise levels of 120 dB RMS within 130m of the platform, indicating that impacts will be highly localised. Platform generated noise will be continuous throughout the life of the platform. Impacts are highly localised and will not result in a permanent change to ambient noise levels following completion of operations, therefore impacts will have no adverse effects.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened marine mammals or marine reptiles and will be	Acceptable
		Change in fauna behaviour Underwater sound emissions generated	Fish	Based on levels adopted by NOAA Fisheries, the US Fish and Wildlife Services, and Canadian Science Advisory Secretariat (DFO, 2004), a conservative threshold level of 130 dB RMS for behavioural changes in fish has been adopted. Based on spherical spreading (Richardson et al., 1995), platform generated sound levels will reduce to below this	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
		by routine platform operations may result in a change in fauna behaviour		level within 50m of the platform. Any impacts will be limited to within this localised area. Limited research has been conducted on shark responses to noise, however studies indicate that sharks will move suddenly away from sounds of more than 20 dB re 1µPa above broadband ambient SPL when approaching within 10m of the source (Myrberg, 1978). The Operational Area is within a distribution BIA for great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Impacts to fish are expected to be highly localised (i.e. within 50m of the sound source), and short-term (behavioural changes will cease once the noise subsides). Any impacts will be inconsequential or have no adverse effect.						undertaken in accordance with all applicable management actions • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Marine Mammals	Cetaceans and pinnipeds are known to experience temporary threshold shift (TTS) and behavioural responses to underwater sound emissions. Behavioural responses range from subtle changes in surfacing and breathing patterns, to cessation of vocalizations, to active avoidance or escape from the area of insonification. Using the National Marine Fisheries Service (NMFS) guidance for non-pulsed sound a behavioural disturbance limit of 120 dB RMS is adopted (NMFS, 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. Based on spherical spreading (Richardson et al., 1985), sound levels will be reduced to below 120 dB RMS within 130m of the source. Any impacts will be limited to within this localised area. The Operational Area is within the following BIAs: southern right whale (distribution), pygmy blue whale (foraging, distribution), and several other threatened species of marine mammals may be present within the Operational Area. Anthropogenic noise is listed as a threat in the Conservation Management Plan for the Southern Right Whale, 2011-2021 and Conservation Management Plan for the Blue Whale, 2015-2025. Impacts to marine mammals are expected to be localised (i.e. within 1300m of the sound source), and short-term (behavioural changes will cease once the noise subsides). Any behavioural impacts resulting from underwater sound emissions will not impact the long term survival and recovery of threatened marine mammals. Given the presence of BIAs within the Operational Area, potential short-term, minor adverse effects are possible.	III						
			Marine Reptile	Using the limited information available, it has been reported that behavioural changes and impairment of hearing sensitivity in marine turtles are likely to occur at levels above 120 dB re 1 µPa (SVT Engineering Consultants 2009). Based on spherical spreading (Richardson et al., 1985), sound levels will be reduced to below 120 dB RMS within 1300m of the source. Any impacts will be limited to within this localised area. Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more	III						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				northerly distribution. The Recovery Plan for Marine Turtles in Australia, 2017-2027, lists noise interference as a key threat. Impacts to marine turtles are expected to be localised (i.e. within 1300m of the sound source), and short-term (behavioural changes will cease once the noise subsides). Any behavioural impacts resulting from underwater sound emissions will not impact the long term survival and recovery of threatened marine turtles. Given the receptor sensitivity to environmental impacts, potential short-term, minor adverse effects are possible.							
Platform Operations	Light Emissions Navigational and safety lights used during normal platform operations will result in light emissions. Light emissions will also be generated during flaring, with rates varying between platforms and activities.	Change in ambient light A change in ambient light levels could result in a localised light glow.	Ambient light	Modelling conducted by ERM (2010) on navigational and safety lighting from a MODU showed that light intensity reduced to 0.1 Lux (equivalent to ambient light at full moon to twilight) within 800 m of the source and to 0.01 Lux (equivalent to ambient light at quarter moon) within 1.2 km. Outside 1.2 km, light from the facility would only be detected during a new moon or if the moon is not visible. Although light from the facility may be visible within 1.2 km, the intensity of the light and any associated sky glow will decrease with distance from the source. The only platforms located within 1.2 km are MLA and MLB. MLA and MLB are bridge -linked, meaning that although MLB is normally unstaffed the lighting levels may not be reduced as a result. Given this, MLA and MLB are assessed as a complex, and light levels are expected to decrease within the same distance. The impacts on ambient light from cumulative effects from MLA and MLB are not expected to be greater than the impacts from a single platform source. The consequences of a change in ambient light will be localised and low intensity, and impacts are expected to be inconsequential or have no adverse effect on ambient light.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened marine reptiles and will be undertaken in accordance with all applicable management actions. • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Change in fauna behaviour A change in ambient light levels could lead to changes in fauna behaviour, through: • Attraction of light-sensitive species such as seabirds, squid and zooplankton in turn affecting predator-prey dynamics; and • Alteration of behaviour that may affect species during breeding periods (e.g.	Fish	Fish, squid and zooplankton may be directly or indirectly attracted to lights at distances of up to 5 km (Shell, 2010), leading to aggregation at the surface and increased predation. These organisms' distributions are driven by oceanographic conditions, with seasonal and diurnal movements. For fish and squid, it is expected that any potential impact of increased predation would be undetectable at a population level and only affect transient individual fish and squid. The proportion of zooplankton exposed and subjected to higher predation rates within the platform light fields is negligible. In the event that deck or navigational lighting results as an attractant to an occasional seabird, it is not expected that this will permanently impact on migration or other behaviours. Most platforms are located more than 5 km from another operating platform, however WTN and TNA are located approximately 4 km apart. At this location the area of impact to fish may overlap, resulting in a larger impact area. As light intensity will be significantly decreased at the overlap, however, no cumulative impacts are expected. The Operational Area is within a distribution BIA for great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Impacts to fish are expected to be localised (i.e. within 5km of the light source), and short-term (behavioural changes will cease once the light	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
		shearwaters, turtle hatchlings).		ceases). Any impacts will be inconsequential or have no adverse effect.							
			Birds	High levels of offshore lighting can attract and disorient seabird species resulting in behavioural changes (e.g. circling light sources leading to exhaustion or disrupted foraging), injury or mortality near the light source. Artificial light can cause significant impacts on burrow-nesting petrels and shearwaters. Fledglings often become disoriented and grounded because of artificial light adjacent to rookeries as they attempt to make their first flight to sea, a phenomenon known as 'fallout'. Rodrigez at al. (2014) investigated the effects of artificial lighting from road lighting on short-tailed shearwater fledglings. The study established that, by removing the light source from nesting areas, there was a decrease in grounded fledglings and a corresponding reduction in bird fatalities. 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. Light emissions are not identified as a threat in conservation advice or recovery plans for any of these species. Any impacts to birds from light emissions will be localised and have little / no adverse effect.	IV						
			Marine Reptiles	Light pollution can be an issue along, or adjacent to, turtle nesting beaches where emerging hatchlings orient to, and head towards, the low light of the horizon unless distracted by other lights which disorient and affect their passage from the beach to the sea (EA, 2003). Pendoley (2000) discovered that in the absence of illumination from the moon, glow from tower flares may influence the orientation of turtles at close range (30–100 m). Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more northerly distribution. The Recovery Plan for Marine Turtles in Australia, 2017-2027, lists light pollution as a key threat, however this relates specifically to turtle hatchlings and nesting sites. There are no nesting sites within 5 km of the Operational Area, therefore any impacts will be inconsequential or have no adverse effect.	IV						
Platform Operations	<u>Emissions to Air</u> Combustion of gaseous and liquid fuels and fugitive emissions vented will occur during platform	<u>Change in air quality</u> The release of combusted and un-combusted hydrocarbons into the atmosphere can lead to a change in air quality, cause atmospheric pollution and	Air Quality	Atmospheric emissions will be generated from platform, sources include emissions from internal combustion engines (including all equipment and generators), flares, fugitives and process vents. Emissions generated during platform operations include NOx, CO, SO_2, VOC's (benzene, xylenes, toluene, ethylbenzene), non-VOC's, particulate matter, CO_2, N_2O, CH_4, SF_6, HFCs and PFCs. The presence of these emissions will lead to a localised decline in air quality. Impacts to air quality from emissions to air will be localised to the source and quickly dissipated in the offshore environment. Any impacts will be inconsequential or have no adverse effect.	IV	A	**CM1:** Facility Integrity Management System **CM2:** Flaring occurs for safety reasons or during equipment malfunction, emergency	None	ALARP	• Impact is well understood • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened bird species and will be undertaken in accordance with all	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
	operations, leading to emissions to air.	contribute to greenhouse gases.	Climate	Global greenhouse gas (GHG) generated by Esso operations in the Bass Strait are reported under the NGER Scheme. Data publish by NGER (2019) demonstrates that oil & gas activities contribute significantly less to state and country-wide GHG emissions than electricity supply and mining industries. Esso is not listed as a top-contributor for Scope 1 or Scope 2 emissions, therefore contribution to GHG emissions (and subsequent change in climate) is considered to be low. Based on this, the primary action (i.e. Esso operations in the Bass Strait) does not represent a 'substantial case; of the circumstance (climate change). Therefore, climate change is not considered an indirect consequence of Esso operations in the Bass Strait for the purposes of Section 527E of the EPBC Act (DSEWPaC 2013). Impacts to climate from production operations emissions will be localised and will quickly dissipate on completion of flaring or venting event. Any impacts will be inconsequential / have no adverse effect.	IV		situations, commissioning / start up and for maintenance reasons.			applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Control measures will lower risk to ALARP through limiting the volume of emissions. • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • Esso meets the regulatory requirement to report GHG emissions to the Clean Energy Regulator • No stakeholder objections or claims have been raised	
		<u>Injury / mortality to fauna</u> Generation of atmospheric emissions has the potential to result in chronic effects to fauna from localised and temporary decrease in air quality.	Birds	Models of combustion emissions from MODU operations (e.g. BP, 2013) indicate that non-GHG emissions such as NO_2 will reduce to below polluting concentrations within 10 km of the source. It is expected that production operations will generate less emissions than MODU operations, therefore the impact area is expected to be reduced. Any venting required during Platform Operations will be small volumes and infrequent discharges. Emissions will quickly dissipate to below detectable levels, and any impacts will be minor and restricted to the immediate vicinity of the vent. In some cases, gas will be directed to the flare during Platform Operations. Flared gas will be burned as efficiently as possible to limit fall-out. Emissions from flaring contain greenhouse gases and could therefore contribute to greenhouse gas emissions. However, volumes of gases released will be low, and given the high energy offshore environment any changes in air quality are expected to be below detectable levels and restricted to the immediate vicinity of the flare. 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. Atmospheric emissions or reduction in air quality are not identified as a threat the conservation advice or recovery plans for any of these species. There is a high density of platforms within the Operational Area, therefore it is possible that cumulative effects to birds could occur. Platforms within 10 km of another platform may lead to an accumulation of atmospheric emissions resulting, however these areas of higher impacts are isolated and will not result in population or ecosystem level effects. Birds are sighted at all platforms within the Operational Area, indicating that a change in air quality is not leading to injury or mortality in bird species observed. Considering this, and the potential for sensitive life stages to be present, impacts are expected to have potential short term, minor adverse consequences.	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
Platform Operations	<u>Planned Discharge – Brine</u> Brine is created by the onboard desalination system, via Reverse Osmosis (RO). Discharges will be continuous.	<u>Change in water quality</u> Planned discharges of brine will lead to a change in water quality through: • Increased salinity • Chemical exposure	Ambient water quality	Reject water discharges from the RO system will have an elevated salinity. The discharges will be quickly dispersed by ocean currents and rapidly mixed with the surrounding marine waters, meaning that any potential impacts are limited to the source of the discharge where concentrations are highest (Azis et.al, 2003). Scale inhibitors and biocides are used in RO systems and will therefore be present in the discharged brine. However, chemicals are used at trace concentrations that would be suitable for human consumption, therefore no impacts to fauna from chemical exposure are expected.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		<u>Injury / mortality to fauna</u>	Plankton	Elevated salinity can affect plankton. Plankton are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985), therefore recovery from disturbance is typically quick. As such, the activity will not result in serious or irreversible damage to organisms at population level which would affect ecological diversity or productivity within Commonwealth marine areas. Any impacts will be highly localised and temporary, and the consequence will be inconsequential or have no adverse effect.	IV						
Platform Operations	<u>Planned Discharge - Sewage and Grey water</u> Staffing levels vary between platforms, however normally staffed platforms discharge approximately 60-150 m^3 of sewage and grey water per day, depending on staffing levels. Discharge point remains stationary.	<u>Change in water quality</u> Change in water quality can occur through: • Nutrient loading (e.g. ammonia, nitrite, nitrate and orthophosphate). • Chemical exposure (organics and inorganics) • Turbidity / sedimentation of particulate matter	Ambient water quality	Nutrient loading can lead to increased growth in primary producers (such as plankton), followed by oxygen depletion. For discharge volumes up to 150 m^3/day the discharges are expected to remain within the nominal mixing zone boundary of 500 m around fixed facilities. The composition of sewage and grey water may include chemicals including organics (e.g. volatile and semi-volatile organic compounds, oil and grease, phenols, endocrine disrupting compounds) and inorganics (e.g. hydrogen sulphide, metals and metalloids, surfactants, phthalates, residual chlorine). There is also the potential for biological pathogens, such as bacteria, viruses, protozoa, parasites, etc. Organic chemicals are expected to degrade; however, some persistence may occur within sediments. In open water environments such as the Bass Strait, discharges are rapidly dispersed, and any nutrient enrichment, chemical exposure or increase in turbidity will be short-term and localised with no accumulation of impacts expected. Impacts will be inconsequential or have no adverse effect.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		<u>Injury / mortality to fauna</u>	Plankton	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).	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
				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. In open water environments such as the Bass Strait, discharges are rapidly dispersed, and any nutrient enrichment, chemical exposure or increase in turbidity will be short-term and localised with no accumulation of impacts expected. Impacts will be inconsequential or have no adverse effect.							
			Commercial Fisheries	There are six Commonwealth-managed fisheries and three Victorian State-managed fisheries which may undertake fishing activities within the Operational Area. Fisheries effort data shows that relatively small numbers of vessels are likely to be encountered within the Operational Area. It is possible that seafood fished within the immediate vicinity of the discharge may not be safe for human consumption or may be tainted due to the presence of chemicals that bioaccumulate. In open water environments such as the Bass Strait, discharges will be rapidly dispersed, and chemical toxicity will be localised with no lasting impacts expected. Any impacts are expected to be limited to the Operational Area and, given the extensive operating area utilised by Commonwealth and State fisheries and that vessels will be excluded from the Operational Area by the PSZ, will have inconsequential or no adverse effects.	IV						
		<u>Change in aesthetic value</u> Solids found in sewage can affect the aesthetic value of an area such as ambient water colour, the presence of surface slicks/sheens and odour.	Tourism	Changes in water quality can lead to a change in aesthetic value. As described above, the intermittent discharge and high-energy marine environment means that discharges are expected to be quickly dissipated, with impacts restricted to the localised area around the discharge. Given the distance of the Operational Area from the nearest tourist site, and the low likelihood of tourism or recreation vessels within the Operational Area due to the distance from shore, presence of PSZ and lack of tourist features, no impacts to tourism from changes in aesthetic value are expected.	No impacts expected						
Platform Operations	<u>Planned Discharge – Food waste</u> 1-2kg of food waste will be discharged per person per day. Discharge point remains stationary.	<u>Change in fauna behaviour</u> Increased scavenging behaviour.	Fish Birds	The long-term discharge of food waste from fixed platforms can result in increased scavenging behaviour around the discharge point. In the high energy marine environment of the Bass Strait any discharges will be rapidly dispersed, therefore impacts will be limited to the Operational Area. In addition, the rapid consumption of this food waste by scavenging fauna, and physical and microbial breakdown, ensures that the impacts of food waste discharges are limited to the discharge point. The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). 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. Changes to predator / prey dynamics are not	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened birds or fish and will be undertaken in accordance with all applicable management actions.	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				identified as a threat in the conservation advice or recovery plans for any of these species. Impacts to fish and birds from the planned discharge of food waste are expected to be highly localised (due to the high energy marine environment, intermittent discharge and rapid consumption) and temporary (behavioural changes will cease once water quality returns to background levels). Any impacts will be inconsequential or have no adverse effect.						• No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Platform Operations Subsea facilities operations	Planned Discharge - Operational Fluids Residual production fluids as well as other chemicals will be discharged into the drains during platform operations. Small volumes of hydraulic fluids will be discharged during subsea value actuation.	Change in water quality	Ambient water quality	Operational fluids used during platform and subsea facility operations include: • Chemicals dosed into the production system (subsea window) • Hydraulic fluids (seabed) These chemicals will be discharged to the marine environment at the seabed and from the subsea window, resulting in a change in water quality. Due to the high energy marine environment, discharges will quickly dissipate. Impacts to ambient water quality will be localised and temporary, and any impacts will be inconsequential or have no adverse effect.	IV	A	**CM3:** Chemical Assessment Process	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from chemicals in the operational fluid 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. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.	IV						
Platform Operations	Produced Water Discharge	**Detailed Evaluation Section 5.3**									

Table 5-2 Wellwork Activities – Impact Scoping

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
Conductor cutting and pulling	Seabed Disturbance Conductor cutting and pulling can lead to seabed disturbance in the immediate vicinity of the well.	Change in water quality Seabed disturbance can lead to increased turbidity, which affects water quality.	Ambient water quality	Water quality change occurs when seabed sediments enter the water column (turbidity). After a period, the suspended sediments settle and the turbidity in the water column returns to pre disturbance levels. Any impacts will be highly localised and temporary. Wellwork activities are intermittent, and ambient water quality will return to background levels following seabed disturbance. Impacts will have inconsequential or no adverse effects on ambient water quality, and no impacts to ecological, economic, cultural or social receptors are expected as a result of a change in water quality.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Change in habitat Seabed disturbance could lead to a change in habitat for benthic organisms. Impacts are restricted to the Operational Area.	Benthic habitats and communities	Smothering and alteration to benthic habitats can occur as a result of seabed disturbance. The type of damage that could be sustained due to smothering may include destruction of habitat. Benthic habitats and communities within the Bass Strait show natural small scale variation, however the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. High rates of disturbance to benthic communities, such as long term disturbance from dredging or trawl fishing, can lead to reduced habitat structure. This results in homogenous, low diversity communities and loss of large and long-lived sedentary species that create habitat structure and leads to reductions in primary production and ecosystem function (Handley et al., 2014). Disturbance from IMR activities is not expected to result in high rates of disturbance at this scale, however it is possible that small scale disturbance will lead to similar outcomes. Seabed disturbance from wellwork activities will be limited to close proximity to existing infrastructure, and typically in areas which have previously been disturbed during installation of infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV						
Wireline / Workover Activities (general)	Emissions to Air Non-routine flaring and venting will occur during depressurisation prior to wellwork activities. Non-routine flaring will occur during	Change in air quality The release of combusted and un-combusted hydrocarbons into the atmosphere can lead to a change in air quality, cause atmospheric pollution and contribute to greenhouse gases.	Air quality	Atmospheric emissions will be generated from venting and flaring during workover operations and will lead to a localised decline in air quality. Volumes of venting / flaring during workover operations will be small. Larger volumes could occur during production start-up, however this will be an isolated event. Impacts to air quality from emissions to air will be localised to the source and quickly dissipated in the offshore environment. Any impacts will be inconsequential or have no adverse effect.	IV	A	**CM4:** Wireline / Workover work scope or plan.	None	ALARP	• Impact is well understood • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened bird species and will be undertaken in accordance with all applicable management actions	Acceptable
			Climate	Global greenhouse gas (GHG) generated by Esso operations in the Bass Strait are reported under the NGER Scheme. Data publish by NGER (2019) demonstrates that oil & gas activities contribute significantly less to state and country-wide GHG emissions than electricity supply and mining industries. Esso is not listed as a top-contributor for Scope 1 or	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
	production start-up.			Scope 2 emissions, therefore contribution to GHG emissions (and subsequent change in climate) is considered to be low. Based on this, the primary action (i.e. Esso operations in the Bass Strait) does not represent a 'substantial case; of the circumstance (climate change). Therefore, climate change is not considered an indirect consequence of Esso operations in the Bass Strait for the purposes of Section 527E of the EPBC Act (DSEWPaC 2013). Impacts to climate from wellwork operations emissions will be localised and will quickly dissipate on completion of activities. Any impacts will be inconsequential / have no adverse effect.						• Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • Esso meets the regulatory requirement to report GHG emissions to the Clean Energy Regulator • No stakeholder objections or claims have been raised	
		<u>Injury / mortality to fauna</u> Generation of atmospheric emissions has the potential to result in chronic effects to fauna from localised and temporary decrease in air quality.	Birds	Any venting required during wireline / workover activities will be small volumes and infrequent discharges. Emissions will quickly dissipate to below detectable levels, and any impacts will be minor and restricted to the immediate vicinity of the vent. In some cases, gas will be directed to the flare during wireline / workover activities. Flared gas will be burned as efficiently as possible to limit fall-out. Emissions from flaring contain greenhouse gases and could therefore contribute to greenhouse gas emissions. However, volumes of gases released will be low, and given the high energy offshore environment any changes in air quality are expected to be below detectable levels and restricted to the immediate vicinity of the flare. 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. Atmospheric emissions or reduction in air quality are not identified as a threat the conservation advice or recovery plans for any of these species. Impacts will be highly localised and temporary, ceasing once the workover operations are complete. Any impacts will be inconsequential or have no adverse effect.	IV						
Wireline /workover Activities (general) Conductor cutting and pulling Conductor Clean-out Sandwash	<u>Planned Discharge – Operational Fluids</u> Fluids contained within the well will be discharged during sandwash and clean-out. Residual fluids may be discharged in the final stages of conductor cutting.	<u>Change in water quality</u> Operational fluids discharged during wellwork may contain chemical additives, resulting in a change in water quality.	Ambient water quality	During wellwork, fluids contained within the well such as residual packer fluid, completion brine, residual drilling muds etc will be circulated out of the well and returns to the Platform. Whole NAF will be returned to shore, whilst the remaining fluid will be discharged to the pile(s). Chemicals may have been added to the well more than 30 years ago, therefore the constituents are mostly unknown. Total discharged volumes will be small, and any hydrocarbons will be captured within the pile system for treatment. Operational fluids which have been added to the well during completion / commissioning will also be discharged during production start-up. The use and discharge of these chemicals will be subject to the Esso Chemical Assessment Process. Operational fluids may be dosed with chemicals, which can lead to a change in water quality through chemical toxicity. Discharges will be made from the open and closed drain system, and quickly dissipate in the high energy marine environment. Impacts will be restricted to close to the discharge location and will have inconsequential / no adverse effect.	IV	A	**CM3:** Chemical Assessment Process	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
	Residual production fluids as well as chemicals dosed into the production system will be discharged into the drains during wellwork operations.	Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from chemicals in the operational fluid 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. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.	IV					Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Cementing	Planned Discharge – Cement Cementing during wellwork will result in a discharge of dry and mixed cement. After wellwork activities, dry cement may be discharged from the facility. Impacts are restricted to the Operational Area.	Change in water quality	Ambient water quality	Cement released from the surface (mixed and dry cement) and the seabed (mixed cement) will result in increased turbidity in close proximity to the release. Modelling of larger cement surface discharges (e.g. 18 m^3 of cement wash modelled by de Campos et al., 2017) shows an average deposition of 0.05 mg/m^2 of material on the seabed; with particulate matter deposited within the three-day simulation period. Any impacts from cementing during wellwork will be greatly reduced from these spatial estimates. Chemical toxicity results from chemical additives added to the dry cement when mixing, therefore changes in water quality through chemical exposure are expected to be restricted to discharges of mixed cement. Low toxicity additives will be selected, and discharges are expected to be highly localised. Once hardened, toxic effects will cease (Terrens et al., 1998; CIN, 2005). Impacts to ambient water quality from planned discharge of cement will be highly localised and temporary, with turbidity and chemical toxicity impacts quickly ceasing following discharge. Any impacts will be inconsequential or have no adverse effect, and impacts to pelagic organisms (such as plankton, fish, marine fauna) are not expected.	IV	A	**CM3:** Chemical Assessment Process	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Change in sediment quality	Ambient sediment quality	Cement has the potential to smother or alter the benthic substrate, resulting in a permanent change in sediment quality. Chevron (2014) indicated that planned cement discharges from overflow during drilling operations, which would be higher in volume than cementing during wellwork, may affect the seabed around the well to a radius of ~10 m–50 m. Once cement has hardened, the sediment quality will be permanently changed. Wellwork will be undertaken at existing wells where cement discharges have already occurred, therefore no further changes to sediment quality are expected as a result of cementing during wellwork. Any impacts to ambient sediment quality will be inconsequential or have no adverse effect and impacts to benthic habitats and communities are not expected.	IV						
Conductor Clean-out Sandwash	Planned Discharge – Solids	Change in water quality Solids discharged to the marine	Ambient water quality	Solids from the reservoir (e.g. sand) may exit the well with the workover brine during wellwork operations. There solids are captured as waste where possible, however in some cases capture is not feasible and solids will be discharged, for example during conductor clean-out operations where the discharge of returns run over the conductor lip. A typical sand		A	**CM5:** Collection and onshore disposal of solids.	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	Clean-out and sandwash will result in solids from inside the well bore being discharged to the seabed.	environment have the potential to change water quality. Impacts are restricted to the Operational Area.		discharge during conductor clean-up operations is 100 bbls of entrained sand in brine. The discharge of brine containing solids can result in increased turbidity in the water column. Volumes will be small, and discharges will be infrequent due to the sporadic nature of wellwork activities. Any discharges will be quickly dissipated in the high energy marine environment, with impacts restricted to close proximity to the discharge location. Impacts will be inconsequential or have no adverse effect, and no impacts to fauna are expected.						• Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	

Table 5-3 IMR Activities – Impact Scoping

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
Pipeline and Subsea IMR	Physical Presence - Interference with Other Marine Users Equipment or infrastructure wet stored on the seabed may lead to interference to other marine users.	Change to the function, interests or activities of other users Change to the function, interests or activities of other users could occur through disruption of commercial and recreational activities. Disruption to activities includes: • exclusion of vessels to areas around the activity; • damage to fishing equipment; and • loss of commercial fish catch. Impacts are restricted to other marine users which interact with the seabed within the Operational Area. No impacts to shipping are expected.	Commercial Fisheries	There are six Commonwealth-managed fisheries and three Victorian State-managed fisheries which may undertake fishing activities within the Operational Area. Presence of fisheries varies between platforms, typically due to water depth determining the location of prey species. Fisheries effort data, however, shows that relatively small numbers of vessels are likely to be encountered within the Operational Area. Wet storage would be short-term and would occur within the PSZ of a facility or subsea infrastructure or within the 200 m operational zone around a pipeline. Any impacts are expected to be limited to the Operational Area and, given the extensive operating area utilised by Commonwealth and State fisheries and the low number of vessels likely to be operating within the Operational Area, will have inconsequential or no adverse effects.	IV	A	**CM6:** Wet storage will occur within an existing PSZ or 200m operational zone around pipelines	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
			Recreational Activities	Recreational activities may occur within the Operational Area such as recreational fisheries and recreational boating and leisure activities. However, given the distance from shore and that impacts are limited to the seabed, no interaction with recreational activities is expected.	No impacts expected						
Pipeline and Subsea IMR	Physical Presence – NORM Naturally occurring radioactive material (NORM) can accumulate in the form of scale on the internal surfaces of equipment which is in contact with the production fluids. NORM could be released as a	Change in habitat Radioactivity derived from natural sources is normally present in the open ocean, particularly at the seabed. Dissolved radium isotopes could be present in NORM scale, potentially increasing the radioactivity levels in close proximity to the scale. If NORM scale is contained in the flowlines it can emit	Plankton	The pathways for exposure of NORM to marine species are through external γ radiation from radium-226, absorption (e.g. by phytoplankton) or through intake from water or food of either radium-226 or radium-228. Once absorbed, radium follows potassium in organisms and is primarily deposited in shell and bone tissue. Secretion from these is very slow and in general the deposited radium will remain there throughout the organism's lifetime (Norse Decom, 2003). There is little knowledge about the effects of deposited NORM on marine organisms, however studies indicate that there is no increased accumulative of radium-226 or radium-228 in marine organisms due to exposure to NORM (Hylland & Eriksen, 2013), and there is little upward transport through bioaccumulation (Norse Decom, 2003). Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to NORM exposure, as they are less mobile and therefore can become exposed to the highest concentration of radiation. However, these are expected to rapidly recover, as they	IV	A	**CM31** Wet Storage Assessment	None	ALARP	• Impact is well understood • Consequence level is below IV, therefore no potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practise control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
	result of wet storage.	radiation in the form of higher energy α and γ rays from radium-226 or low energy β rays from radium-228 (APPEA, 2002).		have high levels of natural mortality and a rapid replacement rate UNEP (1985). As studies indicate that there is limited upward transport of radiation through the food chain, fauna which rely on plankton as prey are not expected to be impacted. 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.						• The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Pipeline and Subsea IMR	Seabed Disturbance Physical disturbance to the seabed can occur during IMR activities such as dredging, cutting and wet storage.	Change in water quality Seabed disturbance can lead to increased turbidity, which affects water quality.	Ambient water quality	Water quality change occurs when seabed sediments enter the water column (turbidity). After a period, the suspended sediments settle and the turbidity in the water column returns to pre disturbance levels. Any impacts will be highly localised and temporary. IMR activities are intermittent, and ambient water quality will return to background levels following seabed disturbance. Impacts will have inconsequential or no adverse effects on ambient water quality, and no impacts to ecological, economic, cultural or social receptors are expected as a result of a change in water quality.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Change in habitat Seabed disturbance could lead to a change in habitat for benthic organisms. Impacts are restricted to the Operational Area.	Benthic habitats and communities	Smothering and alteration to benthic habitats can occur as a result of seabed disturbance. The type of damage that could be sustained due to smothering may include destruction of habitat. Benthic habitats and communities within the Bass Strait show natural small scale variation, however the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. High rates of disturbance to benthic communities, such as long term disturbance from dredging or trawl fishing, can lead to reduced habitat structure. This results in homogenous, low diversity communities and loss of large and long-lived sedentary species that create habitat structure and leads to reductions in primary production and ecosystem function (Handley et al., 2014). Disturbance from IMR activities is not expected to result in high rates of disturbance at this scale, however it is possible that small scale disturbance will lead to similar outcomes. Seabed disturbance from IMR activities will be limited to close proximity to existing infrastructure, and typically in areas which have previously been disturbed during installation of infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
Facility IMR	Emissions to Air Non-routine or safety flaring or venting will occur during facility IMR.	Change in air quality The release of combusted and un-combusted hydrocarbons into the atmosphere can lead to a change in air quality, cause atmospheric pollution and contribute to greenhouse gases.	Air quality	Atmospheric emissions will be generated from venting and non-routine flaring during Facility IMR operations. The presence of these emissions will lead to a localised decline in air quality. Volumes of venting / non-routine flaring during Facility IMR operations will be small. Impacts to air quality from emissions to air will be localised to the source and quickly dissipated in the offshore environment. Any impacts will be inconsequential or have no adverse effect.	IV	A	None identified	None	ALARP	• Impact is well understood • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened bird species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • Esso meets the regulatory requirement to report GHG emissions to the Clean Energy Regulator • No stakeholder objections or claims have been raised	Acceptable
			Climate	Global greenhouse gas (GHG) generated by Esso operations in the Bass Strait are reported under the NGER Scheme. Data publish by NGER (2019) demonstrates that oil & gas activities contribute significantly less to state and country-wide GHG emissions than electricity supply and mining industries. Esso is not listed as a top-contributor for Scope 1 or Scope 2 emissions, therefore contribution to GHG emissions (and subsequent change in climate) is considered to be low. Based on this, the primary action (i.e. Esso operations in the Bass Strait) does not represent a 'substantial case; of the circumstance (climate change). Therefore, climate change is not considered an indirect consequence of Esso operations in the Bass Strait for the purposes of Section 527E of the EPBC Act (DSEWPaC 2013). Impacts to climate from IMR emissions will be localised and will quickly dissipate on completion of flaring or venting event. Any impacts will be inconsequential / have no adverse effect.	IV						
		Injury / mortality to birds Generation of atmospheric emissions has the potential to result in chronic effects to fauna from localised and temporary decrease in air quality.	Birds	Any venting required during Facility IMR activities will be small volumes and infrequent. Emissions will quickly dissipate to below detectable levels, and any impacts will be minor and restricted to the immediate vicinity of the vent. In some cases, gas will be directed to the flare during Facility IMR activities. Flared gas will be burned as efficiently as possible to limit fall-out. Emissions from flaring contain greenhouse gases and could therefore contribute to greenhouse gas emissions. However, volumes of gases released will be low, and given the high energy offshore environment any changes in air quality are expected to be below detectable levels and restricted to the immediate vicinity of the flare. 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. Atmospheric emissions or reduction in air quality are not identified as a threat the conservation advice or recovery plans for any of these species. Impacts will be highly localised and temporary, ceasing once the Facility IMR operations are complete. Any impacts will be inconsequential or have no adverse effect.	IV						
Facility IMR Pipeline and Subsea IMR	Planned Discharge - Operational Fluids	Change in water quality Change in water quality from	Ambient water quality	Operational fluids which may be discharged during IMR activities include: • Chemicals dosed into the production system;	IV	A	**CM3:** Chemical Assessment Process	None	ALARP	• Impact is well understood	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	Residual production fluids as well as chemicals dosed into the production system will be discharged into the drains during IMR activities. Volumes will typically <1bbl. Separator maintenance or pigging at Marlin Complex and WTN platforms may results in trace amounts of mercury in fluids. No routine discharge of Mercury occurs.	discharges from the open and closed drain system will occur through chemical toxicity.		• Chemicals used during cleaning, leak detection, hydrate inhibition; • Operational chemicals such as corrosion inhibitors, oxygen scavengers; • Cement used during grouting and cementing; • Depressurisation fluid from BTA450 (discharged at BTW); and • Traces of mercury. Discharges will be at the seabed, or from the open or closed drain system (discharge from the subsea window). In close proximity to the discharge a change in water quality will occur, primarily through chemical toxicity and increased turbidity. Dispersion modelling (Worley Parsons, 2013) indicates that mercury concentrations return to the ANZECC 2000 ambient water quality guideline for 99% species protection (0.1 ppb) within 1.6 to 5.6 metres of the discharge point with a median current speed (0.27m/s at surface – 0.16m/s at seabed) and between 4.6 and 18.2 metres under 'worst case' conditions (at WTN) with a maximum current speed (1.4m/s at surface - 0.17m/s at seabed). Volumes of operational fluids will be small and will dissipate quickly in the high energy marine environment, therefore any impacts will be restricted to the Operational Area. Any impacts will be inconsequential or have no adverse effects. No impacts to large pelagic fauna such as marine mammals and fish are expected from operational fluids, including mercury, as they are able to avoid acute and chronic exposure through plume avoidance.						• No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
		Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from chemicals in the operational fluid 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. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.	IV						
Pipeline and Subsea IMR	Planned Discharge – Gas (subsea) During IMR activities there may be planned gas releases associated with depressurisation, flushing, isolations or	Change in water quality Methane-consuming microbes (methano-trophic bacteria) may exhaust oxygen supply in the water column, resulting in a change in water quality.	Ambient water quality	Release of gas into the marine environment can lead to a bloom in methano-trophic bacteria, which will increase the biological oxygen demand (BOD) in the surrounding waters and quickly reduce the oxygen available for marine organisms such as plankton. In deep water (i.e. greater than 1,000m) there is potential for ocean stratification to concentrate the effects of methano-trophic bacteria to pockets within the water column, leading to 'dead zones' of oxygen poor waters. Stratification and resulting 'dead zones' are not likely to occur in the Operational Area as the waters are too shallow and hydrodynamics ensure that waters are well mixed. In addition, gas released subsea would quickly reach the surface and dissipate in	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	valve operational activities.			prevailing winds, reducing the volume of gas in the water column available to methano-trophic bacteria, with oxygen levels in the water column expected to return to normal rapidly through natural processes. Any changes in water quality from a subsea release of gas will be limited to the Operational Area. Water quality will quickly return to ambient levels, due to the shallow water depth and high energy marine environment. Any impacts will be inconsequential or have no adverse effects on ambient water quality, and no impacts to ecological, economic, cultural or social receptors are expected as a result of a change in water quality.						further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Facility IMR Pipeline and Subsea IMR	Planned Discharge – Solids IMR methods such as cleaning, abrasive blasting, hot work, repairs and maintenance will result in discharges of solids and fines either from the drains or at the seabed	Change in water quality Incidental discharge of sand blasting, weld/paint residue, coatings, cement, grit or other small solid debris to the marine environment has the potential to change water quality.	Ambient water quality	Surface discharges of solids can lead to a change in water quality. Discharges will be small and infrequent and will be quickly dissipated in the high energy marine environment therefore impacts are restricted to the Operational Area. Solids and fines will be captured on the facility where possible, reducing the volume. Discharges made at the seabed could result in short-term increase in turbidity localised to the discharge location, however seabed currents and the high energy marine environment will result in any discharges being quickly dissipated, with background levels of water quality rapidly returning. It is not possible to capture solids during subsea IMR activities. Impacts will have inconsequential or no adverse effects on ambient water quality, and no impacts to ecological, economic, cultural or social receptors are expected as a result of a change in water quality.	IV	A	Facility IMR **CM7:** Abrasive blasting SWP 50.101 Pipeline and Subsea IMR None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented, where they can lower the consequence of the impact • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable

Table 5-4 Support Operations Activities – Impact Scoping

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
Vessel Operations Helicopter Operations	Physical Presence - Interference with Other Marine Users	Change to the function, interests or activities of other users Change to the function, interests or activities of other users could occur through disruption of commercial and recreational activities. Disruption to activities includes: • exclusion of vessels to areas around the activity; • damage to fishing equipment; and • loss of commercial fish catch.	Commercial Fisheries	There are six Commonwealth-managed fisheries and three Victorian State-managed fisheries which may undertake fishing activities within the Operational Area. Presence of fisheries varies between platforms, typically due to water depth determining the location of prey species. Fisheries effort data, however, shows that relatively small numbers of vessels are likely to be encountered within the Operational Area. Project vessels and helicopters operating within the Operational Area may disrupt activities being undertaken by commercial fishing vessels. However, most activities undertaken by project vessels will be within the 500m Petroleum Safety Zone (PSZ) around each platform and subsea facility, therefore impacts to fishing vessels will be greatly reduced. Impacts are limited to the Operational Area and, given the extensive operating area utilised by Commonwealth and State fisheries and the low number of vessels likely to be operating within the Operational Area, will have inconsequential or no adverse effects.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
			Shipping	With the exception of PCA and DPA, all platforms are located within the ATBA. Shipping activity is limited within the ATBA, as vessels in excess of 200 gross tonnage are prohibited from unauthorised entry. Given this, the presence of vessels within the established PSZs (500 m extending from each platform) will not result in further impacts to shipping.	No impacts expected						
			Recreational Activities	Recreational activities may occur within the Operational Area such as recreational fishing, recreational boating and leisure activities. However, given the distance from shore and the existing PSZs, no interaction with recreational activities is expected.	No impacts expected						
ROV Operations	Seabed Disturbance ROV operations typically take place above the seabed however, operations close to and on the seabed can lead to seabed disturbance.	Change in water quality Seabed disturbance can lead to increased turbidity, which affects water quality.	Ambient water quality	Water quality change occurs when seabed sediments enter the water column (turbidity). After a period, the suspended sediments settle and the turbidity in the water column returns to pre disturbance levels. Any impacts will be highly localised and temporary. ROV Operations are intermittent, and ambient water quality will quickly return to background levels following seabed disturbance. Impacts will have inconsequential or no adverse effects on ambient water quality, and no impacts to ecological, economic, cultural or social receptors are expected as a result of a change in water quality.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
										Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Vessel Operations Helicopter Operations	<u>Underwater Sound Emissions</u>	<u>Change in ambient noise</u>	Ambient noise	Vessels holding position generate sound of up to 182 dB re 1 μPa, with levels of 120 dB re 1 μPa recorded at 3–4 km (McCauley, 1998). Sound emitted from helicopter operations is typically of a low frequency, below 500 Hz (Richardson et al., 1995). Ambient noise levels increase in close proximity to shipping traffic. Given the proximity of the Operational Area to busy shipping lanes, 120 dB re 1 μPa is considered a conservative estimate of ambient noise levels. Any impacts to ambient noise will therefore be highly localised (within 3-4km of the source) and temporary, with ambient levels returning once the source moves away from an area. Impacts will be inconsequential or have no adverse effects.	IV	A	**CM8:** Vessel Master	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish, marine mammals or marine reptiles and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		<u>Change in fauna behaviour</u> Underwater sound emissions generated by vessel and helicopter operations can result in a change in fauna behaviour.	Fish	Sound generated by vessel operations will be below the recoverable injury threshold for fish (~207 dB re1μPa; Popper et al. 2014), and below the levels that strong 'startle' response has been observed (185 - 190 dB RMS; Pearson et al. 1992; Wardle et al. 2001). Limited research has been conducted on shark responses to noise, however studies indicate that sharks will move suddenly away from sounds of more than 20 dB re 1μPa above broadband ambient SPL when approaching within 10m of the source (Myrberg, 1978). Based on levels adopted by NOAA Fisheries, the US Fish and Wildlife Services, and Canadian Science Advisory Secretariat (DFO, 2004), a conservative threshold level of 130 dB RMS for behavioural changes in fish has been adopted. Based on spherical spreading (Richardson et al., 1995), sound levels will reduce to below this level within approximately 400m of the vessel. Any impacts will be limited to within this localised area. The frequency of helicopter noise is at the lower end of typical fish hearing range, however sensitivity varies between different species due to, for example, the presence / absence of a swim bladder. Studies (e.g. Greene and Moore 1995) indicate that, although sound generated by helicopters can be detected underwater, it will likely be masked by other noise sources such as platform noise, and no direct impacts from helicopter noise are therefore expected. The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Impacts to fish are expected to be highly localised (i.e. within 400m of the sound source), and short-term (behavioural changes will cease once the noise subsides). There is likely to be multiple vessels operating at any one time within the Operational Area, therefore it is possible that cumulative effects could occur (from multiple vessels and from combination of vessel and platform emissions). Areas of higher activity, such platform complexes, or periods of higher activity, such as IMR activities using vessels, will be isolated and will not result in population	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				or ecosystem level effects. Any impacts will be inconsequential or have no adverse effect.							
			Marine Mammals	Cetaceans and pinnipeds are known to experience temporary threshold shift (TTS) and behavioural responses to underwater sound emissions. Behavioural responses range from subtle changes in surfacing and breathing patterns, to cessation of vocalisations, to active avoidance or escape from the area of insonification. Using the National Marine Fisheries Service (NMFS) guidance for non-pulsed sound, such as vessel noise, a behavioural disturbance limit of 120 dB RMS is adopted (NFMS, 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. Based on spherical spreading (Richardson et al., 1995), sound levels will be reduced to below 120 dB RMS within 1300m of the source. Any impacts will be limited to within this localised area. The Operational Area is within the following BIAs: southern right whale (distribution), pygmy blue whale (foraging, distribution), and several other threatened species of marine mammals may be present within the Operational Area. Anthropogenic noise is listed as a threat in the Conservation Management Plan for the Southern Right Whale, 2011-2021 and Conservation Management Plan for the Blue Whale, 2015-2025. Impacts to marine mammals are expected to be localised (i.e. within 1300m of the sound source), and short-term (behavioural changes will cease once the noise subsides). Any behavioural impacts resulting from underwater sound emissions will not impact the long term survival and recovery of threatened marine mammals. There is likely to be multiple vessels operating at any one time within the Operational Area, therefore it is possible that cumulative effects could occur (from multiple vessels and from combination of vessel and platform emissions). Areas of higher activity, such platform complexes, or periods of higher activity, such as IMR activities using vessels, will be isolated and will not result in population or ecosystem level effects. Given the presence of BIAs within the Operational Area, potential short-term, minor adverse effects are possible.	III						
			Marine Reptiles	Using the limited information available, it has been reported that behavioural changes and impairment of hearing sensitivity in marine turtles are likely to occur at levels above 120 dB re 1 µPa (SVT Engineering Consultants 2009). Based on spherical spreading (Richardson et al., 1995), sound levels will be reduced to below 120 dB RMS within 1300m of the source. Any impacts will be limited to within this localised area. Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more northerly distribution. The Recovery Plan for Marine Turtles in Australia, 2017-2027, lists noise interference as a key threat. Impacts to marine turtles are expected to be localised (i.e. within 1300m of the sound source), and short-term (behavioural changes will cease once the noise subsides). Any behavioural impacts resulting from underwater sound emissions will not impact the long term survival and recovery of threatened marine turtles. There is likely to be multiple	III						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				vessels operating at any one time within the Operational Area, therefore it is possible that cumulative effects could occur (from multiple vessels and from combination of vessel and platform emissions). Areas of higher activity, such platform complexes, or periods of higher activity, such as IMR activities using vessels, will be isolated and will not result in population or ecosystem level effects. Given the receptor sensitivity to environmental impacts, potential short-term, minor adverse effects are possible.							
Vessel Operations ROV Operations	<u>Light Emissions</u> Navigational and safety lights used during normal vessel operations will result in light emissions. Light from ROVs may attract fish and marine fauna.	<u>Change in ambient light</u>	Ambient Light	Light emissions from vessel operations and ROVs will result in a change in ambient light. Light glow from the vessel is likely to be limited to the operational area and temporary in nature as the vessel moves through the water. As vessels will operated predominantly within the PSZ of existing platforms, vessel light is unlikely to be detectable within the existing light glow. Where vessels are operating at subsea facilities or pipelines, impacts will be inconsequential or have no adverse effect.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish, birds or marine reptiles and will be undertaken in accordance with all applicable management actions. • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		<u>Change in fauna behaviour</u> A change in ambient light levels could result in a localised light glow. This can lead to changes in fauna behaviour.	Fish	Fish, squid and zooplankton may be directly or indirectly attracted to lights at distances of up to 5 km (Shell, 2010), leading to aggregation at the surface and increased predation. These organisms' distributions are driven by oceanographic conditions, with seasonal and diurnal movements. For fish and squid, it is expected that any potential impact of increased predation would be undetectable at a population level and only affect transient individual fish and squid. The proportion of zooplankton exposed and subjected to higher predation rates within the vessel light fields is negligible. In the event that deck or navigational lighting results as an attractant to an occasional seabird, it is not expected that this will permanently impact on migration or other behaviours. The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Impacts to fish are expected to be localised (i.e. within 5km of the light source), and short-term (behavioural changes will cease once the light ceases). Any impacts will be inconsequential or have no adverse effect.	IV						
			Birds	High levels of offshore lighting can attract and disorient seabird species resulting in behavioural changes (e.g. circling light sources leading to exhaustion or disrupted foraging), injury or mortality near the light source. Artificial light can cause significant impacts on burrow-nesting petrels and shearwaters. Fledglings often become disoriented and grounded because of artificial light adjacent to rookeries as they attempt to make their first flight to sea, a phenomenon known as 'fallout'. Rodrigez at al. (2014) investigated the effects of artificial lighting from road lighting on short-tailed shearwater fledglings. The study established that, by removing the light source from nesting areas, there was a decrease in grounded fledglings and a corresponding reduction in bird fatalities. 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	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
				shearwater. Light emissions are not identified as a threat in conservation advice or recovery plans for any of these species. Any impacts to birds from light emissions will be localised and have little / no adverse effect.							
			Marine Reptiles	Light pollution can be an issue along, or adjacent to, turtle nesting beaches where emerging hatchlings orient to, and head towards, the low light of the horizon unless distracted by other lights which disorient and affect their passage from the beach to the sea (EA, 2003). Pendoley (2000) discovered that in the absence of illumination from the moon, glow from tower flares may influence the orientation of turtles at close range (30–100 m). Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more northerly distribution. The Recovery Plan for Marine Turtles in Australia, 2017-2027, lists light pollution as a key threat, however this relates specifically to turtle hatchlings and nesting sites. There are no nesting sites within 5 km of the Operational Area, therefore any impacts will be inconsequential or have no adverse effect.	IV						
Vessel Operations	<u>Emissions to Air</u> Vessels are powered via the use of on-board generators. The operation of these (fuelled by MDO) will result in combustion emissions.	<u>Change in air quality</u> 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.	Air quality	Atmospheric emissions will be generated from combustion during vessel operations. The presence of these emissions in the air will lead to a localised decline in air quality. Impacts to air quality from emissions to air will be localised to the source and quickly dissipated in the offshore environment. Any impacts will be inconsequential or have no adverse effect.	IV	A	**CM9:** Class certification	None	ALARP	• Impact is well understood • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened bird species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Class certification ensures that vessels adhere to the rules of an IACS Member society, such as MARPOL requirements and Marine Orders. • The activity meets ExxonMobil	Acceptable
			Climate	Global greenhouse gas (GHG) generated by Esso operations in the Bass Strait are reported under the NGER Scheme. Data publish by NGER (2019) demonstrates that oil & gas activities contribute significantly less to state and country-wide GHG emissions than electricity supply and mining industries. Esso is not listed as a top-contributor for Scope 1 or Scope 2 emissions, therefore contribution to GHG emissions (and subsequent change in climate) is considered to be low. Based on this, the primary action (i.e. Esso operations in the Bass Strait) does not represent a 'substantial case; of the circumstance (climate change). Therefore, climate change is not considered an indirect consequence of Esso operations in the Bass Strait for the purposes of Section 527E of the EPBC Act (DSEWPaC 2013). Impacts to climate from vessel operations emissions will be localised and will quickly dissipate in the high energy marine environment. Any impacts will be inconsequential / have no adverse effect.	IV						
		<u>Injury / mortality to fauna</u> Generation of atmospheric emissions has the potential to result in chronic effects to fauna from localised	Birds	Models of combustion emissions from MODU operations (e.g. BP, 2013) indicate that non-GHG emissions such as NO_2 will reduce to below polluting concentrations within 10 km of the source. It is expected that vessel operations will generate less emissions than MODU operations, therefore the impact area is expected to be reduced. 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,	III						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
		and temporary decrease in air quality.		common diving petrel, white-faced storm petrel, and short-tailed shearwater. Atmospheric emissions or reduction in air quality are not identified as a threat in the conservation advice or recovery plans for any of these species. There is likely to be multiple vessels operating at any one time within the Operational Area, therefore it is possible that cumulative effects to birds could occur (from multiple vessels and from combination of vessel and platform emissions). Areas of higher activity, such platform complexes, or periods of higher activity, such as IMR activities using vessels, will be isolated and will not result in population or ecosystem level effects. Birds are sighted at all platforms within the Operational Area, indicating that a change in air quality is not leading to injury or mortality in bird species observed. Considering this, and the potential for sensitive life stages to be present, impacts are expected to have potential short term, minor adverse consequences.						Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Vessel Operations	<u>Planned Discharge – Brine</u> Brine is created by the onboard desalination system, via Reverse Osmosis (RO). It will be discharged intermittently, during vessel movement.	<u>Change in water quality</u> Planned discharges of brine will lead to a change in water quality through: • Increased salinity • Chemical exposure	Ambient Water quality	Modelling of brine discharges from a vessel (Frick et al., 2001) assuming no ocean current predict salinity levels would return to ambient levels within 4m of the discharge point. Scale inhibitors and biocides are used in RO systems and will therefore be present in the discharged brine. However, chemicals are used at trace concentrations that would be suitable for human consumption, therefore no impacts to plankton from chemical exposure are expected. Impacts to ambient water quality will be localised (within 4m of the discharge point) and temporary, with any discharges quickly dissipated in the high energy marine environment. Any impacts will be inconsequential or have no adverse effect. Given the small impact area and short-term nature of the impact, no impacts to ecological, economic, cultural or social receptors will occur.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
Vessel Operations	<u>Planned Discharge - Cooling Water</u>	<u>Change in water quality</u> Discharges of cooling water can lead to changes in water quality through: • Increased temperature • Chemical exposure	Ambient Water quality	Discharges of cooling water from vessels will lead to a change in water quality. Volumes will vary with vessel size, however the maximum expected discharge is approximately 50 m³/d. Vessels requiring cooling water may discharge water continuously, however vessel presence within the Operational Area varies and continuous discharge of cooling water in a single location is not expected. Once a vessel moves away from an area, the high energy marine environment is expected to result in the change in water quality quickly dissipating, and ambient water quality will be quickly restored. Impacts will be localised and short-term. Cumulative impacts are not expected. Any impacts will be inconsequential or have no adverse effects on ambient water quality.	IV	A	None identified	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
		Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from chemicals in the vessel cooling water 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 to cooling water discharge is not considered to result in significant impacts on population level of organisms that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.	IV					and threatened fish, marine mammals or marine reptiles and will be undertaken in accordance with all applicable management actions. • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Fish	Modelling of continuous wastewater discharges (including cooling water) found that the temperature of the discharge decreases quickly as the discharge stream mixes with the receiving waters, with the temperature being <1 °C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (WEL, 2014). Note that this study was undertaken at a facility and not from a vessel, therefore is considered conservative. Fish passing through the area will be able to actively avoid entrainment in any heated plume (Langford, 1990). Acclimation of test organisms at 15, 20 and 25°C allowed them to tolerate temperature increments of 8-9°C without damage (UNEP, 1985). The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Impacts to fish are expected to be highly localised (i.e. 100m of the discharge stream), and short-term (high-energy marine environment will dissipate the discharge stream quickly, no long-term continuous discharges expected). Any impacts will be inconsequential or have no adverse effect.	IV						
			Marine Mammals	Similar to fish, marine mammals passing through the area will be able to actively avoid any heated plume (Langford, 1990). Acclimation of test organisms at 15, 20 and 25°C allowed them to tolerate temperature increments of 8-9°C without damage (UNEP, 1985). The Operational Area is within the following BIAs: southern right whale (distribution), pygmy blue whale (foraging, distribution), and several other threatened species of marine mammals may be present within the Operational Area. A change or reduction in water quality has not be identified as a threat in any of the relevant conservation advice or management / recovery plans for these species. Impacts to marine mammals are expected to be highly localised (i.e. 100m of the discharge stream), and short-term (high-energy marine environment will dissipate the discharge stream quickly, no long-term continuous discharges expected). Any impacts will be inconsequential or have no adverse effect.	IV						
			Marine Reptiles	Marine reptiles would be expected to behave in a similar way to fish and marine mammals and would actively avoid a heated plume (Langford,	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				1990). Acclimation of test organisms at 15, 20 and 25°C allowed them to tolerate temperature increments of 8-9°C without damage (UNEP, 1985). Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more northerly distribution. The Recovery Plan for Marine Turtles in Australia, 2017-2027, lists chemical discharge as a key threat, specifically long term exposure to anthropogenic contaminants. Biocides and scale inhibitors typically released with cooling water discharges will be of low concentration and have a low level of bioavailability meaning they will not accumulate within the food chain. Impacts to marine turtles are expected to be highly localised (i.e. 100m of the discharge stream), and short-term (high-energy marine environment will dissipate the discharge stream quickly, no long-term continuous discharges expected). Impacts are not expected to impact the long term survival and recovery of threatened marine turtles. Any impacts will be inconsequential or have no adverse effect.							
Vessel Operations	<u>Planned Discharge - Deck Drainage & Bilge</u> Deck drainage and bilge water can be contaminated with hydrocarbons, oil, detergents, hydraulic oil, and chemicals. Bilge water is treated onboard using an oily water separator (OWS).	<u>Change in water quality</u> A discharge of contaminated deck drainage or bilge water can lead to a change in water quality.	Ambient water quality	Discharges of deck drainage and bilge during vessel operations will lead to a change in water quality through increased turbidity and chemical toxicity. Deck drainage water and bilge water generally consists of a mixture of fresh water, sea water, oil, sludge, chemicals and various other fluids. Discharges will be highly localised and infrequent with high dilution and dispersion rates due to wave and ocean currents. Therefore, decreased turbidity is expected to be very short term, hours rather than days. Bilge water will be treated prior to discharge via an oil in water separator (OWS) with a maximum concentration of 15 ppm oil-in-water being achieved prior to discharge. The remaining oil residue will be retained onboard for onshore disposal. Modelling (Shell, 2010) indicates that chemicals and hydrocarbon discharges will disperse rapidly to below the Predicted No Effect Concentration (PNEC) within 70 m, with no long-term impacts expected. Impacts will be localised to the discharge location. As discharges will be intermittent and vessels will be moving around the operational area, impacts are expected to be short-term with water quality quickly returning to ambient levels. Cumulative impacts are not expected. Any impacts will be inconsequential or have no adverse effect, and no impacts to ecological, economic, cultural or social receptors are expected.	IV	A	**CM9:** Class certification	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Class certification ensures that vessels adhere to the rules of an IACS Member society, such as MARPOL requirements and Marine Orders. • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	**Good Practice Control Measures**	**Additional Control Measures Considered**	**ALARP Outcome**	**Acceptability Assessment**	**Acceptability Outcome**
Vessel Operations	Planned Discharge - Sewage and Grey water Vessels typically generate around 5-15 m^3 of wastewater (consisting of sewage and grey water) per day. Discharges will be made while in transit.	Change in water quality Change in water quality can occur through: • Nutrient loading (e.g. ammonia, nitrite, nitrate and orthophosphate). • Chemical exposure (organics and inorganics) • Turbidity / sedimentation of particulate matter	Ambient water quality	Nutrient loading can lead to increased growth in primary producers (such as plankton), followed by oxygen depletion. Modelling (Woodside, 2008) of a 10m^3 discharge from a stationary source over a 24 hour period shows that sewage was reduced to approximately 1% of the original concentration within 50m of the discharge. Discharges from vessels will likely be made during transit, greatly decreasing the impact area. The composition of sewage and grey water may include chemicals including organics (e.g. volatile and semi-volatile organic compounds, oil and grease, phenols, endocrine disrupting compounds) and inorganics (e.g. hydrogen sulphide, metals and metalloids, surfactants, phthalates, residual chlorine). There is also the potential for biological pathogens, such as bacteria, viruses, protozoa, parasites, etc. Organic chemicals are expected to degrade; however, some persistence may occur within sediments. In open water environments such as the Bass Strait, discharges are rapidly dispersed, and any nutrient enrichment, chemical exposure or increase in turbidity will be short-term and localised with no accumulation of impacts expected. Cumulative impacts are not expected. Impacts will be inconsequential or have no adverse effect.	IV	A	**CM9:** Class certification	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Class certification ensures that vessels adhere to the rules of an IACS Member society, such as MARPOL requirements and Marine Orders. • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Injury / mortality to fauna A change in water quality caused by sewage and greywater discharges could result in injury or mortality to fauna.	Plankton	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 open waters. In open water environments such as the Bass Strait, discharges are rapidly dispersed, and any nutrient enrichment, chemical exposure or increase in turbidity will be short-term and localised with no lasting impacts expected. Any impacts will be inconsequential or have no adverse effects.	IV						
			Commercial Fisheries	There are six Commonwealth-managed fisheries and three Victorian State-managed fisheries which may undertake fishing activities within the Operational Area. Fisheries effort data shows that relatively small numbers of vessels are likely to be encountered within the Operational Area. It is possible that seafood fished within the immediate vicinity of the discharge may not be safe for human consumption or may be tainted due to the presence of chemicals that bioaccumulate. In open water environments such as the Bass Strait, discharges will be rapidly dispersed, and chemical toxicity will be short-term and localised with no lasting impacts expected.	IV						

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				Any impacts are expected to be limited to the Operational Area and, given the extensive operating area utilised by Commonwealth and State fisheries and the low number of vessels likely to be operating within the Operational Area, will have inconsequential or no adverse effects.							
		Change in aesthetic value Solids found in sewage can affect the aesthetic value of an area such as ambient water colour, the presence of surface slicks/sheens and odour.	Tourism	Changes in water quality can lead to a change in aesthetic value. As described above, the intermittent discharge and high-energy marine environment means that discharges are expected to be quickly dissipated, with impacts restricted to the localised area around the discharge. Given the distance of the Operational Area from the nearest tourist site, and the low likelihood of tourism or recreation vessels within the Operational Area due to the distance from shore, presence of PSZ and lack of tourist features, no impacts to tourism from changes in aesthetic value are expected.	No impacts expected						
Vessel Operations	Planned Discharge – Food waste 1-2kg of food waste will be discharged per person per day. Discharges will be made while in transit.	Change in fauna behaviour Increased scavenging behaviour.	Fish Birds	Discharge of food waste from moving vessels may result in a localised, temporary increase in scavenging behaviour by fish and birds. In the high energy marine environment of the Bass Strait any discharges will be rapidly dispersed, therefore impacts will be limited to the Operational Area. In addition, the rapid consumption of this food waste by scavenging fauna, and physical and microbial breakdown, ensure that the impacts of food waste discharges are limited to the discharge point. The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). 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. Changes to predator / prey dynamics are not identified as a threat in the conservation advice or recovery plans for any of these species. Impacts to fish and birds from the planned discharge of food waste are expected to be highly localised (due to the high energy marine environment, intermittent discharge and rapid consumption) and temporary (behavioural changes will cease once water quality returns to background levels). Cumulative impacts are not expected Any impacts will be inconsequential or have no adverse effect.	IV	A	**CM9:** Class certification	None	ALARP	• Impact is well understood • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened birds or fish and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Class certification ensures that vessels adhere to the rules of an IACS Member society, such as MARPOL requirements and Marine Orders. • The activity meets ExxonMobil Environmental Standards and	Acceptable

Activity	Aspect	Impact	Affected Receptor	Consequence Evaluation	Consequence Level	Demonstration of ALARP				Demonstration of Acceptability	
						ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
										ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	

5.3 Produced Formation Water

5.3.1 Sources of Produced Formation Water Discharge

Formation water is naturally occurring water found within formations of the reservoir. When production occurs, water is brought to the surface alongside the hydrocarbons. The produced formation water (PFW) is treated to remove hydrocarbons prior to discharge, with the resulting concentration of oil in the PFW stream consistently less than 30 ppm and typically ranging between 5 and 25 ppm. Low concentrations of other inorganics, such as calcium, ammonia and sulfate with trace amounts of metals, are also present within the PFW stream. PFW is discharged from a number of platforms across the Bass Strait. A summary of PFW discharge volumes and oil-in-water concentrations is provided in Table 5-5 and Table 5-6. PFW discharge volumes have declined since 2014 and are expected to continue declining as oil production decreases.

Table 5-5 Water Overboard Volumes (m^3)

Platform	2014	2015	2016	2017	2018
MLA	0	0	0	0	0
WTN	890	490	870	720	720
HLA	3,020	1,510	2,550	2,740	2,740
FTA	2,470	1,720	2,500	1,940	1,940
CBA	2,730	0	0	0	0
MKA	2,540	270	0	0	0
KFA	3,370	1,440	0	0	0
KFB	2,670	2,670	3,130	2,570	2,570
WKF	2,730	1,600	2,850	2,050	2,050
TNA	1,230	1,020	1,210	640	640
SNA	490	380	380	280	280
FLA	1,300	1,060	1,570	770	770
BMA	380	350	390	190	200
Total	**24,000**	**13,000**	**15,000**	**12,000**	**12,000**

Table 5-6 Oil in Water Content (mg/L)

Platform	2014	2015	2016	2017	2018
MLA	-	-	-	-	-
WTN	14.7	16.8	14.8	11.7	9.8
HLA	18.7	15.7	17.4	17.9	14.4
FTA	14.6	15.7	16.7	17.1	25.4
CBA	18.9	-	-	-	-
MKA	8.4	6.9	-	-	-
KFA	17.9	20.4	-	-	-
KFB	20.9	15.4	18.5	18.2	13.5
WKF	14.2	15	14.4	14.4	12.4
TNA	15.4	13.2	16.3	15.8	15.3
SNA	10	12.4	10.2	10.6	9.1
FLA	11	11.5	10.2	10.8	6.6

Platform	2014	2015	2016	2017	2018
BMA	23.4	15.3	15.6	16.1	15.8
Average	**11.8**	**9.9**	**14.9**	**14.7**	**13.6**

5.3.2 Produced Formation Water Modelling and Studies

To inform the environmental risk and impact assessment of the effects of PFW discharges to the marine environment, Esso has considered the following:

- Discharge regime, as described in Section 5.3.1 above;
- Composition, as provided in Section 5.3.2.1;
- Dispersion modelling; including oceanographic conditions, as inputs to plume tracking and dispersion modelling (Section 5.3.2.3)
- Ecotoxicology, considering the multiple substance potentially affected fraction (msPAF) calculation and whole effluent toxicity tests (Section 5.3.2.3);
- In-situ monitoring, including plume tracking using volatile hydrocarbon profiling, the 2018 in-situ study and previous sediment studies (Section 5.3.2.4).

5.3.2.1 Composition

PFW is sampled and analysed for a wide ranging suite of components on an annual basis. Analysis is completed to understand what components are present in the PFW and if the PFW differs year on year to identify any potential changes to environmental impacts can be identified. PFW is analysed for Total Organic Carbon (TOC), mono-aromatic hydrocarbons, poly-aromatic hydrocarbons (PAHs), phenols, and metals, among other constituents.

At various stages along the production process, chemicals may be added to assist in minimising potential issues such formation of hydrates, corrosion and scale formation or to assist with process stability. Water soluble chemicals may remain in the PFW following processing. The comprehensive suite of analytes tested for during PFW sampling also takes into account components of residual chemicals that may be present in the PFW when discharged.

In 2018 a comprehensive analysis of TNA PFW composition was undertaken as part of the In-Situ study (Barnes et al, 2019). PFW from TNA was sampled and tested for 237 analytes, of which only 67 were detected as present in PFW. Of the analytes that were present:

1. The concentration of analytes measured was consistent with previous testing at TNA and similar to that from other Esso platforms throughout Bass Strait.
2. The concentration of BTEX and phenols were generally within the range reported in PFW discharges from various locations including the North Sea, Gulf of Mexico and Indonesia (OGP 2002, Neff 2002, Johnsen et al. 2004, Neff et al. 2011).
3. The concentration of PAHs were higher than those reported in the Gulf of Mexico but lower than the North Sea, Scotian Shelf and Grand Banks (Neff et al. 2011).
4. The concentration of heavy metals was however lower than reported from the Gulf of Mexico, the North Sea, Scotian Shelf and Grand Banks these areas (Frost 1998, Ekins 2005, UKOOA 2002).

In 2014 – 16 an intensive PFW sampling program was completed to analyse the change in PFW over time. Samples were taken from every platform on a six monthly basis and showed that concentrations of components in PFW were consistent over time.

During the intensive sampling campaign, the differences in produced water composition between platforms were also analysed. The results of this analysis showed that the coefficient of variance[1] was low for all parameters (typically less than 0.5) meaning that there was little variation in composition between platforms. There were some exceptions to this:

- The coefficient of variance for long hydrocarbon chains and some metals was around 1, indicating high variance, however in these cases it was potentially due to mean values approaching zero.
- Physical parameters, including suspended solids, were more variable (coefficients of variance around 1) but were generally below 50 mg/L.
- There was very low variance for Ammonia, TRH C6-C10, Xylenes, Sulphate and Total Sulphur, Chloride and most of the early Naphthalene series.

The results of the sampling program demonstrated that there were no platforms that consistently displayed high degrees of variation across all parameters, meaning produced water from different platforms have similar composition.

PFW sampling and compositional analysis is now completed annually. Annual sampling results are analysed to identify any significant changes in composition year on year. Contaminants of potential concern detected in PFW over the period of 2014 to 2018 are summarized in Table 5-7. Table 5-7 shows the minimum and maximum detections of a component between 2014 and 2018 across all platforms sampled. Table 5-7 also shows the frequency with which these components were detected across all platforms between 2014 and 2018 (i.e. 100% detection = detected every platform sampled, every time it was sampled).

Table 5-7 Contaminants detected in PFW sampling 2014-2018

Parameter	Minimum detected (mg/l)	Median (mg/l)	Maximum detected (mg/l)	% Detected
Aromatic Hydrocarbons				
Mono-aromatics				
Benzene*	0.27	2.1	8.9	100
Toluene*	0.14	4.25	13	100
Ethylbenzene*	0.11	0.24	2	95
m&p-Xylenes	0.78	1.85	4.3	100
o-Xylene	0.22	0.58	1.2	98
Total Xylenes*	1	2.5	5.5	98
1.2.4-Trimethylbenzene	0.09	0.21	0.5	81
1.3.5-Trimethylbenzene	0.039	0.0885	0.22	70
Di-aromatics				
Naphthalene*	0.075	0.23	1.5	100
2-Methylnaphthalene	0.059	0.16	1.2	96
Poly-aromatics				

[1] The coefficient of variance (aka. relative standard deviation) is defined as the ratio of the standard deviation to the mean. It shows the extent of variability in relation to the mean of the population. A lower coefficient of variance implies that there is less variability from the mean of the population (i.e. the concentration of the PFW component between different platforms is similar).

Parameter	Minimum detected (mg/l)	Median (mg/l)	Maximum detected (mg/l)	% Detected
Acenapthene	0.001	0.002	0.007	18
Fluorene	0.001	0.007	0.037	67
Phenanthrene	0.001	0.007	0.037	77
Anthracene	0.00058	0.00429	0.008	8
Phenols				
Phenol*	0.038	0.5	2.4	98
m & p Cresol	0.008	0.3	3.1	96
o-Cresol	0.016	0.26	2.4	98
2,4-Dimethylphenol	0.009	0.1	1.5	91
Inorganic constituents				
Ammonia (as N)*	8.16	23	60	100
Sulphide	0.03	5.2	40	93
Cyanide (total)	0.002	0.007	0.022	11
Nutrients				
Total Nitrogen as N	8.2	25	2200	100
Phosphate	0.02	0.165	3.4	56
Metals				
Arsenic	0.001	0.0035	0.11	11
Calcium	130	440	670	100
Chromium*	0.0003	0.0035	0.058	11
Cobalt	0.002	0.002	0.002	2
Copper*	0.0008	0.0074	0.014	4
Iron	0.018	1.2	9.2	93
Manganese	0.066	0.985	2.9	98
Nickel*	0.001	0.004	0.018	12
Selenium	0.001	0.01	0.11	19
Vanadium*	0.0013	0.0013	0.0013	2
Zinc*	0.001	0.015	0.11	26

5.3.2.2 Dispersion Modelling and Field Verification

Dispersion modelling is used to predict how discharges flow and mix with the receiving waters. This allows the analysis of temperature effects, as well as dispersion of components in a discharge stream to be predicted. Modelling can also be used to calculate a mixing zone. The mixing zone defines the distance from the platform beyond which concentrations will be below ANZECC criteria (or other relevant criteria were applicable).

The dispersion of Esso's produced water is best described in three stages:

Stage 1: **The convective phase,** which provides the initial dilution as PFW is discharged from the pipe. This phase is driven by the momentum of the PFW discharge.

Stage 2: **The dynamic collapse phase** which is the secondary dilution of the PFW plume as it rises to the sea surface, driven by buoyancy derived from the difference between the density of the PFW plume and the ambient seawater.

Stage 3: **The dispersive phase,** which is the dilution and dispersion of the PFW discharge under the influence of local currents and metocean conditions.

A number of dispersion modelling studies on the PFW discharges from Esso's facilities in the Bass Strait have confirmed the relative consistency of the discharge regimes for each platform (Brandsma, 1993, Asia-Pacific Applied Science Associates, 2002, Asia-Pacific Applied Science Associates, 1998, Terrens, 1994)

A visual representation of the discharge showing the three stages of dispersion is shown in Figure 5-1.

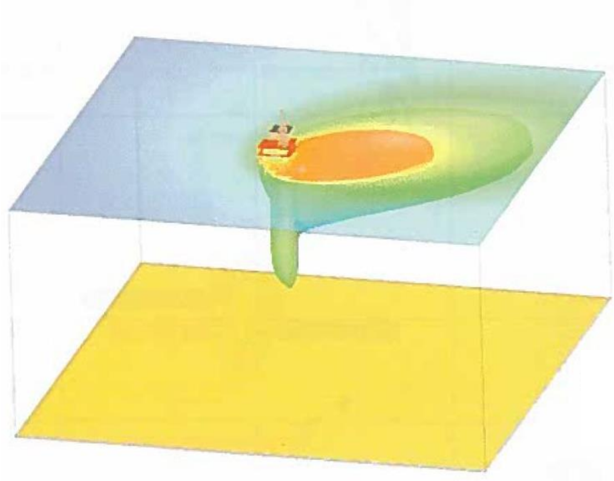

Figure 5-1 Schematic diagram of the modelled PFW discharge from Esso's Kingfish B platform (McAllister, 1997)

Temperature effects were studied as part of dispersion modelling undertaken in 1997 and 2002, using the Offshore Operators Committee (OOC) model. The 1997 model found that temperature of the plume was within 0.5°C of ambient seawater temperature within 32 m. Similar results were obtained in 2002 when modelling using winter conditions predicted a temperature decrease from 85°C on discharge to 2-3°C above ambient temperatures over 30 seconds and within 4 m.

In 2016, a comprehensive produced water dispersion modelling study was undertaken (RPS-APASA, 2016). The study modelled PFW discharge from each platform individually, using input data specific to each platform. Oceanographic conditions were simulated using a three-dimensional current model (HYDROMAP) for Bass Strait which included the combined influence of ocean and tidal currents. Outputs of the oceanographic model were verified by completing detailed comparisons of modelled versus measured hydrodynamic data at three locations (KFB, BTA and KPA).

A near-field discharge model (UM3) was used to assess the dilution of PFW streams during the convective and dynamic collapse phases (Stage 1 and Stage 2) of PFW dispersion using low, medium and high local currents. Near-field mixing dynamics were then used as input into the far-field advection and dispersion model (MUDMAP) (Stage 3) to predict mixing zones for each platform accounting for variation of oceanic conditions over an entire year.

The study also examined the potential for additive effects from platforms discharging within 2km of each other. It showed there was negligible overlap in the zones of potential influence (i.e. almost no change to the probabilistic dilution plume over all model runs) for WTN-TNA, WKF-KFA-KFB and CBA-HLA-FTA-MKA discharges.

Compositional data from each platform was compared to relevant ANZECC Criteria (or other relevant environmental criteria where relevant) for each contaminant to determine the extent of the mixing zone required for each platform. Results of this analysis for each platform are shown in Table 5-8. Results indicate that FTA has the largest mixing zone with maximum horizontal distance of 2 km from the platform required before concentrations of components in PFW are below relevant environmental criteria.

Table 5-8 Summary of the PFW discharge characteristics and predicted model results

	Kingfish fields			Tuna fields		Central fields				Snapper	Bream A	Flounder	Marlin B
	Kingfish A	Kingfish B	West Kingfish	Tuna	West Tuna	Fortescue	Cobia	Halibut	Mackerel				
	KFA	KFB	WKF	TNA	WTN	FTA	CBA	HBA	MKA	SNA	BMA	FLA	MLB
PFW discharge													
Discharge flow rates (kL/d)	14,197	12,488	13,053	11,462	6,783	13,588	15,009	12,481	14,013	4,370	2,358	12,620	4,800
Discharge temperature (°C)	91	87	84	80	63	75	53	89	53	80	65	73	80
Discharge salinity (ppt)	38	36	38	34	27	37	37	38	37	23	32	39	34
Discharge depth (m below MSL)	22.0	24.6	16.0	28.8	29.5	29.9	27.7	11.0	23.5	8.2	24.5	23.9	11.0
Highest dilution level required for each PFW stream (1:X)	2,200	2,400	4,800	2,000	1,000	5,200	3,200	4,600	4,000	1,000	2,600	1,800	2,000
Near-field results													
Maximum horizontal distance (m) to reach end of near-field mixing phase[14]	149	153	93	108	102	200	132	93	150	14	104	104	30
Far-field results													
Maximum horizontal distance (km) to the required dilution	0.37	0.34	1.78	0.32	0.14	2.00	0.76	1.38	1.30	0.12	0.14	0.30	0.15
Minimum horizontal distance (km) to the required dilution	0.21	0.20	0.61	0.20	0.11	0.60	0.32	0.50	0.47	0.09	0.10	0.19	0.11
Area of exposure for the required dilution level (km^2)	0.23	0.21	3.35	0.17	0.04	3.40	0.80	2.15	1.91	0.04	0.04	0.17	0.05

In 2018, dilution models at TNA were verified against field measurements (Barnes et al, 2019). Dye was injected into the PFW discharge at TNA to enable the location of the plume to be positively identified in 3D space. Plume dilution was calculated from fluorometer measurements taken at various depths and at graduated distances from the platform. The study found that PFW discharged to the receiving environment was diluted two to four times faster than was predicted in the 12-month averages derived from plume dispersion modelling previously reported for TNA platform by RPS-APASA (2016).

Furthermore, PFW discharge rates have declined since modelling was completed in 2016 (refer to Table 5-9) so mixing zones are likely smaller than those presented in the study. It is predicted that overall PFW discharge rates will continue to decline over the next five years as oil production slows and high water cut wells are shut-in.

Table 5-9 Maximum daily flow rates (2016)

Platform	Modelled flow rate (kL/d)	2018 Average flow rate (kL/d)	Reduction (%)
WTN	6783	2130	69
HLA	12481	8690	30
FTA	13588	6560	52
CBA	15009	0	100
MKA	14013	0	100
KFA	14197	0	100
KFB	12488	9920	21
WKF	13053	8330	36
TNA	11462	2690	77
SNA	4370	1240	72
FLA	12620	3200	75
BMA	2358	710	70

5.3.2.3 Ecotoxicity

Esso has assessed the ecotoxicity of PFW in two ways:

1. Ecotoxicity sampling and testing (whole effluent toxicity testing) and
2. Calculation of the potential effects to organisms based on the known toxicity of components in the PFW (known as Multiple Substance Potentially Affected Fraction (msPAF))

Whole Effluent Toxicity

Whole effluent toxicity testing was completed in 2016. Ecotoxicity tests were undertaken for acute and chronic end points for all platforms. For chronic end point tests, data was collected according to methods, species and taxa selection in accordance with ANZECC guidelines (ANZECC, 2000).

Data from the ecotoxicity tests shows that all acute effects occur at dilution factors of less than 8 for PFW on all platforms, whilst chronic effects (NOEC or EC50) did not occur once PFW was diluted by factors more than 74 on all platforms, which dispersion modelling predicts will be achieved within 20m of the discharge point.

Multiple Substance Potentially Affected Fraction (msPAF)

Multiple Substance Potentially Affected Fraction (msPAF) calculations are used to assess ongoing toxicity risks to marine species. msPAF uses PFW composition data to assess the collective impact of multiple chemical stressors present in PFW on marine organisms (Schafer et al., 2013).

Parkerton et al. (2016) describes the application of msPAF to PFW. Ecotoxicity data for PFW constituents are used to define the species sensitivity distribution that describes the relationship between the percent of species impacted and concentration of the stressor, i.e. contaminant. The predicted near-field exposure concentration for each stressor is estimated by dividing the measured PFW contaminant concentrations by a dilution factor derived from dispersion modelling outputs (e.g. the dilution factor at 1000 m). The predicted exposure concentrations (PECs) of each PFW contaminant is then used as input to compute the predicted affected fraction (PAF) of species for each contaminant which is then summed (depending on mode of action considerations) to compute the msPAF. The resulting msPAF predicts the fraction of all species affected by exposure to all contaminants in PFW.

While msPAF is a theoretical calculation, results correlate with whole-effluent toxicity data using chronic endpoints. In addition, ANZECC/ARMCANZ allows for other trigger points to be used where real data (i.e. WET data) is available for specific effluent discharges (which is the case for Bass Strait platforms).

msPAF results for all platforms consistently predict less than 5% species potentially affected by PFW discharge at 1000m from the discharge point. Put differently, PFW constituent concentrations at 1000 m are protective of 95% of species.

5.3.2.4 In-situ (Field) Monitoring

In 2018 Esso undertook a comprehensive in-situ study of the impact of PFW discharge in Bass Strait (Barnes et al, 2019). The study included water sampling and field based validation of dispersion models (refer to section 5.3.2.2) as well as examining contaminants in sediment and benthic fauna in order to assess the cumulative effect of PFW discharge over the history of Bass Strait operations.

Water sampling

An assessment was completed to determine at which platforms in field water sampling should be completed to verify theoretical dispersion modelling. TNA was selected for the dispersion and water based component study because it was identified as the most likely to affect marine biota based on the concentration of ammonia relative to the ANZECC 2000 guideline. In addition, whole effluent toxicity testing indicated that TNA PFW had a relatively high toxicity to species tested, in particular *Hormosira banksii* (brown algae) compared to the majority of other platforms (Parkerton et al. 2018).

During the study, dye was injected into the PFW discharge at TNA to ensure that the plume could be positively identified in 3D space. PFW samples were taken from the platform and marine water samples were taken from within the plume. Samples were also taken at reference sites.

The study found that the majority of the analytes detected in discharged PFW from TNA were not detected in the plume measurements. Of those detected, most analytes within chemical groupings such as BTEX, total petroleum hydrocarbons and metals were reduced to below limits of detection or were consistent with background concentrations in marine water samples collected relatively close to TNA (59 m). All analytes detected in the marine environment (regardless of source) had concentrations below 80 % species protection trigger values, thus protective of at least 80 % of species.

Sediment sampling and Benthic fauna

An assessment was completed to determine at which platforms sediment sampling should be completed to verify theoretical eco-toxicity calculations. TNA and WKF were selected for the sediment study because they were identified as having the highest potential effect to benthic infauna based on the total annual load of discharged suspended solids as well as the presence of detectable metals and polyaromatic hydrocarbons (PAHs) that are more likely to settle on the seafloor.

The study collected sediment and benthic infauna samples from two Zones in the vicinity of TNA and WKF platforms (Zone 1: 50 m to 180 m and Zone 2: 180 m to 1000 m from the platform) and from two reference locations between ~ 8 km and 13 km from any one platform. 18 samples were collected in each Zone and tested for concentrations of contaminants of potential concern. Samples were also analysed for benthic fauna.

Concentrations of analytes in the majority of sediment samples collected at TNA and WKF were below ANZECC 2000 Guideline Sediment Quality Guidelines (SQG) and 2013 Revision to SQG; and were generally similar amongst sampling locations or not recorded above LOR. These findings agree with those previously recorded within the vicinity of Esso oil and gas facilities in Bass Strait (Cardno 2016, Marine Solutions 2018). Moreover, these concentrations are substantially lower than those reported in close proximity to other oil and gas facilities throughout the world (Olsgard and Gray 1995, Schifter et al. 2015, Kennicutt 2017).

Despite the low concentrations detected, various metals, hydrocarbons and total organic carbon concentrations close to the platforms were above those recorded at reference locations and decreased along a gradient away from the platforms. In these cases, parity with reference locations was calculated to be achieved within 240 m of TNA for all contaminants, 500 m of WKF for hydrocarbons and 1,900 m of WKF for metals (Barnes et al, 2019).

Patterns in Benthic Infauna Taxon Abundance
The diverse assemblages of benthic infauna collected during this study are similar to those reported previously in proximity to Esso's platforms (URS 2000, Cardno 2016, Marine Solutions 2018) and more broadly throughout Bass Strait (Parry et al. 1990, Coleman et al. 1997, Passlow et al. 2006). The contribution of individual taxon to the overall assemblage, however, varied between these studies which is likely due to a number of natural factors including habitat heterogeneity at various scales (micro and macro), depth, sediment characteristics and temporal differences between sampling periods (URS 2000, Cardno 2016, Marine Solutions 2018).

The abundance of 21 and 22 taxa at TNA and WKF respectively was significantly influenced by distance from the platform. For the majority of these taxa at TNA (15) the abundances decreased with distance from platform. In contrast, for the majority of these taxa at WKF (14) abundances increased with distance from platform. Where there was a significant relationship between taxon abundance and distance to platform, abundances were modelled to reach (i.e. increased to or decreased from) Reference location levels at distances of between 5 m and 1,250 m from TNA or between 144 m and 1,007 m from WKF. This is consistent with other studies which have observed both a decline in infaunal abundance and species richness within close distances (e.g. several metres) of marine structures (Davis et al. 1982, Wilding 2006) and enhanced species richness, abundance or biomass of certain species close to the structures (Davis et al. 1982, Montagna et al. 1996, Peterson et al. 1996).

Where significant gradients of individual taxa occurred, they were generally correlated with the proportion of gravel (2.0 mm and above) sized particles in the sediment. A higher proportion of coarser sediments (gravel, >2.0 mm) occurred around the platforms, reducing with distance, compared to locations at greater distances from the platforms. It was concluded that although analytes detected near the platforms may be contributing to varying distributions of some individual taxa, it is only grain size (particularly the proportion of gravel size particles) that is likely driving change to the overall assemblage close to platform.

5.3.3 Impacts of PFW Discharge

PFW discharged to the marine environment has the potential to result in the following impacts:

- Change in water quality,
- Change in sediment quality.

As a result of change in water quality and change in sediment quality, further impacts may occur:

- Injury / mortality to fauna.

Receptors affected by the discharge of PFW which have been identified as occurring in the area are identified in Table 5-10. Dispersion modelling showed no change in the discharge plume modelling for platforms within 2 km of another PFW discharge point, therefore no cumulative impacts from PFW discharge are expected to occur.

Table 5-10 Receptors affected by impacts associated with discharges of PFW

Impacts	Receptors				
	Water quality	Sediment quality	Benthic habitats and communities	Plankton	Fish
Change in water quality	✓				
Change in sediment quality		✓			
Injury / mortality to fauna			✓	✓	✓

Discharges of PFW have the potential to result in injury or mortality to marine fauna from changes in temperature or exposure to chemical toxicity within the PFW discharge. Large marine fauna such as marine mammals and marine reptiles are highly mobile and would move away from the discharge plume limiting potential impacts. As these species are transient, they are not expected to experience any chronic or acute effects. Uptake of dissolved hydrocarbons is also less likely since these animals are air breathing and do not possess gill structures that promote cellular uptake of dissolved constituents. Changes in water quality will be localised and potential for toxic impacts to marine mammals and marine reptiles are negligible, therefore no impacts are expected.

5.3.4 Consequence Evaluation

5.3.4.1 Change in water quality

Discharges of PFW can affect water quality through chemical toxicity and increased temperature.

Modelling demonstrates that temperature will reduce to ambient levels within 32 m of the discharge location, with dilution of over 500 times within approximately 100 to 200 m of the platform. Where platforms are located within 2 km of another platform, no change to the modelled discharge plume was observed, indicating that no cumulative or combination impacts from PFW discharge are expected.

Dispersion models have been verified against field measurements at TNA (Barnes et al., 2019).

Based on this, change in water quality is expected to be localised to the discharge source. Components of PFW and temperature changes will quickly dissipate in the high energy marine environment, and long-term impacts are not expected. Impacts could have potential short term, minor adverse effects on water quality, with a **Consequence Level III**.

5.3.4.2 Change in sediment quality

Discharges of PFW can affect sediment quality through chemical toxicity and increased temperature.

Modelling demonstrates that temperature will reduce to ambient levels within 32 m of the discharge location. Water depth at platforms discharging PFW ranges from 55 m (SNA) to 93 m (HLA, FTA, CBA, FLA), therefore temperate changes are not expected to reach the seabed and no change in sediment quality from change in temperature is expected.

A change in sediment quality could occur if components of PFW settle on the seabed. Sediment sampling during in-situ field monitoring at TNA and WKF found that the concentration of PFW components analysed were below ANZECC 2000 Guideline SQG in the majority of sediment, although an increase in various metals, hydrocarbons and TOCs was seen close to the platform when compared to the reference locations. In these cases, parity with reference locations was calculated to be achieved within 240 m of TNA for all contaminants, 500 m of WKF for hydrocarbons and 1,900 m of WKF for metals (Barnes et al, 2019).

Change in sediment quality from PFW discharges is localised. Any impacts will be inconsequential or have no adverse effect, with a **Consequence Level IV**.

5.3.4.3 Injury / mortality to fauna

Plankton and Fish

A change in water quality due to PFW discharge may cause injury or mortality to fish and plankton species though increased water temperature and toxicity.

Early life stages of fish (embryos, larvae) and other plankton would be most susceptible to exposure from chemicals in PFW discharges, as they are less mobile and therefore can become exposed to the plume at the discharge point. This may indirectly affect the population of prey species.

The impact to plankton species from a change in temperature varies from species to species. Vijverberg, (1980) showed that changes in the temperature due to discharges from a desalination plant on plankton led to a positive effect on reproduction biology and the growth rate of several species of plankton. However, thermal stress was the major source of copepod mortality reported by Choi et al. (2012) with mortality caused by a difference of approx. 5°C. Modelling shows a rapid decrease in temperatures near the discharge source and ambient temperatures are reached within 32 m of the source. Therefore, impacts to plankton species by temperature variations are expected to be localised to the discharge source of the PFW.

Although acute toxicity from exposure to PFW has been recorded in many marine organisms (Querbach et al. 2005), these are generally from extended exposure times (up to 96 hours), which are much longer than marine organisms drifting in the water column (i.e. plankton) or actively moving through the area (fish). While small numbers of fish and crustaceans residing close to the discharge point could be exposed to PFW components at higher concentrations and exposure periods, the available evidence suggests that the concentration of components, such as naphthalene, phenanthrene and pyrene, must be higher than that recorded in undiluted PFW on the platform (i.e. before discharge) to result in acute toxicity (IOGP 2002). Furthermore, the concentration of metals and inorganics detected in the receiving waters is likely to ensure the protection of 90% of marine organisms (ANZECC 2000).

The Operational Area is within a distribution BIA for great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Change in water quality is likely to result in localised and short-term impacts to plankton and fish, with no population or ecosystem level changes expected. Any impacts will be inconsequential or have no adverse effect, with a **Consequence Level IV**.

Benthic Habitats and Communities

A change in sediment quality due to PFW discharge may cause injury or mortality to benthic communities though toxicity.

Particulates with higher molecular weight PAHs are a primary contaminant of concern in sediment due to partitioning affinity to suspended solids. Petroleum hydrocarbons adsorbed to suspended organic and inorganic solids in the water column are much less bioavailable to marine organisms than hydrocarbons in solution or dispersed in the water column (Anderson et al., 1983; Neff and Breteler, 1983). Because of the low bioavailability of sediment-adsorbed hydrocarbons, most benthic marine animals are able to tolerate relatively high concentrations of sediment hydrocarbons (Neff, 1989). For platforms WTN, FTA, HLA, MKA, WKF, KFB, KFA, and SNA the ratio of naphthalene to phenanthrene is low (closer to 0 than 100) so most aromatic hydrocarbons are expected to be in suspended form.

Precipitation from mixing PFW and seawater may result in components in PFW reaching the seabed.

In-situ monitoring data shows that changes to sediment quality from PFW, such as increased metals and PAHs, will be below ANZECC (2000) SQG. Impacts to benthic communities are expected to be short-term and localised, with no population or ecosystem level impacts. Any impacts will be inconsequential or have no adverse effect and are therefore assessed as **Consequence Level IV**.

5.3.5 Controls

Good Practice	Adopted	Control	Rationale
Removal of oil in water prior to discharge	✓	**CM10:** Water handling system	PFW is separated from crude oil and then treated by dissolved gas flotation and/or hydrocyclones to remove oil to below 30 mg/L daily average (or 50 mg/L daily average during water handling start-up) before discharge to the ocean.
Regular sampling and testing of PFW	✓	**CM11:** Annual Produced Water Sampling Program and Toxicity Assessment (msPAF)	Composition testing and msPAF ecotoxicity assessments are conducted routinely to confirm less than 5% potentially affected species within 1000 m mixing zone.

5.3.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The planned discharge of PFW to the marine environment is a well understood and practised activity both nationally and internationally. The impacts associated with planned PFW 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**. No stakeholder objections or were claims raised with regards to the planned discharge of cement. Esso believes **ALARP Decision Context A** should apply. In order to assess impacts associated with PFW discharges, Esso has undertaken modelling and monitoring studies using discharge scenarios within the Operational Area. Although the assessment determines that the results of these studies are representative of all PFW discharges within the Operational Area, Esso acknowledges that these assumptions have a level of uncertainty. Therefore, although Esso believes ALARP Decision Context A is appropriate to the planned discharge of PFW assessment, an Engineering Risk Assessment has been undertaken to ensure that any additional controls have been identified and evaluated.		
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**
Disposal of PFW onshore via pipelines	Eliminate disposal of produced formation water offshore.	Transporting PFW to shore introduces potential risks to pipeline integrity as PFW promotes internal corrosion. Material selection and inspection and maintenance strategies are such that water inside these existing pipelines is minimised to reduce the rate of internal corrosion. Transport of PFW through platform equipment can increase potential failure rates and internal corrosion. There is limited capacity for PFW processing onshore (limited by pipeline, plant processing capacity and discharge capacity) and also requires a lot of energy to pump and then reheat the water.	Not adopted
Reinjection of PFW	Eliminate disposal of produced	PFW reinjection into productive or disused wells has been trialled but was unsuccessful on a number of platforms due to technical difficulties, such as insufficient reservoir drink rate and	Not adopted

	formation water offshore.	blockages across the reservoir perforations due to sand.	
Equipment clean out	Increased efficiency of water handling system	There is currently monitoring by the Production Surveillance and Optimisation group of water handling system performance. In the event that a decrease in efficiency of the water handling system is noted, measures such as vessel cleaning and cleaning of certain parts of the hydrocyclones may be taken to improve performance.	Under assessment and will be adopted as required
Optimisation of control systems on water handling	Improved monitoring of OIW measurements	Work is currently being progressed to optimise the control systems associated with the water handling system (i.e. mode of operation of control valves). It is expected that optimisation of these control systems will minimise variation in flowrate through the online OIW Sigrist analyser and thus lead to more stable readings.	Under assessment and will be adopted as required

5.3.7 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 PFW, 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 PFW discharges.

6 Environmental Risk Assessment

6.1 Overview

The purpose of the risk assessment is to ensure that all risks associated with the petroleum activity are identified and evaluated, and the resulting risks are demonstrated to be ALARP and Acceptable in accordance with the Esso impact and risk assessment methodology (Section 4.3).

The assessment of risks been undertaken in two stages:

1. Risk Scoping (Section 6.2)
2. Detailed Evaluation (Sections 6.4 to 6.7)

6.2 Risk Scoping

Scoping of the risks relevant to the activity ensures that a systematic assessment can be undertaken. The context of the risk assessment has been set through a description of the activity (Section 2.4) and identification of potential environmental receptors within the Operational Area and the PEA (Section 2.4.4.3). By considering the relationship between environmental aspects and the activity (Table 3-2), Esso has identified all risks to affected receptors which could potentially occur as a result of the petroleum activity.

A series of workshops was held to identify environmental impacts and risks associated with the petroleum activity and assess controls to ensure impacts and risks are managed to ALARP and an acceptable level. The workshops were attended by environment and asset personnel. Impacts and risks were evaluated using the impact assessment methodology (Section 4.3) to determine consequence to receptors, ALARP decision context, and likelihood and residual level of risks. Control measures were identified, and an assessment of acceptability was undertaken against the Esso Acceptability Criteria and the defined acceptable levels of environmental performance (Table 3-3).

For most risks identified, the workshop was able to determine that the adopted controls lowered risks to ALARP and to an acceptable level. These risks, and the outcomes of the assessment, are described in Table 6-1, Table 6-2, Table 6-3 and Table 6-4.

In some cases, it was not possible to finalise the risk evaluation during the workshops. This was typically due to the need for either modelling outcomes or an in-depth literature review to support the evaluation and assessment of potential risks to receptors. In these cases, a detailed evaluation has been provided as follows:

- Unplanned Introduction of IMS (Section 6.4)
- Accidental Release – LOC from drain system (Section 6.5)
- Accidental Release – LOC (vessel) (Section 6.6)
- Accidental Release – Loss of Well Control (Section 6.7)

For all risks, control measures have been considered as described in Section 3.8. Controls are applied where a reduction in the consequence or the likelihood of the risk will occur as a result of their adoption. They may also be required by legislation, or by internal Esso requirements. Where the assessment of the risk identified that there were no suitable Good Practice control measures, and additional controls considered would not lower the risk assessment outcomes, no controls have been adopted. This is identified in the table and assessed as part of the demonstration of acceptability.

Environmental Performance Outcomes and Standards relevant to risks associated with the petroleum activity are provided in Volume 4.

6.3 Worst-case discharge scenarios

During the risk workshops, worst-case discharge scenarios were considered. These were determined using the AMSA Technical Guideline for contingency planning (AMSA, 2015), and experienced input from environment and asset personnel in attendance.

AMSA (2015) recommends that risk scenarios should consider the worst-case scenarios, the maximum credible case scenario and the most likely case scenario, in order to determine the overall resource levels for response capabilities required. This assessment focuses on two types of risk scenario (definitions from AMSA, 2015):

- Worst-case scenario (WCS) - The largest volume that could be spilled as a result of any event or combination of events. The results of a catastrophic event or failure.
- Most likely case scenario (MLCS) - The most likely spill over $10m^3$ for the facility or activity. The largest spill likely to occur within the life span of the facility and/or activity.

For worst-case scenarios of each hydrocarbon type, modelling has been undertaken. Modelling is described in the relevant detailed evaluation sections. For most-likely case scenarios, industry experience and literature have been used to determine the fate of spilled hydrocarbons or chemicals, and potential consequences to receptors.

Modelling has been undertaken for the following scenarios:

- Loss of containment (vessel collision) – Section 6.6
- Loss of well control – Section 6.7

A pipeline rupture from an anchor drag or dropped object resulting in the partial loss of inventory of the pipeline was also considered for modelling. The worst-case scenario for a subsea pipeline failure is a 10 mm hole at the Marlin tee, located 1.7 km from MLA platform, where the release (695,000 L) is stopped in 95 hours. Volume and duration of a pipeline spill is less than the loss of well control (LOWC) scenario and therefore was not taken forward for modelling as it does not represent the worst-case.

Table 6-1 Operations Activities –Risk Scoping

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
Platform Operations	Accidental Release - Dropped Objects Dropped objects can occur from lifting / crane operations.	Change in habitat Dropped objects can change habitat through the presence of a foreign object, and through dragging of equipment across the seabed. Risks are restricted to the Operational Area	Benthic habitats and communities	Alteration to benthic habitats, including destruction of habitat, as a result of a dropped object on the seabed can affect benthic habitats and communities. Benthic habitats and communities within the Bass Strait show natural small scale variation; however, the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. High rates of disturbance to benthic communities, such as long term disturbance from dredging or trawl fishing, can lead to reduced habitat structure. This results in homogenous, low diversity communities and loss of large and long-lived sedentary species that create habitat structure and leads to reductions in primary production and ecosystem function (Handley et al., 2014). Disturbance from dropped objects during platform operations is not expected to result in high rates of disturbance at this scale, however it is possible that small scale disturbance will lead to similar outcomes. Change in habitat from dropped objects will be limited to close proximity to existing infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	**CM1:** Facility Integrity Management System	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
Platform Operations Subsea facilities Operations Pipeline Operations	Accidental Release – LOC (chemicals / hydraulic fluids) Chemical or oil spills resulting from a single-point failure typically occur because of: • equipment failure	Change in water quality Accidental release can lead to toxicity impacts near the spill location.	Ambient water quality	Minor spill volumes (<1 bbl) can lead to a change in water quality through toxicity. The aqueous film forming foam (AFFF) contain some PFAS (per- and poly-fluoroalkyl substances) – based products. A release of AFFF will result in a change in water quality due to chemical toxicity. Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	B	4	A	**CM1:** Facility Integrity Management System **CM12:** OPEP	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and	Acceptable
		Injury / mortality to fauna Accidental release can lead to toxicity impacts near the	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydraulic fluids, as they are less mobile and therefore can become exposed to the plume at the outfall. Phytoplankton are typically not sensitive to the impacts of oil, though they do accumulate it rapidly, whilst									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	• incorrect storage • incorrect handling Includes drips and drops, water soluble chemicals released from the piles, oil & chemical storage and handling scenarios, and firefighting foam used during a fire. Volumes typically <1bbl.	spill location, however due to the high-energy nature of the receiving water column, impacts are expected to be localised and temporary.		zooplankton are known to be vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016). Firefighting foams are a mixture of chemicals. Fluorochemical containing foams such as AFFF have the potential to cause long lasting (chronic) effects if continuous exposure occurs due to high bioaccumulation potential. Marine fauna known to bioaccumulate fluorochemicals, such as plankton, are the most affected (Klein, 2009). Plankton is generally abundant in the upper layers of the water column and are expected to rapidly recover once the releases ceases as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985). Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al., 2004). As such, exposure of planktonic communities to accidental chemical and hydraulic fluid discharges is not considered to result in significant impacts on these organisms at population levels that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011). Any impacts will be inconsequential or have no adverse effects.								recovery of listed and threatened marine mammals, marine reptiles and birds and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented where they can further lower the impact consequence • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Fish	Toxic exposure from small volumes of released chemicals and hydrocarbons can affect fish in close vicinity to the discharge through dermal contact, ingestion and inhalation. Pelagic species are 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. Many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
Platform Operations	Accidental Release - Waste Non-hazardous waste can be accidentally released through inappropriate storage and handling.	Change in habitat Non-hazardous waste can become marine debris, changing the habitat for marine fauna.	Benthic habitats and communities	Some waste materials released may sink to the seabed in close proximity to the release site. These materials will rest on the seabed, resulting in smothering to benthic fauna and a localised change in habitat. Change in habitat from accidental release of waste will be limited to the Operational Area. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV	B	4	A	**CM13:** Platform induction process (Greencard)	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage. • Activity will not impact the long term survival and recovery of listed and threatened birds, marine mammals or marine reptiles and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
		Injury / mortality to fauna Non-hazardous waste can cause physical harm to marine fauna through ingestion or entanglement.	Birds Marine reptiles Marine mammals	Marine fauna most at risk from marine pollution include marine mammals, marine reptiles and seabirds through ingestion or entanglement. Impact will occur to species on the sea surface or in the surface waters. The ingestion or entanglement of marine fauna has the potential to limit feeding / foraging behaviours and thus can result in mortalities. The Operational Area is within a number of seabird foraging BIAs, and a foraging BIA for pygmy blue whale. Marine turtles are not expected to occur regularly within the Operational Area, although their presence is possible. Non-hazardous pollution of this kind is not listed as a threat to any marine fauna. Listed threatened species of marine fauna may occur within the Operational Area; however, any impacts will be localised to the release site and affect individual fauna only. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									
Platform Operations	Accidental Release - Bulk Transfer	Injury / mortality to fauna Spills of hydrocarbons and	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydrocarbons, as they are less mobile and therefore can become exposed to the plume at the outfall. However, these are expected to rapidly recover	IV	D	4	A	**CM1:** Facility Integrity Management System	None	ALARP	• Risk is well understood	Acceptable

								Demonstration of ALARP				Demonstration of Acceptability	
Activity	**Aspect**	**Risk**	**Affected Receptor**	**Consequence Evaluation**	**Consequence Level**	**Likelihood**	**Risk Ranking**	**ALARP Decision Context**	**Good Practice Control Measures**	**Additional Control Measures Considered**	**ALARP Outcome**	**Acceptability Assessment**	**Acceptability Outcome**
	Bulk transfer of glycol, methanol, brine, workover fluids or diesel fuel from vessel to platform is conducted using flexible hoses. Accidental release may occur with hose failure. Maximum release <1000 litres.	chemicals can lead to toxicity impacts near the spill location.		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 to accidental chemical and hydrocarbon discharges is not considered to result in significant impacts on these organisms at a population level that would affect ecological diversity or productivity within Commonwealth marine areas. Rather, it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.					**CM14:** Procedures for bulk transfer of fluids from supply vessels.			• Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Fish	Toxic exposure can affect fish through dermal contact, ingestion and inhalation. Given the maximum release volume, surface and entrained oil concentrations are possible. Fish are at risk from dissolved hydrocarbons and entrained hydrocarbons in the water column. Some fish are attracted to floating objects at sea and may congregate under slicks. Pelagic species are 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. Many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Fish are most vulnerable to water column toxicity in shallow nearshore waters, bays and estuaries, where the toxicity concentration can significantly rise. In the open marine environment, dilution is likely, and impacts are significantly reduced. The Operational Area is within a distribution BIA for great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species are not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									
Pipeline Operations	<u>Accidental Release – LOC (pipeline)</u> Pipeline operations can lead to an accidental release from a pipeline.	<u>Change in water quality</u>	Ambient water quality	A release of liquid hydrocarbons or chemicals from a pipeline can lead to a change in water quality through toxicity. Accidental release of gas can lead to a bloom in methane-consuming microbes (methano-trophic bacteria), which may exhaust oxygen supply in the water column resulting in a change in water quality Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	E	4	A	**CM1:** Facility Integrity Management System **CM12:** OPEP	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity	Acceptable

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	Pipeline content could be hydrocarbons (liquid or gas) or chemicals. Pipeline damage leading to an unplanned release from a pipeline could occur due to: • dropped object • Anchor drag.	<u>Injury / mortality of fauna</u> Hydrocarbons or chemicals released at the seabed could result in injury / mortality to species in close proximity to the discharge.	Plankton	Plankton, specifically zooplankton, are vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause a range of effects, from immediate mortality or declines in egg production and hatching rates to a decline in swimming speeds (Hook et al., 2016). Release of gas into the marine environment can lead to a bloom in methano-trophic bacteria, which will increase the biological oxygen demand (BOD) in the surrounding waters and quickly reduce the oxygen available for plankton. Plankton are typically abundant in the upper layers of the water column and decline with depth. Given the seabed location of the spill, exposure of planktonic communities is not considered to result in significant impacts on organisms at population level that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011a). Any impacts will be inconsequential or have no adverse effects.								• Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened birds, marine mammals or marine reptiles and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Benthic habitats and communities	Benthic invertebrates are potentially at risk of toxic impacts from exposure to in-water hydrocarbons. While exposure can lead to impacts including mortality, recovery of benthic invertebrates exposed to entrained hydrocarbons would be expected once background water quality conditions are restored within weeks to months from initial 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 in Committee on Oil in the Sea, 2003). No impacts to benthic habitats and communities are expected from a gas release as the gas will travel quickly to the surface, and chronic or acute exposure will not occur. 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 exoskeleton and larval forms may be more prone to impacts from in-water hydrocarbons. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that injury or mortality to benthic invertebrates may occur as a result of a change in water quality, however any impacts will be localised to the release site, with hydrocarbons quickly dissipating in the high energy marine environment. Any changes will be short term due to the mostly homogenous nature of the benthic environment and rapid recovery rate, with no long-term changes to ecosystem are expected. Impacts will be inconsequential or have no adverse effect.									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
			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). 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 metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Free-swimming fish and sharks are likely to actively avoid oil, greatly reducing the likelihood of an impact (ITOPF, 2010). Where exposure does occur, pelagic species are typically 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. The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									
			Birds	Birds at sea (e.g. foraging, resting) have the potential to directly interact with surface hydrocarbons only; no impacts are expected from in-water hydrocarbons unless species are diving during feeding (e.g. terns, boobies). 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. 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. All species apart from the white-faced storm petrel are diving or pursuit-plunging species, meaning their main method of foraging is entering the water the retrieve prey. This makes them susceptible to in-water oiling. Pollution is listed as a key threat in the National Recovery Plan for Threatened Albatrosses and									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				Giant Petrels, 2011-2016 (in addition to a number of individual species plans within this group). There is no clear link between quantity of oil spilt and the likely impacts on birds (ITOPF, 2010), as sensitivity to oiling varies immensely. There are no breeding colonies within the Operational Area, and surface oiling is not expected, therefore potential impacts are greatly reduced. The area is listed as a BIA for foraging species known to either dive or pursuit-plunge, meaning impacts to those species from in-water hydrocarbons are possible. Any injury or mortality from hydrocarbon exposure on an individual level will not impact the long term survival and recovery of threatened bird species. Any impacts will be inconsequential or have no adverse effects.									
			Marine mammals	Marine mammals are most at risk from surface / floating oil, specifically when surfacing to breach or breathe (ITOPF, 2010). Surface oiling is not expected from a seabed release of hydrocarbons from a loss of containment from a pipeline, therefore surface impacts to marine mammals are not expected. In-water / entrained hydrocarbons can lead to impacts to marine mammals through ingestion and skin contact. 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 are not particularly susceptible to ingestion of oil in the water column as they feed by skimming the surface (i.e., they are more susceptible to surface 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. 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. If spilled oil reaches these biologically important habitats, it 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. The Operational Area is within the following BIAs: southern right whale (distribution), pygmy blue whale (foraging, distribution), and several other threatened species of marine mammals may be present within the Operational Area. Pollution is listed as a key threat in the Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) and Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale), and habitat modification is listed as a key threat in the Conservation Management Plan for the Blue									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				Whale, 2015-2025, Conservation Management Plan for the Southern Right Whale, 2011-2021 and Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale). It is possible that a seabed release of hydrocarbons from a pipeline spill could lead to impacts to marine mammals. Impacts are expected to effect individuals only, however given the known site-fidelity of some marine mammal species and the presence of BIAs for distribution and foraging; impacts may disrupt important behaviours. As any release will be a small volume and will dissipate quickly in the high energy marine environment, any impacts are expected to be highly localised and short-term. Any injury or mortality from hydrocarbon exposure on an individual level will not impact the long term survival and recovery of threatened marine mammals. Any impacts will be inconsequential or have no adverse effects									
			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). Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all species are known to have a more northerly distribution. Given the low distribution within the Operational Area it is unlikely that marine turtles will be found in close proximity to the release location, therefore chronic and acute exposure are not expected. Ingestion of oil from affected prey is the most likely impact pathway. 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). Pollution is not listed as a key threat in any Management Plan, Recovery Plan or Conservation Advice for marine turtles. Any injury / mortality to marine fauna will affect individual turtles only and will not impact the long term survival and recovery of threatened marine turtle species. Any impacts will be inconsequential or have no adverse effect.									
Platform Operations	<u>Accidental Release - LOC (bulk storage, topside)</u> IBCs located on the main deck store	<u>Change in water quality</u> Spills of hydrocarbons and chemicals can lead to toxicity impacts near the spill location.	Ambient water quality	IBCs are typically 1250 Litres in volume. When stored on the main deck, a spill from an IBC would go to the open drain. A release of chemical of hydrocarbons (diesel) from bulk storage via the open drains would lead to a change in water quality through toxicity. Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	D	4	A	**CM1:** Facility Integrity Management System **CM12:** OPEP	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological	Acceptable

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	fuel and chemicals. IBC volumes are typically 1250 L. Bulk storage occurs in the jacket legs on several platforms. An accidental release would be a pinhole leak only. An IBC represents the worst-case discharge scenario, and therefore pinhole leaks from jacket bulk storage are not discussed further.	Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydrocarbons, 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 to accidental chemical and hydrocarbon discharges is not considered to result in significant impacts on these organisms at a population level that would affect ecological diversity or productivity within Commonwealth marine areas. Rather, it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.								diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Fish	Toxic exposure can affect fish through dermal contact, ingestion and inhalation. Given the maximum release volume, surface and entrained oil concentrations are possible. Fish are at risk from dissolved hydrocarbons and entrained hydrocarbons in the water column. Some fish are attracted to floating objects at sea and may congregate under slicks. Pelagic species are 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. Many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Fish are most vulnerable to water column toxicity in shallow nearshore waters, bays and estuaries, where the toxicity concentration can significantly rise. In the open marine environment, dilution is likely, and impacts are significantly reduced. The Operational Area is within a distribution BIA for great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									
Platform Operations	Accidental Release – LOC from drain system	**Detailed Evaluation Section 6.5**											

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
Platform Operations Subsea facilities operations	Accidental Release - Loss of Well Control	**Detailed Evaluation Section 6.7**											

Table 6-2 Wellwork Activities – Risk Scoping

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
Wireline / Workover Activities (general) Conductor cutting and pulling	Accidental Release - Dropped Objects During wellwork activities, objects could be accidentally dropped onto the seabed.	Change in habitat Dropped objects can change habitat through the presence of a foreign object, and through dragging of equipment across the seabed. Risks are restricted to the Operational Area	Benthic habitats and communities	Alteration to benthic habitats, including destruction of habitat, as a result of a dropped object on the seabed can affect benthic habitats and communities. Benthic habitats and communities within the Bass Strait show natural small scale variation; however, the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. High rates of disturbance to benthic communities, such as long term disturbance from dredging or trawl fishing, can lead to reduced habitat structure. This results in homogenous, low diversity communities and loss of large and long-lived sedentary species that create habitat structure and leads to reductions in primary production and ecosystem function (Handley et al., 2014). Disturbance from dropped objects during wellwork activities is not expected to result in high rates of disturbance at this scale, however it is possible that small scale disturbance will lead to similar outcomes. Change in habitat from dropped objects will be limited to close proximity to existing infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	**CM1:** Facility Integrity Management System	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	**Good Practice Control Measures**	**Additional Control Measures Considered**	**ALARP Outcome**	**Acceptability Assessment**	**Acceptability Outcome**
Cementing	<u>Accidental Release – Cement</u> During cementing operations, an accidental release of cement could occur.	<u>Change in habitat</u> Mixed cement discharged will harden quickly at the discharge location, resulting in a change in habitat.	Benthic habitats and communities	Although the discharge of cement is unplanned, impacts to benthic habitats and communities would be the same as those described for a planned release. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments, however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystems are expected. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	None identified	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
Wireline / Workover Activities (general)	<u>Accidental Release - LOC (chemicals / hydraulic fluids)</u> Chemical or hydraulic fluid spills resulting from a single-point failure typically occur because of: • equipment failure • incorrect storage	<u>Change in water quality</u> Accidental release can lead to toxicity impacts near the spill location.	Ambient water quality	Minor spill volumes (<1bbl) can lead to a change in water quality through toxicity. Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	**CM15:** Preventative Maintenance System	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage	Acceptable
		<u>Injury / mortality to fauna</u> Accidental release can lead to toxicity impacts near the spill location, however due to the high-energy nature of the receiving	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydraulic fluids, as they are less mobile and therefore can become exposed to the plume at the outfall. Phytoplankton are typically not sensitive to the impacts of oil, though they do accumulate it rapidly, whilst zooplankton are known to be vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	• incorrect handling Includes drips and drops, and oil & chemical storage and handling scenarios. Volumes typically <1bbl.	water column, impacts are expected to be localised and temporary.		immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016). Plankton is generally abundant in the upper layers of the water column and are expected to rapidly recover once the releases ceases as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985). Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al., 2004). As such, exposure of planktonic communities to accidental chemical and hydraulic fluid discharges is not considered to result in significant impacts on these organisms at population levels that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011a). Any impacts will be inconsequential or have no adverse effects.								• Activity will not impact the long term survival and recovery of listed and threatened fish species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Fish	Toxic exposure from small volumes of released chemicals and hydrocarbons can affect fish in close vicinity to the discharge through dermal contact, ingestion and inhalation. Pelagic species are 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. Many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									
Wireline / Workover Activities (general)	Accidental Release - Loss of Well Control	**Detailed Evaluation Section 6.7**											

Table 6-3 IMR Activities – Risk Scoping

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
Facility IMR	Unplanned interaction with fauna Interaction with fauna could occur through: • Personnel accessing areas where wildlife is present • Dropped objects • Use of UAVs / drones.	Change in fauna behaviour Disruption to marine fauna could lead to a change in fauna behaviour, including startle response. Risks are restricted to the Operational Area.	Birds	Although birds may use the facility for nesting, they are typically found high up within the structure therefore interactions are unlikely. Startle responses such as flying away from a disturbance are unlikely to be detrimental, and birds will return to their nest / roost once the disturbance has passed. Birds may also be disturbed by the use of UAVs. Drones are widely used in ornithological research, allowing data collection with minimal disturbance. Approach studies (e.g. Vas et al., 2015) demonstrated that no visible change in behaviour occurred within 4 m of approach. 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. There are no specific areas of roosting or nesting within the Operational Area. Disturbance / disruption during roosting or nesting is not identified as a threat in the conservation advice or recovery plans for any of these species. Impacts will be short-term and temporary, with individuals returning to natural behaviours following disturbance. Any impacts will be inconsequential or have no adverse effects.	IV	D	4	A	**CM16:** SWP 50.139.A1 – Drone Operation Offshore **CM17:** SWP 50.313 – Sea Deck Access	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened bird or marine mammal species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
			Marine mammals	Marine mammals are known to occur within the Operational Area. Pinnipeds, specifically fur seal, have been sighted using the lower level sea deck as a haul-out site for resting. If an interaction occurs, pinnipeds are likely to startle quickly, moving away from the disturbance, therefore limiting impacts. Disturbance will be limited where possible i.e. through avoidance of areas where fauna is known to be resting. Marine mammals can be affected by UAVs in two ways: noise disturbance, and disturbance of visual cues caused by the UAV shadow. Recordings of in-water noise from UAVs indicate that they will only be detected above background noise levels up to 1 m below the surface and will likely be undetected against vessel / platform noise (Christiansen et al., 2016). Evidence suggests that marine mammals residing near the sea surface do not typically display changes in behaviour in response to close flying UAVs (Christiansen et al., 2016). Conversely, evidence suggests that pinnipeds in-air may be disturbed by UAVs. Studies show various reactions to UAV presence, with pinnipeds often returning to the water from haul-out sites as a result of UAV presence (Pomeroy et al., 2015). Returning to the water is a common reaction for pinnipeds, and could be caused by a number of factors, however disturbance from UAV presence cannot be ruled out. Australian fur seal, New Zealand fur seal and Australian sealion are all known to be present within the Operational Area, although no BIAs have been identified. The Recovery Plan for Australian Sea Lion (*Neophoca cinereal*) listed human disturbance to colonies and deliberate killing as threats to the sealion population. There are no colonies located within the									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				Operational Area, and deliberate killing is not permitted. No impacts to the long term survival and recovery of Australian sea lion is expected. It is possible that unplanned interaction with fauna in-water i.e. pinnipeds hauled out on the lower sea deck, could cause disturbance to individuals, however, impacts from UAVs are not expected. Any disturbance will be highly localised (to species on the lower sea deck) and temporary. Impacts are inconsequential or will have no adverse effect.									
Facility IMR Pipeline and Subsea IMR	Accidental Release - Dropped Objects Objects may be dropped during mechanical repairs, cutting of structures and piles and from vessel during subsea IMR activities.	Change in habitat Dropped objects can change habitat through the presence of a foreign object, and through dragging of equipment across the seabed. Risks are restricted to the Operational Area.	Benthic habitats and communities	Alteration to benthic habitats, including destruction of habitat, as a result of a dropped object on the seabed can affect benthic habitats and communities. Benthic habitats and communities within the Bass Strait show natural small scale variation; however, the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. High rates of disturbance to benthic communities, such as long term disturbance from dredging or trawl fishing, can lead to reduced habitat structure. This results in homogenous, low diversity communities and loss of large and long-lived sedentary species that create habitat structure and leads to reductions in primary production and ecosystem function (Handley et al., 2014). Disturbance from dropped objects during IMR activities is not expected to result in high rates of disturbance at this scale, however it is possible that small scale disturbance will lead to similar outcomes. Change in habitat from dropped objects will be limited to close proximity to existing infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem structure are expected. Any impacts will be inconsequential or have no adverse effects.	IV	A	4	A	None identified	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
Facility IMR Pipeline and Subsea IMR	Accidental Release – LOC (chemicals / hydraulic fluids) Chemical or hydraulic fluid spills resulting from a single-point failure	Change in water quality Minor spill volumes can lead to toxicity impacts near the spill location.	Ambient water quality	Minor spill volumes can lead to a change in water quality through toxicity. Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	**CM1:** Facility Integrity Management System	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage	Acceptable
		Change in habitat Mixed cement discharged will harden quickly at the discharge location,	Benthic habitats and communities	Although the discharge of cement is unplanned, impacts to benthic habitats and communities would be the same as those described for a planned release. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	typically occur because of: • equipment failure • incorrect storage • incorrect handling Includes drips and drops, and oil & chemical storage and handling scenarios. Volumes typically <1bbl.	resulting in a change in habitat.		homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments, however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystems are expected. Any impacts will be inconsequential or have no adverse effects.								• Activity will not impact the long term survival and recovery of listed and threatened fish species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
		Injury / mortality to fauna	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydraulic fluids, as they are less mobile and therefore can become exposed to the plume at the outfall. Phytoplankton are typically not sensitive to the impacts of oil, though they do accumulate it rapidly, whilst zooplankton are known to be vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016). Plankton is generally abundant in the upper layers of the water column and are expected to rapidly recover once the releases ceases as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985). Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al., 2004). As such, exposure of planktonic communities to accidental chemical and hydraulic fluid discharges is not considered to result in significant impacts on these organisms at population levels that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011). Any impacts will be inconsequential or have no adverse effects.									
			Fish	Toxic exposure from small volumes of released chemicals and hydrocarbons can affect fish in close vicinity to the discharge through dermal contact, ingestion and inhalation. Pelagic species are 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. Many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary,									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.									

Table 6-4 Support Operations Activities – Risk Scoping

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
Vessel Operations	Unplanned Interaction with Fauna The presence of moving or stationary vessels, helicopters, and other aerial and marine based moving vehicles may result in interaction with marine fauna such as collision	Injury / mortality to fauna Vessel strike can lead to injury or death. Risks are restricted to the Operational Area	Marine mammals - cetaceans	Cetaceans are naturally inquisitive animals that are often attracted to offshore vessels and facilities. Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat co-exist (Whale and Dolphin Conservation Society, 2006). Laist et al. (2001) identifies 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 undertake petroleum activities do not have the same limitations on manoeuvrability and would not be moving at these speeds when conducting activities within the scope of this EP, inside the Operational Area. The Operational Area is within a foraging BIA for the pygmy blue whale. Vessel strike is identified as a key threat in the following: • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) • Conservation Management Plan for the Blue Whale, 2015-2025 • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) • Conservation Management Plan for the Southern Right Whale, 2011-2021 • Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale) Given the potential presence of sensitive species, potential short-term, minor adverse effects are possible.	III	D	4	A	**CM8:** Vessel Master	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish or marine mammals and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	Acceptable
			Fish	Large slow-moving marine fauna, such as the whale shark, are most susceptible to vessel strike. There is limited data regarding strikes to whale sharks, possibly due to lack of collisions being noticed and lack of reporting; however, marks observed on animals show that strikes have occurred (Peel et al. (2016; cited in Commonwealth of Australia, 2016). Whale sharks may be present in the Operational Area, although no BIA has been identified. The Approved				A	None identified	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological	Acceptable

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP: ALARP Decision Context	Demonstration of ALARP: Good Practice Control Measures	Demonstration of ALARP: Additional Control Measures Considered	Demonstration of ALARP: ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Demonstration of Acceptability: Acceptability Outcome
				Conservation Advice for *Rhincodon typus* (Whale Shark) identifies boat strike as a key threat. As the Operational Area is located outside of a BIA, any impacts will be to an individual only with no population or ecosystem-level impacts expected. Any impacts will be inconsequential or have no adverse effects.								diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish or marine mammals and will be undertaken in accordance with all applicable management actions. • No control measures identified which can further lower the impact consequence • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
			Marine mammals - pinnipeds	Pinnipeds are not listed as a species vulnerable to vessel strike. This is likely due to their high level of activity within the water column, and their highly mobile nature. However, Esso has encountered several pinnipeds on the surface within the Bass Strait. Pinnipeds are commonly seen on and around Esso platforms although there have only been 3 incidents reported in the last 10 years relating to interactions with vessels. Any potential impacts to pinnipeds would be on individuals, with no population or ecosystem level impacts expected.									
			Marine reptiles	Marine turtles are vulnerable to vessel collision, although collision is more likely in slow moving vessels (Hazel, 2007). There is limited data regarding marine turtle vessel strikes, however marks observed on animals show that strikes have occurred (Peel et a., 2016, cited in Commonwealth of Australia, 2016). Marine turtles are also vulnerable to entrainment in propellers or water intakes. Five listed / threatened species of marine turtle may occur within the Operational Area, although there are no BIAs or critical habitats located within the PEA and all marine turtles are known to have a more northerly distribution. Vessel disturbance is listed as a key threat in the Recovery Plan for Marine Turtles in Australia, 2017-2027; however, this is in reference to shallow coastal foraging and nesting sites where there is a high number of commercial and recreational vessels. As the Operational Area is located outside of a BIA / critical habitat, any impacts will be to an individual only with no population or ecosystem-level impacts expected. Any impacts will be inconsequential or have no adverse effects									
Vessel Operations	Unplanned Introduction of IMS	**Detailed Evaluation Section 6.4**											
Vessel Operations ROV Operations	<u>Accidental Release - Dropped Objects</u> Potential dropped objects may include personnel protective gear, small tools and	<u>Change in habitat</u> Dropped objects can change habitat through the presence of a foreign object. Risks are restricted to the Operational Area	Benthic habitats and communities	Dropped objects can occur due to ineffective use of handling procedures, or storm / inclement weather conditions. The impact energy of an object free falling overboard as it hits the seafloor is influenced by several factors, including mass, shape of the object, water depth and prevailing currents (Sari et al. 2016). The mass of small objects such as glasses, gloves, hard hats, small tools and hardware fixtures is unlikely to contribute to impact energies with the potential to cause damage to benthic habitat. Where objects are dropped and remain on the seabed, colonisation by epifauna is expected. By providing a hard substrate on bare substrate, this will result in a localised	IV	E	4	A	**CM18:** Preventative Maintenance System (PMS) **CM19:** Cargo Securing Manual	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1 • No potential to affect biological diversity or ecological integrity	Acceptable

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
	hardware fixtures (e.g. clamps).			change in biodiversity with fouling communities settling on the object. Dropped objects will eventually degrade but may take years. Change in habitat from dropped objects will be limited to the Operational Area. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.								• Activity will not result in serious or irreversible damage • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Vessel Operations ROV Operations	Accidental Release – LOC (chemicals / hydraulic fluids) Chemical or hydraulic fluid spills resulting from a single-point failure typically occur because of: • equipment failure • incorrect storage • incorrect handling Includes drips and drops, and oil & chemical storage and handling scenarios. Volumes typically <1bbl.	Change in water quality Accidental release can lead to toxicity impacts near the spill location.	Ambient water quality	Minor spill volumes (<1 bbl) can lead to a change in water quality through toxicity. Due to the high energy marine environment, impacts will be limited to the discharge location and will be quickly dissipated. Any impacts will be inconsequential or have no adverse effects.	IV	C	4	A	Vessel Operations **CM20:** SMPEP ROV Operations **CM21:** ROV pre-post dive checks **CM22:** ROV IMCA Audit	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened fish species and will be undertaken in accordance with all applicable management actions. • Good practice control measures have been defined and implemented • Control measures are consistent with Esso's Environment Policy	Acceptable
		Injury / mortality to fauna Minor spill volumes can lead to toxicity impacts near the spill location, however due to the high-energy nature of the receiving water column, impacts are expected to be localised and temporary.	Plankton	Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from an unplanned release of chemicals / hydraulic 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 to accidental chemical and hydraulic fluid discharges is not considered to result in significant impacts on these organisms at population levels that would affect ecological diversity or productivity within Commonwealth marine areas. Rather it is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action. Any impacts will be inconsequential or have no adverse effects.									
			Fish	Toxic exposure from small volumes of released chemicals and hydrocarbons can affect fish in close vicinity to the discharge through dermal contact, ingestion and inhalation. Pelagic species are 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. Many fish species can metabolize									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP: ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Demonstration of Acceptability: Acceptability Assessment	Acceptability Outcome
				toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). The Operational Area is within a distribution BIA for the great white shark; however, no threats have been identified in the Recovery Plan for the White Shark (*Carcharodon carcharias*). Fish communities in the Operational Area are typical of the region. Listed threatened species which may occur; however, any impacts will be localised to the release site and temporary, with hydrocarbon / chemical releases dissipating quickly in the high energy marine environment and fish species not expected to suffer extended exposure. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.								• The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives • No stakeholder objections or claims have been raised	
Vessel Operations	<u>Accidental Release - Waste</u> Non-hazardous waste can be accidentally released through inappropriate storage and handling.	<u>Change in habitat</u> Non-hazardous waste can become marine debris, changing the habitat for marine fauna.	Benthic habitats and communities	Some waste materials released may sink to the seabed in close proximity to the release site. These materials will rest on the seabed, resulting in smothering to benthic fauna and a localised change in habitat. Change in habitat from accidental release of waste will be limited to the Operational Area. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects.	IV	E	4	A	**CM9:** Class Certification	None	ALARP	• Risk is well understood • Level of Environmental Risk is below 1. • No potential to affect biological diversity or ecological integrity • Activity will not result in serious or irreversible damage • Activity will not impact the long term survival and recovery of listed and threatened birds, marine reptiles or marine mammals and will be undertaken in accordance with all applicable management actions. • Activity will be undertaken in accordance with the management actions provided in the Threat Abatement Plan (2018). • Good practice control measures	Acceptable
		<u>Injury / mortality to fauna</u> Non-hazardous waste can cause physical harm to marine fauna through ingestion or entanglement.	Birds Marine reptiles Marine mammals	Marine fauna most at risk from marine pollution include marine mammals, marine reptiles and seabirds through ingestion or entanglement. Impact will occur to species on the sea surface or in the surface waters. The ingestion or entanglement of marine fauna has the potential to limit feeding / foraging behaviours and thus can result in mortalities. The Operational Area is within a number of seabird foraging BIAs, and a foraging BIA for pygmy blue whale. Marine turtles are not expected to occur regularly within the Operational Area, although their presence is possible. Non-hazardous pollution of this kind is not listed as a threat to any marine fauna. The Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018) lists vessel-sourced, solid, non-biodegradable floating material as a threat to marine fauna.									

Activity	Aspect	Risk	Affected Receptor	Consequence Evaluation	Consequence Level	Likelihood	Risk Ranking	Demonstration of ALARP				Demonstration of Acceptability	
								ALARP Decision Context	Good Practice Control Measures	Additional Control Measures Considered	ALARP Outcome	Acceptability Assessment	Acceptability Outcome
				Listed threatened species of marine fauna may occur within the Operational Area; however, any impacts will be localised to the release site and affect individual fauna only. Impacts are not expected to result in population or ecosystem level effects and will not affect the long-term survival or recovery of listed threatened species. Any impacts will be inconsequential or have no adverse effects.								have been defined and implemented • Control measures are consistent with Esso's Environment Policy • Class certification ensures that vessels adhere to the rules of an IACS Member society, such as MARPOL requirements and Marine Orders. • The activity meets ExxonMobil Environmental Standards and ExxonMobil OIMS objectives No stakeholder objections or claims have been raised	
Vessel Operations	Accidental Release - LOC (vessels)	**Detailed Evaluation Section 6.6**											

6.4 Unplanned Introduction of IMS

6.4.1 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 threatens 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 and become IMS; some are relatively benign, and few have spread widely beyond ports and harbours.

The following pathways have the potential to result in the introduction of IMS:

- discharge of ballast water from vessels containing IMS; and
- biofouling of the vessel hull and niches (e.g. sea chests, bilges, strainers) Risk Assessment

The translocation and establishment 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.
- Changes in the functions, interests or activities of other users

Receptors that could be affected by the introduction and establishment of IMS are identified in Table 6-5.

Table 6-5 Receptors potentially affected by impacts associated with introduction of IMS

Impacts	Receptors	
	Benthic habitats and communities	Commercial Fisheries
Change in ecosystem dynamics	✓	
Changes in the functions, interests or activities of other users		✓

6.4.1.1 Change in ecosystem dynamics

Successful IMS establishment 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 one in 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.

The benthic habitat within the PEA 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, the Ninety Mile Beach Marine National Park on the Victorian coast, is located between 12 km (Seahorse) and 87 km (Blackback) inshore from the operational area. The Beware Reef Marine Sanctuary and Point Hicks Marine National Park (Figure 6-1) are located more than 40 km inshore from the operational area, with the Kipper and Tuna facilities nearest to these sites of conservation significance.

…

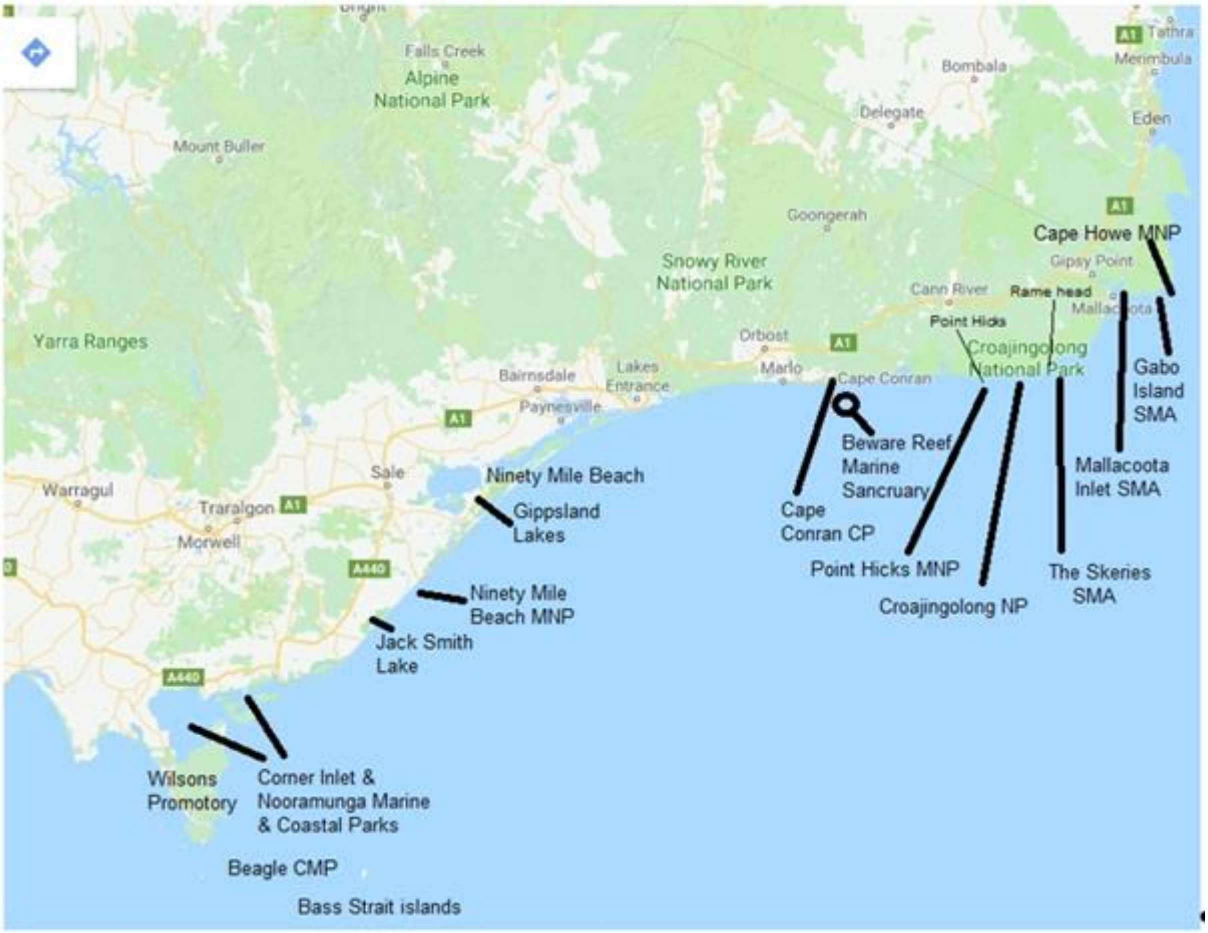

Figure 6-1 Sites of conservation significance along Gippsland Coastline

Once established, some pests can be difficult to eradicate (Hewitt, 2002) and therefore there is 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). Given that the habitat found within the PEA is mostly soft sediment, potential for settlement of IMS within the PEA is limited.

6.4.1.2 Change in the functions, interests or activities of other users

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 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.

6.4.1.3 Consequence evaluation

If an introduced IMS successfully established within an offshore area, it is expected that any colony would remain fragmented and isolated, and only within the vicinity of the facilities (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 that is not formally managed resulting in a **Level III** consequence.

6.4.1.4 Likelihood evaluation

Vessel movement, including support and supply vessels, workover rigs and well intervention vessels as well as submersible equipment and ROVs (especially those entering the Operational Area from interstate or internationally) may pose a risk of introducing IMS. The introduction of IMS is less likely for submersible equipment and workover rigs that are transported to site out of water, 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 equipment is lowered into the water).

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 (Australian Government Bureau of Resource Sciences (BRS), 2007).

IMS management areas are typically defined as all nearshore waters, extending from the lowest astronomical tide mark to at least 12 nm from land and in all waters less than 50 m deep. Most platforms and facilities are outside of this management area, however BTA, BTW, SHA and TWA are close to the nearshore boundary and in water depths of less than 50 m. DPA and PCA are also within the potential management area, however vessel traffic is significantly reduced to these locations.

While the 12 nm / 50 metre depth boundary has a very clear legal basis, it also provides a natural buffer area between offshore areas and the nearshore habitats that are susceptible to IMS establishment. Many of the IMS have a planktonic larval stage. By maintaining the 12 nm / 50 m depth criteria, the effects of dispersal and dilution of IMS larvae significantly reduces the risk of successful establishment in susceptible nearshore environments. For example, BRS established that the relative risk of an IMS incursion decreases with distance from the shoreline. It is estimated that for Bass Strait, the IMS risk is reduced to a third at 3 NM from the nearest shore and to about 1% at 24 nm offshore.

For these reasons, it is considered **Very Unlikely (D)** that this activity would result in the introduction and establishment of an IMS and any subsequent impact to receptors.

6.4.2 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	D	4

6.4.3 Controls

Good Practice	Adopted	Control	Rationale
Ballast Water Management	Yes	**CM23:** Ballast Water Management Plan **CM24:** Ballast Water Certificate	The Biosecurity Act 2015 requires that vessels have a Ballast Water Management Certificate and Ballast Water Management Plan (BWMP), and undertake reporting and management of ballast in accordance with the Act. The BWMP must: • be vessel specific (vessel name and International Maritime Organization (IMO) number) • be approved by a survey authority, recognised organisation, or the vessel's flag administration • nominate the rank(s) of the responsible officer and crew

Good Practice	Adopted	Control	Rationale
			• contain the ballast water management method and pumping rates. BWMPs should be consistent with the Ballast Water Convention's Guidelines for Ballast Water Management and Development of Ballast Water Management Plans (G4 Guidelines). A valid BWMC must be issued by either a survey authority, classification society, or the administration of the vessel, and be in accordance with Regulation E-1 of the Ballast Water Convention.
		CM8: Vessel Master	The Vessel Master has responsibility for ensuring these Requirements are followed ensuring Ballast water records show location of ballast water uptake and discharge.
	Yes	**CM25:** DAWR clearance when entering Australian territory	Vessels that are intending to discharge internationally sourced ballast water within Australian waters must submit a Ballast Water Report through Maritime Arrivals Reporting System (MARS) at least 12 hours prior to arrival to gain DAWR clearance. 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 and in water at least 50 m deep. Ballast tank sediment must be disposed of in an area outside 200 nautical miles from the nearest land, and in at least a depth of 200 metres, or at an approved land-based reception facility.
Biofouling Management	Yes	**CM26**: IMS Risk Assessment Procedure (IMS-RAP).	IMS Risk Assessment Procedure aligned with National Biofouling Guidelines for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009) and the Western Australian Department of Fisheries Biofouling Risk Assessment Tool The IMS-RAP is to be applied to all contracted non-trading vessels undertaking petroleum activities in the Gippsland Basin. The Western Australian Department of Fisheries Biofouling Risk Assessment Tool (https://vesselcheck.fish.wa.gov.au) will be completed for all 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). If a vessel check does not result in low risk, an IMS expert will be engaged to review risk assessment and recommend mitigation measures to implement for the vessels risk to be acceptable.

6.4.4 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 effect on the benthic habitat, there is the potential for **Consequence Level III** impacts. No stakeholder objections or claims were raised with regards to the risk of introduction and establishment of IMS. Based on the Level III consequence rating, Esso believes **ALARP Decision Context B** should apply. An Engineering Risk Assessment has been undertaken to assess the costs and benefits associated with additional, alternative and/or improved controls.		
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 support vessels that are currently operating in Bass Strait to reduce the potential for introduction of IMS.	By only using vessels that are currently operating in Bass Strait, the 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.	Limiting support vessel selection to use of those currently operating in Bass 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. Likewise, a specialist well intervention vessel would likely be sourced from international markets. 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.	Not adopted
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 highly specialist facilities and must to be completed at specific locations, immediately prior to vessels commencing work. 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

6.4.5 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)	✓	There is potential for a localised, but irreversible, impact to benthic communities resulting in a Level III 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.	✓	The habitat with the potential to be impacted is characterised by soft sediment communities which are scarce in the Operational Area. However, in the event that soft sediment communities do occur, there is low potential for serious or irreversible environmental damage. As described in Section 3.9, further evaluation is therefore required against the remaining Principles of ESD, as follows: *Where the activity has the potential to result in serious or irreversible environmental damage, further assessment is undertaken to determine if there is significant uncertainty in the evaluation.* 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, and Principles of ESD are therefore met.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The following legislative and other requirements are considered relevant as they apply to the implementation of the Ballast Water Management Convention in Australia: • Biosecurity Act 2015; and • Australian Ballast Water Management Requirements (DAWR, 2017). Vessel biofouling management aligns with: • Protection of the Sea (Harmful Anti-fouling Systems) Act 2006; and

Factor	Demonstration Criteria	Criteria Met	Rationale
			• Marine Order 98 (Marine pollution prevention - anti-fouling systems) 2013. 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 and establishment of IMS.

6.5 Accidental Release – LOC from drain system

6.5.1 Causes of LOC from drain system

Skimmer piles are used to separate hydrocarbons from water in liquids directed to the open and closed drain systems. Hydrocarbon vapours migrate to the top of the pile, hydrocarbon liquids settle out on top of the water in the pile, and water at the very bottom of the pile discharging to sea via the pile window (Figure 6-2).

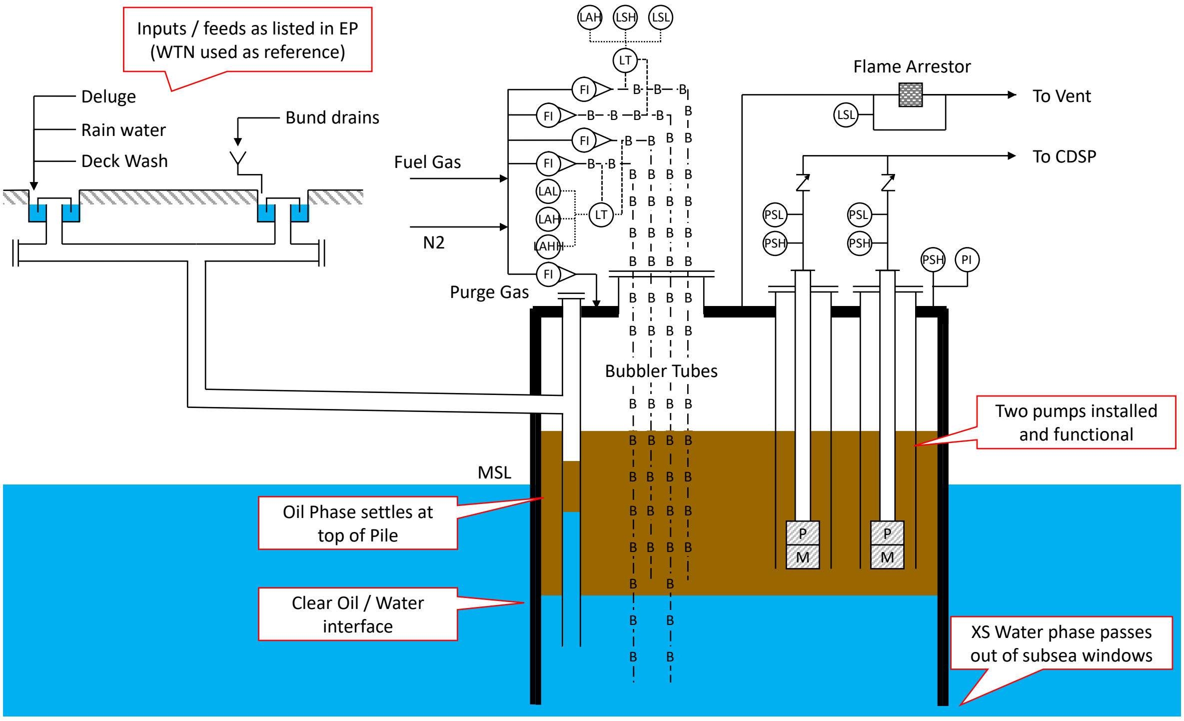

Figure 6-2 Pile System Schematic

Hydrocarbon liquid from the piles is monitored by level monitoring equipment which is connected to alarms which prompt pump out of hydrocarbons back to the process system before hydrocarbons reach the subsea window.

Closed piles have pressure alarms to manage high pressure levels which lead to a platform shutdown. This is both for safety reasons (to manage the risk of backpressure through the drain system) and to manage the risk of pushing hydrocarbons out of the subsea window.

LOC from the drain system could occur if hydrocarbons migrate to the subsea window of the skimmer pile. This could be caused by:

- Formation of emulsion which is not detected by level instrumentation. Emulsions could be formed due to chemicals disposed to the piles or from agitation.
- Failure of pumps to pump out hydrocarbon phase.
- Over pressure of pile
- Excess flow of liquids into pile.

LOC from the drain system could occur at all platforms, apart from BMB, DPA, PCA and WTN which do not have drain systems. Maximum volumes contained within the drain systems range from 13 m^3 (at BTA platform) to 240 m^3 (at platforms CBA and SNA). The subsea window, where discharges occur, are between 18 m (at FTA platform) and 49 m (at SNA platform) below the sea surface.

The volume of hydrocarbon liquid inadvertently released from the drain systems is likely to be less than the volume of the pile system. A highly conservative estimate of loss of containment of 240 m^3 of hydrocarbons has been used to assess the risk of LOC from drain system, based on the complete loss of the largest pile system volume at 100% hydrocarbon content. This volume is an overestimate as level alarms and regular monitoring ensures piles do not operate at 100% hydrocarbon content. In addition, the. hydrostatic pressure within the pile system would limit the release and restrict the amount lost, and fluid contained within the pile system is unlikely to be 100% hydrocarbon.

6.5.2 Risk Assessment

A loss of containment from the drain system will lead to a change in water quality, which could lead to injury / mortality in fauna.

Receptors that could be affected by a LOC from drain system are identified in Table 6-6.

Table 6-6 Receptors potentially affected by impacts associated with LOC from the drain system

Receptors	Impacts			
	Change in water quality	Injury / mortality to fauna	Change in habitat	Change to the function, interests or activities of other users
Water quality	✓			
Plankton		✓		
Fish		✓		
Marine Reptiles - Turtles		✓		
Birds		✓		
Marine Mammals		✓		
Coastal Habitats			✓	
Australian Marine Parks			✓	
KEFs			✓	
Fisheries – Commercial (Commonwealth and State)				✓
Recreation and Tourism				✓

6.5.2.1 Consequence Evaluation

A spill of hydrocarbons to the marine environment can lead to a change in water quality through toxicity. Hydrocarbon in the piles is likely to be mainly diesel, as this is the hydrocarbon type most commonly discharged to the drain system.

The maximum release volume described as the Worst-case scenario is similar to the discharge volumes modelled for the loss of containment due to Vessel Collision (Section 6.6). A detailed description of modelling is provided in Section 6.6.2. Note that modelling scenarios are based on surface release, whereas hydrocarbons from the drain system would be released from the subsea window. Diesel is naturally buoyant and would be expected to rise quickly through the water column to the surface. Modelling undertaken for a surface release is considered appropriate to understand the potential consequences to receptors. Environmental risks to receptors are expected to be similar to those described in Section 6.6.3.

Given the moderate spill area and the potential for impacts to sensitive receptors, a loss of containment from the drain system would have possible minor, short-term effects on receptors, **Consequence Level III.**

6.5.2.2 Likelihood Evaluation

Loss of containment from the drain system is an accidental release event which has happened previously within the Bass Strait Operations. Considering the volume of hydrocarbons associated with a LOC from the drain system, together with the control measures in place, the probability of a LOC from the drain system resulting in the impacts described above is considered **Likely (C).**

6.5.3 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	C	3

6.5.4 Controls

Good Practice	Adopted	Control	Rationale
Pile management system	✓	**CM1:** Facility Integrity Management System	A functional pile pump allows the hydrocarbon phase in the piles to be pumped down on a regular basis. Pumps are maintained as per the applicable OIMS 6-2 equipment strategy which calls for demonstration that pumps are functional (i.e. are able to pump out the contents of the pile). The equipment strategy also defines the criticality of the equipment. Pile pumps have been defined as criticality A, the highest level. Platforms have at minimum one pump installed. Platforms have access to a contingency pump (in the event that the primary pump is OOS or fails) either on the platform or in the LFD warehouse. Level monitoring instrumentation is also maintained as per the applicable OIMS 6-2 equipment strategy which calls for instrumentation to be cleaned and calibrated on a recurring basis.
	✓	**CM30**: Offshore Technical Monitoring Program	Pile 'health' is monitored regularly to identify and assess abnormalities in pile level trends. Surveillance Engineers monitor pile levels on a quarterly basis against expected level trends. Abnormalities will be assessed for their significance and appropriate action taken to address the cause. This process allows for issues with level instrumentation, pile pumps or general pile health to be identified and managed.

6.5.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context B** Loss of containment of hydrocarbon from the open drain systems can have a number of causes. There is a good understanding of potential spill sources, and the control measures required to manage these. These control measures are not regulated but are guided by OIMS management systems. There is little uncertainty associated with the potential environmental impacts which have been evaluated as **consequence Level III**. Despite this, the likelihood of LOC from pile systems has assessed to be Likelihood B as it has happened several times at site over the past 10 years. No stakeholder objections or were claims raised during consultation for this campaign. Based on the likelihood rating, Esso believes **ALARP Decision Context B** should apply.		
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**

Install secondary pile pump for redundancy.	Having two pile pumps would allow for contingency should the primary pump fail or be out of service.	Engineering design of piles on HLA, WKF for open piles and BTA, MLA, HLA, KFA, KFB, MKA, TNA, & SNA, for closed piles does not allow for retrospective installation of two pumps. In these cases, significant structural modifications to the pile and the platform would be required.	Adopted on BTA, KFA, KFB, MKA, TNA, SNA, CBA, FLA, FTA, BMA, MLA, MLB & WTN for open piles. Adopted on WKF, CBA, FLA, FTA, BMA, MLB & WTN closed piles. Not adopted on remaining facilities **CM17:** Facility Integrity Management System (Topsides)
Store spare pile pumps at LFD warehouse.	Storing spare pile pumps at the LFD warehouse enables rapid replacement of faulty pumps.	Warehouse sparing methodology has been developed based on the type of pumps and the commonality of pumps between platforms (i.e. pumps that are common between platforms have more spares available)	Adopted. **CM17:** Facility Integrity Management System (Topsides)
Dose with emulsion breaking chemicals	Emulsion breakers help to manage pile levels by breaking down emulsions that may form in piles. Use of emulsion breakers has the benefits of: • Assisting pumps to function by pumping liquid (not emulsion) • Assisting in accuracy of level instrumentation which uses density to differentiate between oil and water.	Only a limited number of emulsion breakers are assessed as suitable for use using the Chemical Selection Assessment Process	Adopted **CM3**: Chemical Assessment Process
Alternative disposal options for waste hydrocarbons	Reduced volume of hydrocarbons directed to drains and piles.	Significant safety risks associated with alternative disposal methods. Waste will not be returned to the process (i.e. will not be recycled)	Not adopted

6.5.6 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 3 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.	✓	Activity will not impact the long term survival and recovery of listed and threatened fish, marine mammals or marine reptiles and will be undertaken in accordance with all applicable management actions.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "manage 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"
	Meets ExxonMobil Environmental Standards	✓	The use of piles for management of waste hydrocarbons meets the Upstream Waste Management Standards which calls for consideration of the waste hierarchy. Use of piles allows for waste hydrocarbon to be 'recycled' and returned back to the process. Further, the use of piles meets expectations of the Upstream Water Management Standard The Upstream Water Management Standards and standards for appropriate disposal of uncontaminated deck drainage.
	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 6-2 objectives ensure equipment is maintained over the operating life of the equipment preventing or mitigating a significant event that could result in significant and environment consequences.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the accidental LOC from pile systems.

6.6 Accidental Release – LOC (vessel)

6.6.1 Causes of LOC (Vessels)

The following activities have the potential to result in a spill of marine diesel:

- A collision between a support vessel and either a third-party vessel within the 500 m zone or a platform that results in tank rupture and marine diesel 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 marine diesel spill and the response preparedness required, stochastic and deterministic modelling was undertaken in accordance with Section 3.7.1.1 (RPS, 2019a). Model inputs and parameters are summarised Table 6-7.

Table 6-7 Vessel collision Marine Diesel spill modelling inputs and parameters

Parameter	Details				
Scenario Description	Surface release of marine diesel in the event of loss of containment after vessel collision				
Release locations (surface release)	West Kingfish (WKF)	Perch (PCA)	Barracouta (BTA)	Kipper (KPA)	Halibut A (HLA)
Coordinates (GDA94)	38° 35’ 39" S 148° 06’ 15" E	38° 34’ 15" S 147° 19’ 16” E	38° 17’ 53" S 147° 40’ 28" E	38°10’ 53" S 148° 35’ 35” E	38°24’15” S 148°19’13” E
Water Depth	76m	42m	46m	94m	73m
Number of spill simulations	100				
Period of the year (season)	Annual analysis				
Hydrocarbon type	Marine diesel - MDO Group II				
Total spill volume (m^3) / Release rate (m^3/hr)	280 m^3 / 46.7 m^3/hr				220 m^3 / 36.7 m^3/hr
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 oil in a ruptured tank to another tank could also restrict the amount lost. Based on the type of support vessel usually in service, the largest fuel tank volume of 280 m^3 has been used to undertake the impact assessment. The Halibut scenario was based on a pipeline repair vessel with a slightly smaller tank (220 m^3).				
Release duration	6 hours				
Modelled duration	30 days				
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)			

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.

On release to the marine environment, diesel is predicted to be distributed over time into the following components:

- surface;
- water column, consisting of:
  - entrained (non-dissolved oil droplets that are physically entrained by wave action) and;
  - dissolved (principally the aromatic hydrocarbons);
- evaporated;
- stranded on shoreline; and
- decayed (microbial biodegradation).

Of these components, surface hydrocarbons, dissolved aromatics and oil stranded on shorelines have the most significant impact.

Figure 6-3, Figure 6-4, Figure 6-5 and Figure 6-6 present the fate and weathering graph for modelling of a marine diesel release at each of the modelled locations. Volatile and semi-volatile components of the oil are predicted to evaporate within first 24 hours, with the remaining oil tending to remain within the wave-mixed layer of the water column (3-10 m deep, depending on the conditions).

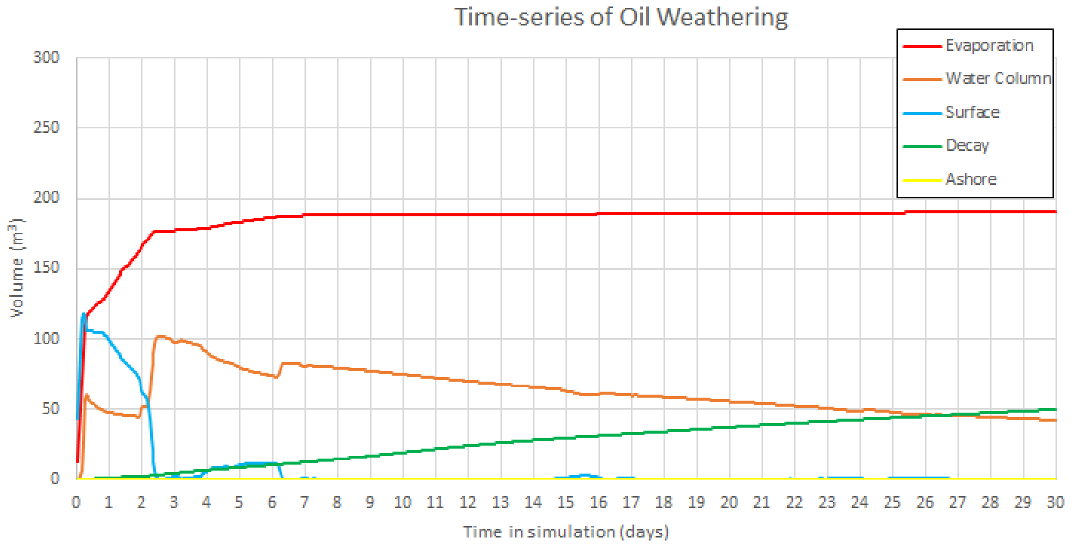

Figure 6-3 Predicted weathering of MDO for the single spill trajectory at WKF with the largest sea surface swept area

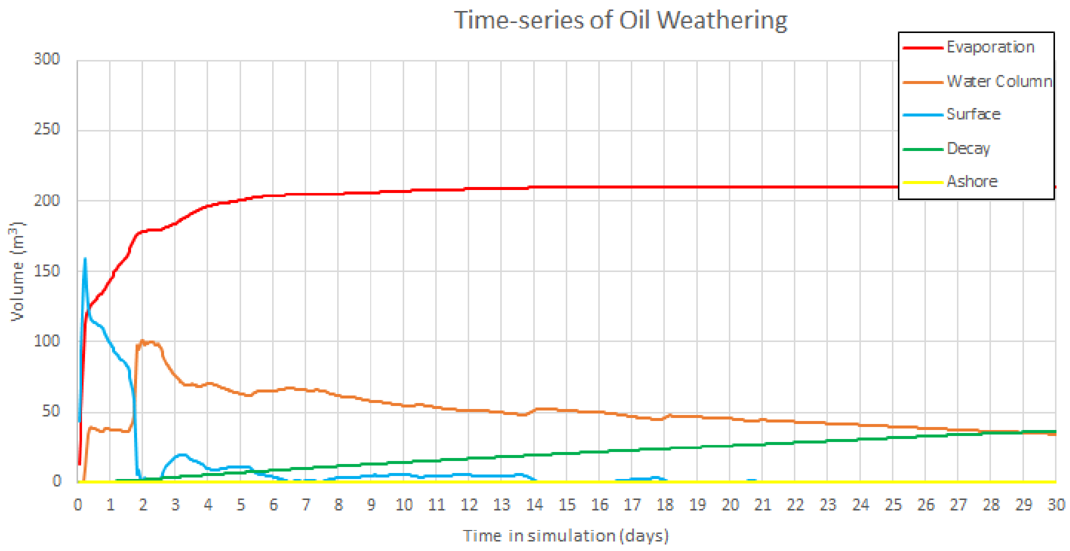

Figure 6-4 Predicted weathering of MDO for the single spill trajectory at PCA with the largest sea surface swept area

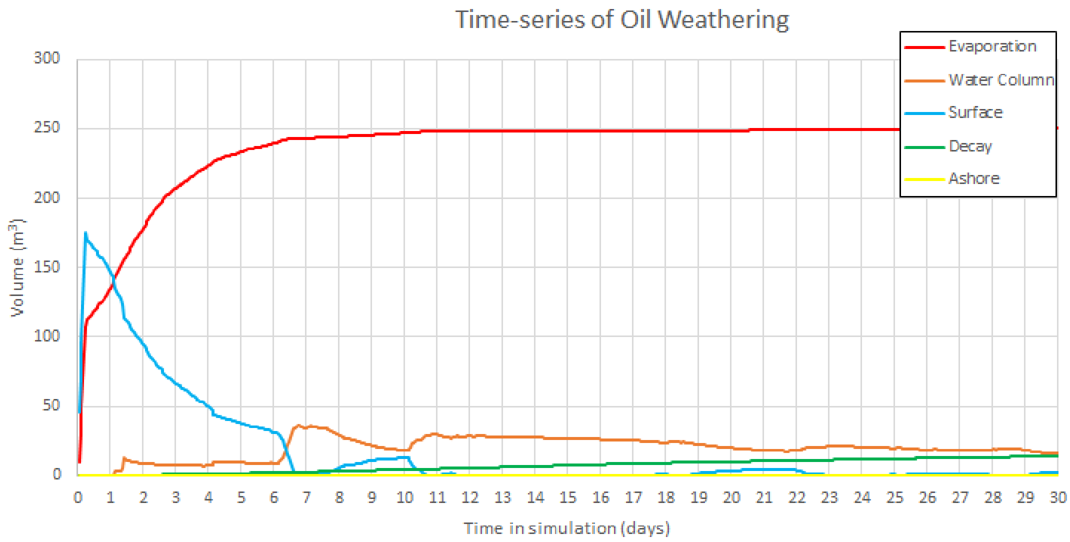

Figure 6-5 Predicted weathering of MDO for the single spill trajectory at BTA with the largest sea surface swept area

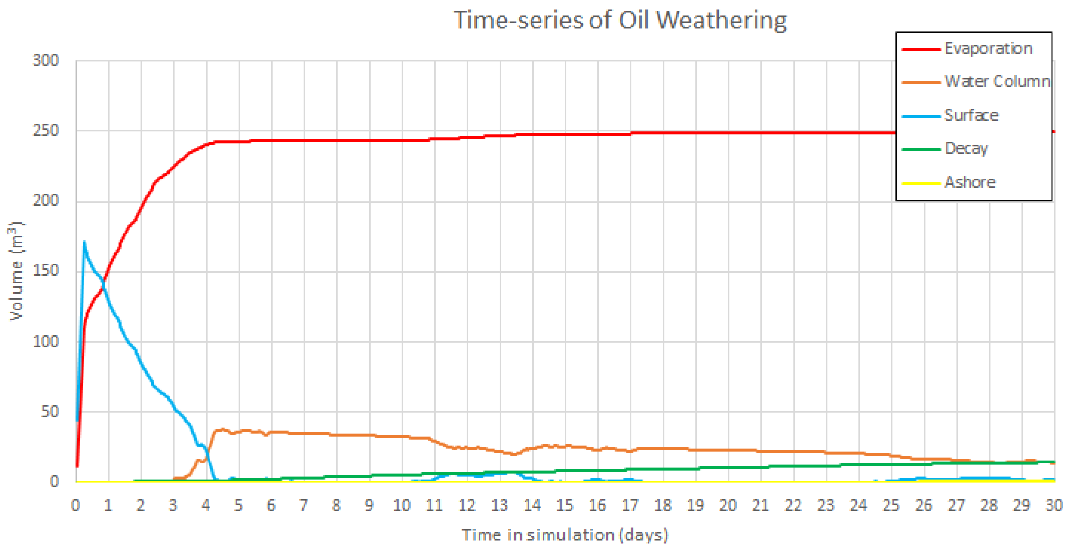

Figure 6-6 Predicted weathering of MDO for the single spill trajectory at KPA with the largest sea surface swept area

6.6.2.2 Modelling Outputs – Stochastic

Oil spill modelling predicts 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 extent of potential moderate hydrocarbon exposure is described in Table 6-8. Other features outside of the moderately exposed area but within the PEA are identified in Table 6-9.

Table 6-8 Environmental sensitivities with potential moderate exposure from a marine diesel release

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)				
		LOC at West Kingfish (WKF)	**LOC at Perch (PCA)**	**LOC at Barracouta (BTA)**	**LOC at Kipper (KPA)**	**LOC at Halibut A (HLA)**
Surface Exposure	Moderate 10 g/m^2	Maximum distance from release site is approx. 33 km. The zone of moderate exposure overlaps the following BIAs (92% probability): Birds • Black-browed Albatross - Foraging • Buller's Albatross - Foraging • Campbell Albatross - Foraging • Common Diving-petrel - Foraging • Indian Yellow-nosed Albatross - Foraging • Short-tailed Shearwater - Foraging • Shy Albatross - Foraging • Wandering Albatross – Foraging Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark - Distribution	Maximum distance from the release site is 24 km. The zone of moderate exposure overlaps the following foraging BIAs (99% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Short-tailed Shearwater • Shy Albatross • Wandering Albatross Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark – Breeding & Distribution	Maximum distance from the release site is 33 km. The zone of moderate exposure overlaps the following foraging BIAs (100% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Shy Albatross • Wandering Albatross • Short-tailed Shearwater (34% probability) Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark – Breeding & Distribution.	Maximum distance from the release site is 17 km. The zone of moderate exposure overlaps the following foraging BIAs (up to 97% probability): Birds • Antipodean Albatross • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Shy Albatross • Wandering Albatross • White-faced Storm-petrel Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark – Distribution. Upwelling East of Eden has 97% probability of exposure.	Maximum distance from the release site is 16 km. The zone of moderate exposure overlaps the following foraging BIAs (up to 97% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Shy Albatross • Wandering Albatross Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark – Distribution. Upwelling East of Eden has 1% probability of exposure. Other KEFs, state waters or coastal receptors are not predicted to be exposed.
Shoreline Exposure	Moderate 100 g/m^3	No shoreline contact is predicted.	There is a 2% probability of shoreline contact.	The highest probabilities of shoreline contact: Wellington (3%), Seaspray (2%) and Ocean Grange (1%). Maximum 9 km of shoreline contacted at moderate exposure.	No shoreline contact is predicted.	No shoreline contact is predicted.
In-water (dissolved) Exposure	Moderate 50 ppb instantaneous	No moderate in-water (dissolved) exposure predicted.	No moderate in-water (dissolved) exposure predicted.	No moderate in-water (dissolved) exposure predicted.	No moderate in-water (dissolved) exposure predicted.	No moderate in-water (dissolved) exposure predicted.

Table 6-9 Environmental sensitivities outside of the moderately exposed area but within the PEA from an MDO release at PCA

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)				
		LOC at West Kingfish (WKF)	**LOC at Perch (PCA)**	**LOC at Barracouta (BTA)**	**LOC at Kipper (KPA)**	**LOC at Halibut A (HLA)**
Surface Exposure	Low 1 g/m^2	Maximum 74 km from release location. The BIAs listed as being affected by moderate exposure (described in Table 6-8), have a 100% probability of low surface exposure. In addition, the white-faced storm petrel foraging BIA has an 8% probability of low surface exposure. There is a 5% chance of low surface exposure at Upwelling East of Eden KEF.	Maximum 75 km from release location. BIAs affected by moderate exposure (described in Table 6-8) will also be affected (100%) by low surface exposure.	Maximum 74 km from release location. In addition to the BIAs affected by moderate exposure (described in Table 6-8), low surface exposure may occur within the Upwelling East of Eden KEF (13%), with a predicted minimum time before exposure of 22 hours.	Maximum 161 km from release location. All BIAs affected by moderate exposure (described in Table 6-8), have a 100% probability of being exposed to low levels of surface exposure. In addition, the following BIAs may be exposed: • Humpback Whale – Foraging (1%) • Wedge-tailed Shearwater – Foraging (1%) Upwelling East of Eden has 100% probability of exposure. Other KEFs, state	Maximum 40 km from release location. All BIAs affected by moderate exposure (described in Table 6-8), have a 100% probability of being exposed to low levels of surface exposure. In addition, the following BIAs may be exposed: • Wedge-tailed Shearwater – Foraging (1%) Upwelling East of Eden has 12% probability of exposure. Other KEFs, state waters or coastal receptors are not predicted to be exposed.

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)				
		LOC at West Kingfish (WKF)	LOC at Perch (PCA)	LOC at Barracouta (BTA)	LOC at Kipper (KPA)	LOC at Halibut A (HLA)
					waters or coastal receptors are not predicted to be exposed.	
Shoreline Exposure	Low 10g/m^2	No shoreline contact is predicted.	There is a 2% probability of shoreline contact.	Probability of shoreline contact: 4%. The minimum time ~2 hours; maximum volume of oil ashore was 25.1 m^3. Wellington, Ocean Grange and Seaspray are predicted to be the first shoreline receptor, after 2 days (<4% probability). Maximum 8 km of shoreline contacted (mean: <1m^3; peak 25 m^3)	No shoreline contact is predicted.	No shoreline contact is predicted.
In-water (dissolved) Exposure	Low 10ppb instantaneous	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to release location have less than 6% probability of being exposed at low instantaneous dissolved hydrocarbon threshold. Upwelling East of Eden KEF may be exposed at low threshold (1%).	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to LOC location have less than 3% probability of being exposed at low instantaneous dissolved hydrocarbon threshold. Exposure not predicted to extend into Victorian, NSW or Tasmanian State Waters, or any coastal receptors.	Exposure will be confined to the surface 10 m of the water column. 0-10m water depth Low probability of foraging seabirds, and other nearby BIAs being exposed by low threshold instantaneous dissolved hydrocarbons (1%). No exposure to Victorian, NSW or Tasmanian State Waters, or any coastal receptors predicted.	Exposure will be confined to the surface 10 m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, White Shark BIA that occur in close proximity to release location have less than 2% probability of being exposed at low instantaneous dissolved hydrocarbon threshold. Upwelling East of Eden KEF may be exposed at low threshold (2%). Exposure not predicted to extend into Victorian, NSW or Tasmanian State Waters, or any coastal receptors.	Confined to the surface 10 m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, White Shark BIA that occur in close proximity to release location have up to 13% probability of being exposed at low instantaneous dissolved hydrocarbon threshold. Upwelling East of Eden KEF may be exposed at low threshold (29%). Exposure not predicted to extend into Victorian, NSW or Tasmanian State Waters, or any coastal receptors.
In-water (entrained) Exposure	Low 10ppb instantaneous	Exposure will be confined to the surface 10m of the water column. 0-10m water depth: Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to release location have up to 43% probability of being exposed at low instantaneous entrained hydrocarbon threshold. Some breeding or migrating birds may also be exposed. Upwelling East of Eden KEF (30%), Big Horseshoe Canyon (11%), Canyons on the eastern continental slope, and Shelf rocky reefs (1% each) may be exposed. Cape Howe, Ninety Mile Beach, Point Hicks, Batemans, Beware Reef, Kent Group, Gippsland Lakes, New Zealand Star Bank, Wakitipu Rock, Warrego Rock, Wright Rock, The Skerries SMA, Bega Valley, Cape Conran, Cape Howe / Mallacoota, Croajingolong, Eurobodalla, Marlo, Point Hicks, Shoal Haven, and Sydenham Inlet MNPs have between 1-24% probability of being exposed. Victoria State Waters (19%), NSW (14%) and Tasmania State Waters (7%) may be exposed.	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to release location have up to 51% probability of being exposed at low instantaneous entrained hydrocarbon threshold. Some breeding or migrating birds may also be exposed. Beagle (9%), East Gippsland (5%) and Flinders AMP (1%) have a low probability of being exposed al low levels. Upwelling East of Eden KEF (50%), Big Horseshoe Canyon (3%), Canyons on the eastern continental slope (4%), and Shelf rocky reefs (6%) may be exposed. Cape Howe, Ninety Mile Beach, Point Hicks MNPs have 10-49% probability of exposure, as does New Zealand Star Bank (35%), Beware Reef (16%) and The Skerries SMA (16%). Batemans, Kent Group, Gippsland Lakes, Wright Rock, Bega Valley, Cape Conran, Cape Howe / Mallacoota, Croajingolong, Marlo, Point Hicks and Sydenham Inlet have	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to release location have up to 51% probability of being exposed at low instantaneous entrained hydrocarbon threshold. Some breeding or migrating birds may also be exposed. Beagle and East Gippsland Flinders AMP (4% each) have a low probability of being exposed al low levels. Upwelling East of Eden KEF (51%), Big Horseshoe Canyon (3%), Canyons on the eastern continental slope (1%), and Shelf rocky reefs (3%) may be exposed. Cape Howe, Point Hicks have 27-51% probability of exposure, as does Cape Conran (13%), Cape Howe / Mallacoota (17%), Croajingolong (east: 15%), New Zealand Star Bank (39%), Beware Reef (13%) and The Skerries SMA (14%). Ninety Mile Beach, Batemans, Kent Group, Gippsland Lakes, Bega Valley and Corringle have less than 9% probability.	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to release location have up to 34% probability of being exposed at low instantaneous entrained hydrocarbon threshold. Some breeding or migrating birds may also be exposed. Beagle (6%), East Gippsland (9%), Flinders (2%) and Freycinet AMP (1%) have a low probability of being exposed al low levels. Upwelling East of Eden KEF (34%), Big Horseshoe Canyon (10%), Canyons on the eastern continental slope (8%), and Shelf rocky reefs (4%) may be exposed. Cape Howe, (21%) and Point Hicks (12%) may be exposed, as does New Zealand Star Bank (27%). Batemans, Beware Reef, Kent Group, Wright Rock, The Skerries SMA, Bega Valley and Cape Conran, have less than 9% probability.	Exposure will be confined to the surface 10m of the water column. 0-10m water depth Foraging seabirds, Pygmy Blue Whale and Southern Right whale, Indo-Pacific/Spotted Bottlenose Dolphin, Grey nurse shark and White Shark BIA that occur in close proximity to LOC location have up to 83% probability of being exposed at low instantaneous entrained hydrocarbon threshold. Some breeding or migrating birds may also be exposed. Beagle (6%), East Gippsland (7%) and Flinders (3%) have a low probability of being exposed al low levels. Upwelling East of Eden KEF (46%) and Big Horseshoe Canyon (17%) may be exposed. Cape Howe, (21%) and Point Hicks (20%) may be exposed, as does New Zealand Star Bank (24%). Bega Valley (12%), Cape Howe / Mallacoota (13%), Point Hicks (11%) and Croajingolong (13%) Wilsons Promontory, Beware Reef, Kent Group, Wakitipu Rock, Cape Conran, Corringle, Golden Beach, Lake Tyers Beach, Lakes Entrance, Marlo, Ocean Grange, Point Hicks, Sydenham Inlet and

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)				
		LOC at West Kingfish (WKF)	LOC at Perch (PCA)	LOC at Barracouta (BTA)	LOC at Kipper (KPA)	LOC at Halibut A (HLA)
			between 12- 39% probability of being exposed. Wright Rock, Clonmel Island, Corringle, Golden Beach, Lake Tyers Beach, Lakes Entrance, Ocean Grange, Snake Island, Wilsons Promontory and Woodside Beach have less than 9% probability. Victoria State Waters (49%), NSW (29%) and Tasmania State Waters (5%) may be exposed.	Victoria State Waters (51%), NSW (20%) and Tasmania State Waters (4%) may be exposed.	Victoria State Waters (21%), NSW (19%) and Tasmania State Waters (4%) may be exposed.	Wilsons Promontory have less than 9% probability. Victoria State Waters (22%), NSW (16%) and Tasmania State Waters (6%) may be exposed.

6.6.3 Risk Assessment

An accidental release of marine diesel has the potential to result in the following impacts:

- Change in water quality;
- Change in habitat.

As a result of change in water quality and / or habitat, further impacts may occur which include:

- Injury / mortality to fauna;
- Change in fauna behaviour
- Change to the function, interests or activities of other users.

Receptors that could be affected by a LOC (Vessels) are identified in Table 6-10.

Table 6-10 Receptors potentially impacted by a LOC (vessels)

Impacts	Water quality	Fish	Birds	Marine reptiles	Marine mammals	Coastal habitats and communities	Heritage	Commercial Fisheries	Tourism
Change in water quality	✓						✓		
Change in habitat						✓	✓		
Injury / mortality to fauna		✓	✓	✓	✓	✓	✓		
Change in fauna behaviour		✓	✓	✓	✓	✓	✓		
Changes to the functions, interests or activities of other users							✓	✓	✓

6.6.3.1 Consequence Evaluation

Consequence evaluation of potentially exposed receptors in the event of a LOC (Vessels) is described below.

Although AMPs, MNPs and State Marine Parks are identified within the PEA, any exposure will be of low exposure value and no impacts are therefore expected.

Table 6-11 Risks of surface, shoreline and in-water hydrocarbon exposure from marine diesel spill

Receptor	Impact of marine diesel exposure	Exposure risk assessment
Water quality	A release of marine diesel has the potential to result in a change in water quality, however a significant proportion (~97.3%) consists of volatile components which evaporate within the first 24 hours so water quality impacts are limited.	Modelling predicts that a change in water column will be restricted to surface exposure, with limited in water (dissolved) exposure predicted. The area of exposure for an individual release event will be small, with maximum distance from the release site of surface exposure predicted to be 33 km. Shoreline exposure is considered unlikely, with the highest probability of oiling predicted as 3%. The consequences to water quality 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). 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 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.	Modelling predicts low in-water (dissolved) exposure as a result of a diesel spill from vessel collision. Moreover, NOAA (2013) and ITOPF (2011) state that marine diesel 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).
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. 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.	Several threatened, migratory and/or listed marine species may occur in the area exposed to 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. 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 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 14 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 marine diesel exposure	Exposure risk assessment
Marine Reptiles	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). Marine reptiles can therefore be affected by surface and shoreline exposure. <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 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).	Marine turtles, or their habitat, may occur in the area potentially exposed to marine diesel at moderate - high concentrations, however they are not noted to reside or aggregate in significant numbers, and there are no recognised BIAs or critical habitats 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).
Marine Mammals (Pinnipeds)	Pinnipeds are directly at risk from impacts associated with the exposure to surface, shoreline and in-water hydrocarbons. In-water hydrocarbon exposure is not predicted to occur at moderate-high levels, however low-level exposure may occur. <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 a*l (1976) suggest that in fact, fouling of approximately one-third of the body surface resulted in 50% greater	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 marine diesel exposure	Exposure risk assessment
	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 (dissolved and entrained hydrocarbons at low exposure levels)</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 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). In-water (dissolved) exposure is not predicted to occur at moderate-high levels, however low-level exposure may occur. <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 (dissolved and entrained) 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	Several threatened, migratory and/or listed cetacean species may traverse the MDO spill plume. The distribution and 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 marine diesel exposure	Exposure risk assessment
	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 – Shoreline (Sandy)	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 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). 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.	The maximum length of coastline potentially at risk from stranded oil at the moderate threshold is 14 km. This coastline is dominated by wide sandy beaches. 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 marine diesel exposure	Exposure risk assessment
	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 and Commonwealth Heritage	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).
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, 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).	Several commercial fisheries may operate within the area potentially exposed in the event of a LOC 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).
Tourism	Refer to sections on fish, cetaceans and sandy shorelines above.	Tourism and recreation are 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).

6.6.3.2 Likelihood Evaluation

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)**.

6.6.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	E	4

6.6.5 Controls

Good Practice	Adopted	Control	Rationale
Support vessel approach protocols	✓	**CM27**: Support vessel approach procedure	Support vessel approach procedure outlines the required 500 m approach and DP operational checklists complete to ensure safe approach to the platforms.
Structured operational limits criteria for dynamic positioning (DP) operations	✓	**CM28**: ASOG / CAMO procedures	The application of ASOG / CAMO risk management tools is industry best practice for 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	✓	**CM27**: 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.
Shipboard Marine Pollution Emergency Plan (SMPEP)	✓	**CM20:** 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.

6.6.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Operating vessels 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.

6.6.7 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 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 marine diesel 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 - Loss of Well Control

6.7.1 Causes of Loss of Well Control

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.

During production operations the probability of loss of containment of reservoir hydrocarbons is very unlikely. However, workover operations pose a remote chance of losing primary and secondary well control, resulting in a release of reservoir hydrocarbons to the marine environment.

6.7.2 Spill Modelling

Potential LOWC from four locations were selected for modelling to establish the extent of possible environmental impact (RPS, 2019b). These scenarios were chosen based on the highest producing crude oil wells, the planned work-over program in the next 5 years and their geographical location spread across Esso's production operations in Bass Strait. The West Kingfish scenario represents the highest performing well in the south section of Gippsland basin (although lower than the other scenario's due to reservoir decline). The Cobia scenario was determined to be the highest performing well representing the central fields. The Turrum scenario (at Marlin platform) represent the highest performing wells nearest to the shore, while the Tuna scenario was chosen to represent the east section of the Gippsland basin (Table 6-12).

Gippsland crude oil assay analysis was conducted in 2019 as a basis for spill modelling (Table 6-12). The Cobia scenario accesses the Halibut reservoir and an updated Halibut crude oil assay was collected, along with 6 other crude/condensate samples. The wells at Tuna and Turrum were watered out (hence the planned workover program) so a proxy crude assay was used to represent the hydrocarbon properties for these fields. The proxy crude was chosen, based on historical reservoir information to choose the best representative crude for Tuna and Turrum.

While crude oil from the Moonfish reservoir is Type IV (heavy crude), the few wells that access Moonfish (from Snapper) have high water cuts with low oil production rates. Consequently, their loss of well control scenarios are within the representative scenarios selected above. Wellwork to increase production rates from Moonfish will require assessment to confirm coverage under this EP.

Table 6-12 LOWC spill modelling inputs and parameters

Parameter	Details			
Release location	West Kingfish (WKF) Platform	Cobia (CBA) Platform	Marlin (MLA) Platform	Tuna (TNA) Platform
Coordinates (GDA94)	38° 35' 39" S 148° 06' 15" E	38° 27' 04" S 148° 18' 28" E	38° 13' 54" S 148° 13' 09" E	38° 10' 16" S 148° 25' 05" E
Number of spill simulations	100			
Period of the year (season)	Annual analysis			
Well / Crude	West Kingfish W2 West Kingfish crude	Cobia A19A Halibut crude	Turrum A10 West Kingfish crude#	Tuna A2 Flounder crude#
Total spill volume	114 kbbl / 0.04 GCF	391 kbbl / 0.10 GCF	519 kbbl / 0.39 GCF	158 kbbl / 0.07 GCF
Daily release rate	1,163 bbl/day	3,990 bbl/day	5,296 bbl/day	1.612 bbl/day
Volume basis	Worst Credible Discharge Scenario (WCDS): • Minor planned and unplanned workover/P&A on highest producing oil wells (tubing flow) • Failure of BOP on workover rig, with a surface discharge			

Parameter	Details			
	• Assessment considers future activity on existing wells • Modelled with tubing and casing as installed, entire volume available to flow. • Fluid Properties based on recent well test data, or a previously matched Prosper model (whichever has a higher rate) • Discharge rates are assumed to remain constant, except for the TNA well scenario which is limited by reserves volume and will decline.			
Release duration	98 days (tracked for 118 days)			
Duration basis	Relief well assumed to be primary response (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.			
Density (@ 15oC)	0.7981 (g/ml)	0.8215 (g/ml)	0.7981 (g/ml)	0.7999 (g/ml)
API	45.7	40.6	45.7	45.3
Dynamic Viscosity	2.4 (cSt) @ 20 °C	3.4 (cSt) @ 20 °C	2.4 (cSt) @ 20 °C	2.80 (cSt) @ 20 °C
Pour Point	9 °C	0 °C	9 °C	18 °C
Oil Property Category	Group I (non persistent oils)	Group II (Light persistent oil)	Group I (non persistent oils)	Group I (non-persistent oils)

 # Crude samples from current Tuna and Turrum wells were not able to be analysed to produce an assay due to the water cut being too high. As such, a crude assay proxy was chosen, based on present testing and historical reservoir information.

6.7.2.1 Modelling Outputs - Weathering and Fate

The properties of the oils used in the modelling of the LOWC scenarios is shown in Table 6-12. West Kingfish W2, Tuna A2 and Turrum A10 are classified as a Group I oil according to the International Tanker Owners Pollution Federation classifications (ITOPF, 2014), while Cobia A19A (Halibut reservoir) is classified as a Group II oil.

On release to the marine environment, crude is predicted to be distributed over time into the following components:

- surface;
- water column, including
    - entrained (non-dissolved oil droplets that are physically entrained by wave action);
    - dissolved (principally the aromatic hydrocarbons);
- evaporated;
- stranded on shoreline and
- decayed (microbial biodegradation).

Of these components, surface hydrocarbons and dissolved aromatics have the greatest impact receptors.

Figure 6-7, Figure 6-8, Figure 6-9 and Figure 6-10 present the fate and weathering graphs for modelled crude releases. The weathering graphs demonstrate that the West Kingfish, Halibut and Flounder crudes tend to persist on the sea surface for approximately 20 days under low wind conditions, while a large portion of the spill volume could potentially remain entrained in the water column for extended times in the presence of winds greater than 10 knots.

Note that evaporation rates will increase with temperature. However, volatile components (BP <180°C) are expected to evaporate within the first 12 hours, semi-volatile components (180 °C < BP < 265 °C) within the first 24 hours; and low volatility components (265 °C < BP < 380 °C) are expected to evaporate over several days.

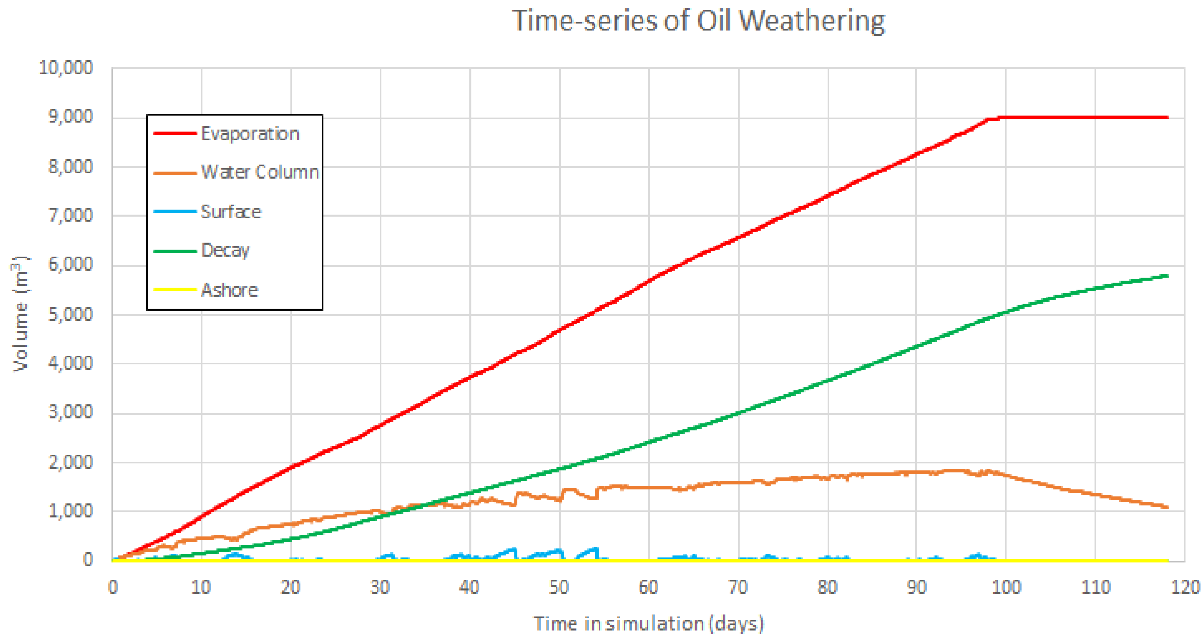

Figure 6-7 Predicted weathering and fates of West Kingfish crude from modelling a single trajectory of a 114 kbbl LOWC release from West Kingfish Platform

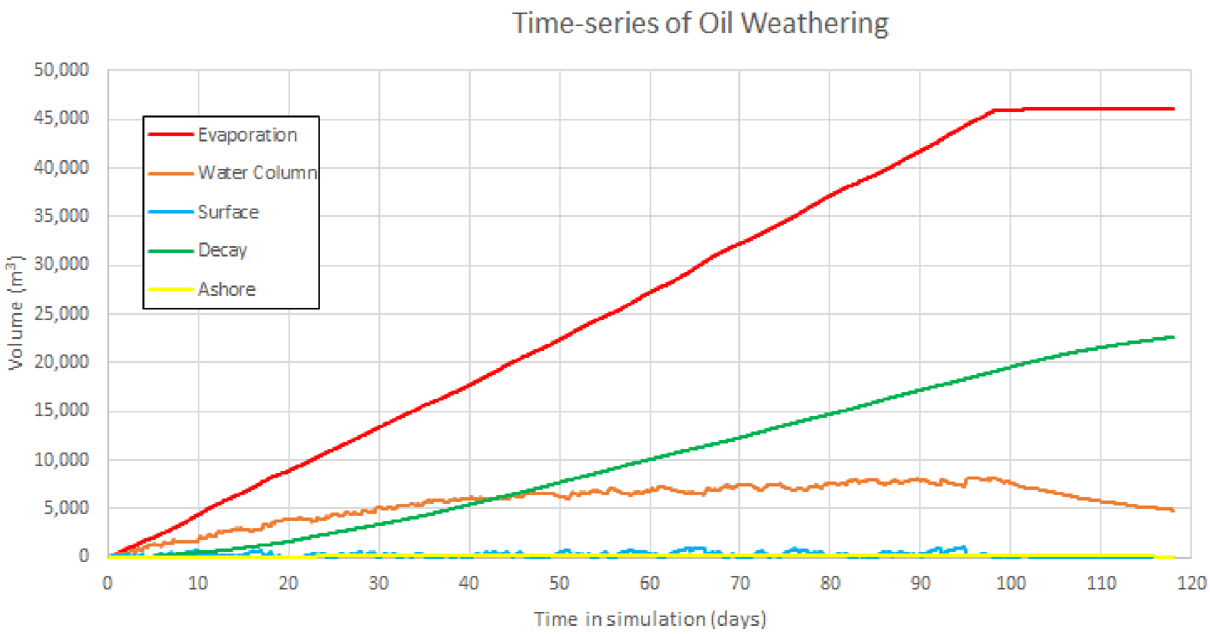

Figure 6-8 Predicted weathering and fates of Halibut crude from modelling a single spill trajectory of a 391 kbbl LOWC release from Cobia Platform

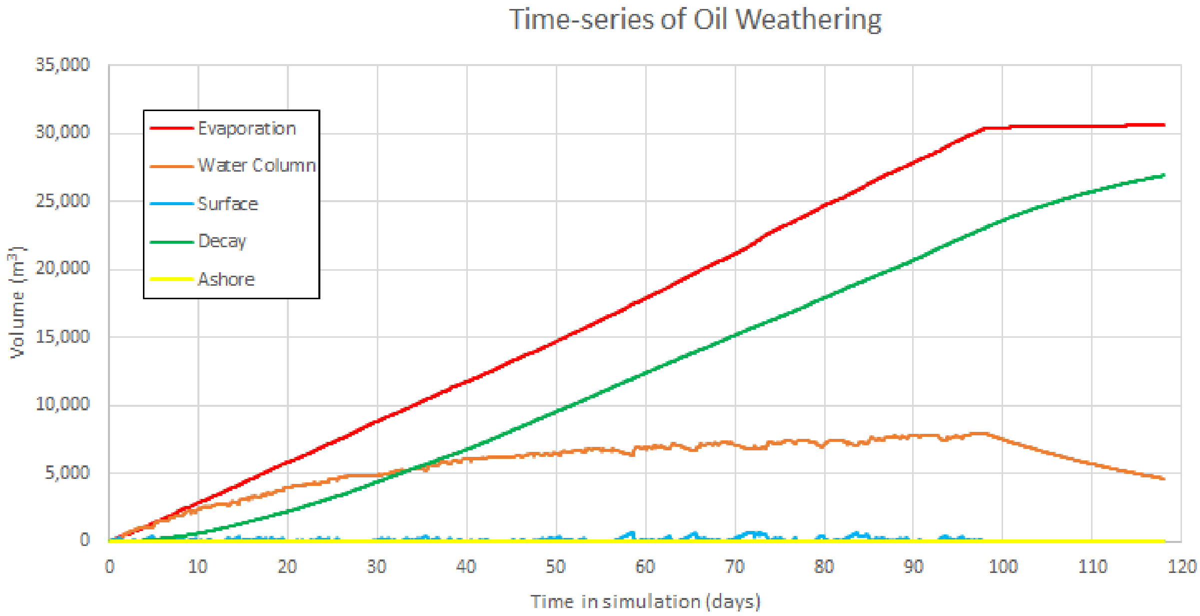

Figure 6-9 Predicted weathering and fates of West Kingfish crude from modelling a single spill trajectory of a 519 kbbl LOWC release from Marlin A Platform

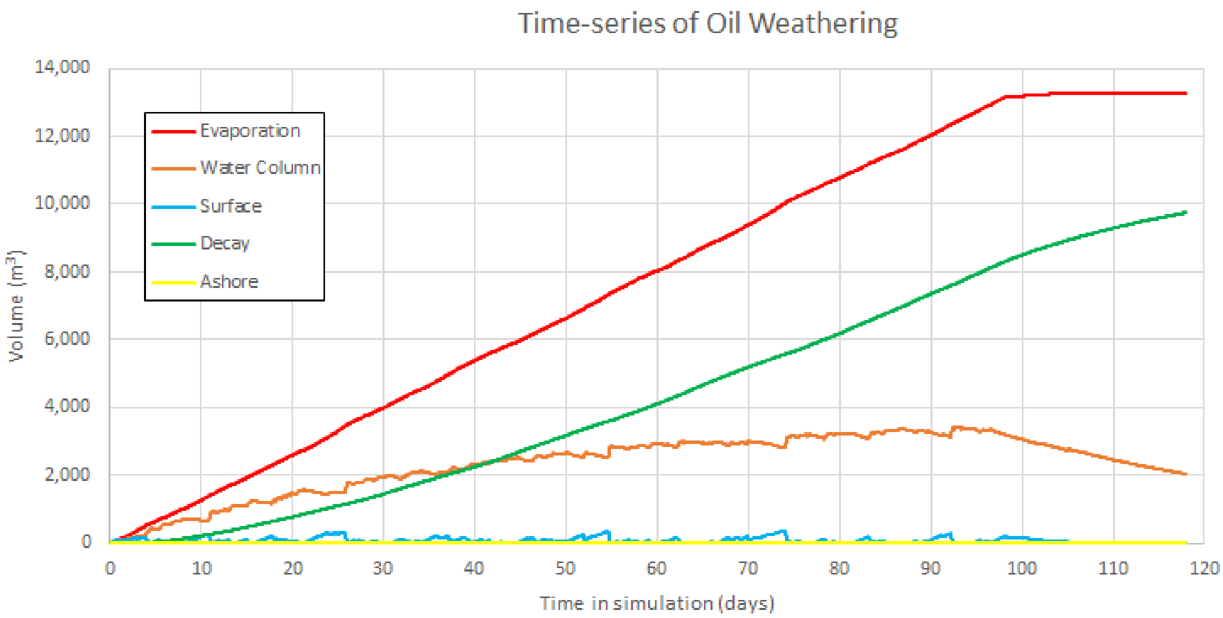

Figure 6-10 Predicted weathering and fates of Flounder crude from modelling a single spill trajectory of a 158 kbbl LOWC release from Tuna Platform

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 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, therefore 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.

Using the representative worst case scenarios, the extent of potential moderate hydrocarbon exposure from a LOWC is described in Table 6-13, and Figure 6-11, Figure 6-12, Figure 6-13 and Figure 6-14. Other features outside of the moderately exposed area but within the PEA are described in Table 6-14.

Table 6-13 Environmental sensitivities with potential for moderate hydrocarbon exposure from an LOWC

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	**LOWC at Cobia Platform**	**LOWC at Marlin A Platform**	**LOWC at Tuna Platform**
Surface exposure	Moderate 10 g/m^2	No exposure predicted.	Maximum distance from the release location was 31 km. The zone of moderate exposure overlaps the following BIAs (100% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Short-tailed Shearwater • Shy Albatross • Wandering Albatross • Short-tailed Shearwater (4% probability) Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark –Distribution Upwelling East of Eden has 3% probability of exposure.	Maximum distance from the release location was 46 km. The zone of moderate exposure overlaps the following BIAs (100% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Short-tailed Shearwater • Shy Albatross • Wandering Albatross Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark –Distribution Upwelling East of Eden has 100% probability of exposure.	Maximum distance from the release location was 78 km. The zone of moderate exposure overlaps the following BIAs (100% probability): Birds • Black-browed Albatross • Buller's Albatross • Campbell Albatross • Common Diving-petrel • Indian Yellow-nosed Albatross • Short-tailed Shearwater • Shy Albatross • Wandering Albatross Marine mammals • Pygmy Blue Whale - Distribution & Foraging • Southern Right Whale – Migration • White Shark –Distribution Upwelling East of Eden has 100% probability of exposure.
Shoreline Exposure	Moderate 100 g/m^2	No shoreline exposure predicted.	The highest probability of shoreline exposure (14%) was predicted for East Gippsland and Cape Howe/Mallacoota, followed by Bega Valley (10%) and Croajingolong (West) (2%).	The maximum length of shoreline exposure is 150 km (average: 36 km). The probability of shoreline exposure along the Gippsland shore between East Gippsland and Lakes Entrance (West) / Shoal Haven ranged from 89% to 10%. Time before exposure after LOWC event ranged from three days (Gabo Island, Cape Howe / Mallacoota, Corringle, Lake Tyers Beach, Lakes Entrance), up to three months (Montague Island).	Only Bega Valley (5% probability) recorded shoreline contact above the moderate threshold.
In-water (dissolved) Exposure	Moderate 50ppb instantaneous	0-10m water depth The zone of moderate exposure potentially overlaps albatross, petrel and tern foraging BIAs (1-97%), and breeding BIAs (1-2%). Marine mammal BIAs potentially in the zone of moderate exposure include (2-97%): Grey Nurse Shark (foraging and migration), Humpback Whale (foraging), Indo-Pacific / Spotted Bottlenose Dolphin (breeding), Pygmy Blue Whale (foraging and distribution), Southern Right Whale (migration), and White Shark (breeding, distribution and foraging). KEFs potentially within the zone of moderate exposure include the Upwelling East of Eden KEF (94%), Big Horseshoe Canyon (6%), Canyons on the eastern continental slope and Shelf rocky reefs (1%).	0-10m water depth A number of seabirds that forage near the LOWC location are predicted to have a 100% probability of exposure at moderate instantaneous dissolved hydrocarbon levels in 0-10m water depth: Pygmy Blue Whale, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, White-faced Storm-petrel. Also, Southern Right Whale (migration), White Shark (distribution & foraging) were also predicted to have a 100% probability of exposure. Little Penguin & Wedge-tailed Shearwater (each 92%), Sooty Shearwater (52%), Flesh-footed Shearwater (28%), Crested Tern (24%), Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross & Wilsons Storm Petrel (each 21%) showed a lower probability during foraging, while Little Penguin (breeding: 16%), Crested Tern (breeding: 15%), Indo-Pacific/Spotted Bottlenose Dolphin	0-10m water depth: A number of seabirds that forage near the LOWC location are predicted to have a 100% probability of exposure at moderate instantaneous dissolved hydrocarbon levels in 0-10m water depth: Antipodean Albatross, Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross, White-faced Storm-petrel, Wedge-tailed Shearwater, Little Penguin, Common Diving-petrel, Short-tailed Shearwater, Buller's Albatross. Also, Pygmy Blue Whale (distribution & foraging), Southern Right Whale (migration), White Shark (distribution & foraging), Humpback Whale (foraging), Indo-Pacific/Spotted Bottlenose Dolphin (breeding) and Grey Nurse Shark (migration) were also predicted to have a 100% probability of exposure.	0-10m and 10-20m water depth Pattern is similar for moderate exposure in 0-10m and 10-20m water depth, although BIAs are predicted to have less than 64% probability of moderate exposure in 10-20 m water depth, and AMPs less than 15% probability in 0-10m depth and less than 7% in 10-20m water depth.

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
		AMPs: Beagle AMP (5%), East Gippsland AMP (3%), Flinders AMP (4%) and Freycinet AMP. (1%). New Zealand Star Bank (28%), Cape Howe 16%, Cape Howe Kent Group (10%), Point Hicks 7%), Batemans (5%) and Ninety Mile Beach (1%), as well as Bega Valley & Cape Howe / Mallacoota (11%), Croajingolong East/West (2%), Eurobodalla & Point Hicks (1%). <u>10-20m water depth</u> Probability of exposure to seabirds is substantially lower than in 0-10 m water depth (below 38%). Upwelling East of Eden (38%) probability of being exposed. For the remaining receptors, the probabilities are similar to that within 0-10m depth.	(breeding: 83%), Humpback Whale (foraging: 82%), Grey Nurse Shark (foraging: 63%), Southern Right Whale (connecting Habitat: 5%), Short-tailed Shearwater (breeding: 3%), Grey Nurse Shark (migration: 61%), White Shark (breeding: 25%), White-faced Storm-petrel (breeding: 39%) also showed a lower probability. Beagle (25%), East Gippsland (31%), and Flinders (5%) may be exposed at moderate instantaneous thresholds. Upwelling East of Eden (100%), followed by Big Horseshoe Canyon (67%), Shelf rocky reefs (17%) and Canyons on the eastern continental slope (14%) may be exposed, as may New Zealand Star Bank (95%), Cape Howe (91%), Point Hicks (80%), Kent Group (26%), Batemans (15%), Beware Reef (12%), Warrego Rock (8%), Ninety Mile Beach (1%). And Cape Howe / Mallacoota 68%), Bega Valley (64%), Croajingolong (West: 54%; East): 32%), Point Hicks (47%), Sydenham Inlet (15%), Eurobodalla & Marlo (each 10%), Cape Conran (7%), Corringle (4%), Lake Tyers Beach (3%), Shoal Haven (2%0 and Lakes Entrance (1%). <u>10-20m water depth</u> In 10-20 m depth, the pattern is quite similar.	Predicted moderate instantaneous dissolved hydrocarbon levels within State Waters were: Victoria (100%), NSW (96%) and Tasmania (24%). New Zealand Star Bank, Point Hicks, Cape Howe, Upwelling East of Eden showed 100% probability at moderate levels in 0-10m water depth. East Gippsland (34%) and Beagle AMP (25%). <u>10-20m water depth</u> Patterns of exposure to moderate instantaneous dissolved hydrocarbon levels were comparable in 10-20 a water depth. The probability of exposure in 20-30 m water depth was below 47% and was largely limited to a number of foraging seabirds, and other BIAs near the LOWC location. <u>20-30m water depth</u> East Gippsland, Beagle, Flinders, Jervis, Lord Howe, Central Eastern, and Freycinet AMP were predicted to have a probability less than 9% for instantaneous exposure to moderate hydrocarbons in 20-30 m water depth. Victoria (40%), NSW (35%) and Tasmania State Waters (7%) showed lower probability of exposure within 20-30 m water depth than in water depth between 0-20m. Bega Valley (33%), Cape Howe / Mallacoota (21%), Croajingolong West/ East (15%), Point Hicks (13%) have a lower likelihood of exposure in 20-30 m water depth, with less than 7% for Eurobodalla, Sydenham Inlet, Cape Conran, Marlo, Corringle, Shoal Haven and Snake Island.	

Table 6-14 Environmental sensitivities outside of the moderately exposed area but within the PEA from an LOWC

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
Surface Exposure	Low 1 g/m^2	Maximum distance extends approx. 37 km from release location. Area of low exposure overlaps (100%) with foraging bird BIAs (Black-browed Albatross, Buller's Albatross, Campbell Albatross, Common Diving-petrel and Indian Yellow-nosed Albatross, Short-tailed Shearwater, Shy Albatross, Wandering Albatross), Pygmy Blue Whale foraging and distribution BIA, Southern Right Whale migration BIA and White Shark distribution BIA. There is also a 3% probability for overlap with the White-faced Storm-petrel breeding BIA. There is a very low (3%) probability of surface exposure within the Upwelling East of Eden KEF.	Maximum distance extends approx. 239 km from release location. BIAs affected by moderate exposure (described in Table 6-13) will also be affected (100%) by low surface exposure. Additional bird foraging BIAs potentially within the zone of low exposure include Antipodean Albatross (48%), Little penguin (13%), Short-tailed shearwater (95%), Sooty Shearwater (1%), Wedge-tailed Shearwater (21%), and White-faced Storm-petrel (44%). Additional marine mammals BIAs include: Grey Nurse Shark (1%), Humpback Whale (8%), White Shark foraging (9%). There is a 96% probability of surface exposure within the Upwelling East of Eden KEF.	Maximum distance extends approx. 368 km from release location. 100% probability of surface exposure predicted for albatross species BIAs, as well as Pygmy Blue Whale, and Southern Right Whale BIAs, within the first 2 hrs. The Short-tailed Shearwater BIA has a 63% probability The Black Petrel, Crested Tern, Flesh-footed Shearwater, Great-winged Petrel and Northern Giant Petrel BIAs have a 5% probability of being exposed during foraging and Wilsons Storm Petrel migration BIA (5%), while the Little Penguin Foraging (32%) and Breeding (4%) BIA may be exposed within a week to 45 days. The Indo-Pacific/Spotted Bottlenose Dolphin Breeding BIA has a 26% probability of being exposed. Exposure of the Grey Nurse Shark BIAs is <20% Humpback	Maximum distance extends approx. 198 km from release location. 100% probability of surface exposure predicted for albatross species BIAs (Black-browed Albatross, Bullers Albatross, Campbell Albatross, Common Diving-petrel, Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross), as well as Pygmy Blue Whale and Southern Right Whale and White Shark distribution BIAs, within the first 2 hrs. The Antipodean Albatross (98%), White-faced Storm-petrel (98%), and Short-tailed Shearwater (5%) may be exposed during foraging, as is the White Shark Breeding BIA (6%). The Upwelling East of Eden KEF demonstrated a 100% probability of low surface hydrocarbon exposure.

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
				Whale 65%, White Shark Foraging BIA (63% breeding BIA (30%) and Distribution BIA (100%). There is a 100% probability of surface exposure within the Upwelling East of Eden KEF, and 5% for the Canyons on the eastern continental slope KEF. Cape Howe, Point Hicks, Batemans and New Zealand Star Bank MNP have a 4-18% probability of being exposed at low levels.	Cape Howe, Point Hicks, Batemans and New Zealand Star Bank MNP have a 4-18% probability of being exposed at low levels.
Shoreline Exposure	Low $10 g/m^2$	No shoreline exposure predicted.	Highest probability of shoreline contact was 23%. The minimum time before oil contact was approximately 210 hours (8.75 days) and the maximum volume of oil ashore was 46 m^3 (289 bbl). The highest probability of contact (23%) by shoreline oil was predicted for East Gippsland and Cape Howe/Mallacoota. East Gippsland recorded the greatest volume of oil to come ashore (46 m^3) and the maximum length of shoreline oiled (14 km) above the low threshold. Peak shoreline loading (611 g/m^2) is predicted at East Gippsland and Cape Howe / Mallacoota (mean 196 g/m^2), with a maximum volume of 46 m^3 (mean 5 m^3) and maximum of 11 km of shoreline contacted at moderate levels (>100 g/m^2).	The probability of any shoreline contact is 94%, with a minimum time for visible hydrocarbons ashore after 62 hrs. The maximum predicted volume ashore is 563 m^3 (average of all runs: 107 m^3), with a maximum length 0f 221 km (average: 60 km). The maximum predicted probability of contact to any shoreline at, or above, the minimum shoreline contact threshold (10 g/m^2) was at East Gippsland (89%), where the minimum time before oil contact was approximately 3 days. The maximum volume of oil ashore at East Gippsland was 260 m^3 (1,636 bbl). The highest probabilities of contact by shoreline oil were predicted at East Gippsland (52%), Bega Valley (29%) and Cape Howe/Mallacoota (22%) at the low (10 g/m^2) threshold. Peak shoreline loading is predicted at Gabo Island (4.2 kg/m^2), Bega valley (3.2 kg/m2), and East Gippsland and Cape Howe / Mallacoota (2.4 kg/m^2), with a maximum volume of 260 m^3 at East Gippsland (mean 43 m^3), and maximum of 51 km of shoreline contacted at East Gippsland at moderate levels (>100 g/m^2).	The highest probabilities of contact by shoreline oil were predicted at East Gippsland (7%), Bega Valley (5%) and Cape Howe / Mallacoota (2%) at the low (10 g/m^2) threshold. Peak shoreline loading (314 g/m^2) is predicted at Bega valley (mean 278 g/m^2), with a maximum volume of 6 m^3 (mean <1 m^3) and maximum of 2 km of shoreline contacted at moderate levels (>100 g/m^2).
In-water (dissolved) Exposure	Low 10ppb instantaneous	0-10m water depth At the surface layer (0-10 m), the probability of dissolved hydrocarbon exposure at the low threshold to receptors is 100% for the a number of sea birds frequenting the area near the LOWC event during foraging: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, Campbell Albatross, Common Diving-petrel, Indian Yellow-nosed Albatross, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, White-faced Storm-petrel. The following BIAs have a 20-99% probability during foraging: Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross, Black Petrel, Crested Tern, Flesh-footed Shearwater, Little Penguin Wedge-tailed Shearwater). The White Shark (distribution), Pygmy Blue Whale (foraging & distribution) and Southern Right Whale (migration) BIAs also have a 100% probability. The following BIAs also have a high probability of exposure: White Shark (foraging: 99%; breeding: 25%), Humpback Whale (foraging: 83%), Indo-Pacific/Spotted Bottlenose Dolphin – (breeding: 77%), Grey Nurse	0-10m water depth The greatest probability of low dissolved hydrocarbon exposure in the 0-10 m layer was 100%, predicted for the foraging seabirds near the LOWC location: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, Campbell Albatross, Common Diving-petrel, Indian Yellow-nosed Albatross, Little Penguin, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, Wedge-tailed Shearwater, and White-faced Storm-petrel, as well as Humpback Whale (foraging), Pygmy Blue Whale (distribution and foraging), Southern Right Whale – (migration), White Shark (distribution and foraging). Additionally, the Upwelling East of Eden KEF recorded a 100% probability of low dissolved hydrocarbon exposure. Big Horseshoe Canyon KEF (95%), Shelf rocky reefs (57%) and Canyons on the eastern continental slope (53%) showed a lower probability of exposure. New Zealand Star Bank (100%), Cape Howe & Point Hicks (99%), Beware Reef 56%), Batemans (51%), Kent Group (43%), Warrego Rock (25%) also showed a	0-10m water depth The greatest probability of low dissolved hydrocarbon exposure in the 0-10 m layer was 100%, predicted for the foraging seabirds near the LOWC location: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, Campbell Albatross, Common Diving-petrel, Indian Yellow-nosed Albatross, Little Penguin, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, Wedge-tailed Shearwater, White-faced Storm-petrel. Additionally, the following seabirds had a 95-68% probability of being exposed during foraging in 0-10m water depth: Sooty Shearwater, Black Petrel, Flesh-footed Shearwater, Crested Tern, Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross. And the following seabird BIAs: Wilsons Storm Petrel (migration), White-faced Storm-petrel (breeding), Crested Tern (breeding), Little Penguin (breeding). A number of other seabird BIAs had 1-4% probability of exposure. Other BIAs with 100% probability of exposure include: Indo- Pacific/Spotted Bottlenose Dolphin (breeding), Grey Nurse Shark (migration), Humpback Whale (foraging), Pygmy Blue Whale (distribution), Pygmy	0-10m water depth The greatest probability of low dissolved hydrocarbon exposure in the 0-10 m layer was 100%, predicted for the foraging seabirds near the LOWC location: Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross, White-faced Storm-petrel, Antipodean Albatross, Wedge-tailed Shearwater, Little Penguin, Short-tailed Shearwater, Common Diving-petrel and Buller's Albatross with Sooty Shearwater predicted to have a 95% probability, Black Petrel and Flesh-footed Shearwater a 66% probability, and Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, and White-capped Albatross 59% each, Little Penguin and Crested Tern Breeding BIA 61% each, and Wilsons Storm Petrel (migration) (59%). The following BIAs are also predicted to have a 100% probability of exposure: Pygmy Blue Whale (distribution & foraging), Southern Right Whale (migration), White Shark (distribution & foraging), Humpback Whale (foraging), Indo-Pacific/Spotted Bottlenose Dolphin (breeding), Grey Nurse Shark (foraging & migration). White Shark (breeding: 58%).

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
		Shark (foraging: 66%; migration: 62%), Sooty Shearwater (foraging: 62%), White-faced Storm-petrel (breeding: 39%), Little Penguin (breeding: 23%), Crested Tern (breeding: 22%), Wilsons Storm Petrel (migration: 20%) The Upwelling East of Eden KEF recorded a 100% probability low dissolved hydrocarbon exposure, followed by Big Horseshoe Canyon (64%), Canyons on the eastern continental slope (13%), and Shelf rocky reefs (21%). Victoria State Waters (88%), New South Wales State Waters (75%) and Tasmania State Waters (37%) may also be exposed by low threshold instantaneous dissolved hydrocarbons, as may Cape Howe / Mallacoota MNP (71%), Bega Valley Sub-LGA (69%), Croajingolong Sub-LGA (West: 62%; East: 29%), Point Hicks Sub-LGA (53%), Sydenham Inlet Sub-LGA (19%), Cape Conran (13%), Eurobodalla Sub-LGA (11%) and Marlo Sub-LGA (7%). And Beagle AMP (37%), East Gippsland AMP (25%), Flinders AMP (4%), Freycinet & Jervis AMPs (1%). <u>10-20m water depth</u> Within 10-20 m water depth, the exposure pattern is very similar	high probability, followed by Jervis Bay & Gippsland Lakes (6%), Ninety Mile Beach (5%) and Wilsons Promontory (4%). Croajingolong East/West, Cape Howe / Mallacoota, Bega Valley, Point Hicks, Sydenham Inlet, Cape Conran, Marlo, Corringle, Eurobodalla, Lake Tyers Beach, Shoal Haven showed a 14-96% probability of instantaneous exposure in 0-10m depth. <u>10-20m water depth</u> In the 10-20 m depth layer, exposure pattern is quite similar.	Blue Whale (foraging), Southern Right Whale (migration), White Shark (distribution), White Shark (foraging), with Grey Nurse Shark (foraging: 99%) and White Shark (breeding: 82%) a slightly lower probability of exposure. Humpback Whale (migration), and Southern Right Whale (connecting Habitat) showed a 4% probability. East Gippsland (86%), Beagle (42%), Jervis (20%) and Flinders AMP (17%) may be exposed, with Freycinet, Lord Howe, Central Eastern and Hunter AMP having less than 4% probability. The Upwelling East of Eden KEF recorded a 100% probability of low dissolved hydrocarbon exposure in 0-10m water depth. Big Horseshoe Canyon KEF (84%), Shelf rocky reefs (69%) and Canyons on the eastern continental slope (53%) showed a lower probability of exposure, with Lord Howe seamount chain, Tasman Front and eddy field, Tasmantid seamount chain, and Seamounts South and east of Tasmania less than 4% probability. Victoria and New South Wales State Waters have a 100% probability, with 38% for Tasmania State Waters. New Zealand Star Bank, Cape Howe & Point Hicks (100% each), Beware Reef 79%), Batemans (72%), Kent Group (38%), Gippsland Lakes (28%), Jervis Bay (19%), Wilsons Promontory Marine Park (13%). Ninety Mile Beach, Wilsons Promontory, Corner Inlet, Booderee, Nooramunga Marine and Coastal Park, Warrego Rock, Corner Inlet, Lord Howe Island, Corner Inlet Marine and Coastal Park each had 2-7% probability of exposure. Bega Valley, Cape Howe / Mallacoota, Croajingolong (West) and Point Hicks showed a 100% probability, followed by Croajingolong (East) (99%), Sydenham Inlet (86%), Cape Conran (80%), Marlo (78%), Eurobodalla (57%), Corringle (52%), Lake Tyers Beach (37%), Lakes Entrance (32%), Shoal Haven (30%), Lakes Entrance (West) (25%), Ocean Grange (15%), Snake Island (14%), Wilsons Promontory (NE: 14%; East: 13%), Clonmel Island (13%), Corner Inlet (11%) and Golden Beach (10%). Seaspray, Woodside Beach, McLoughlins Beach, Shell Harbour Wollongong, Kiama, Wilsons Promontory (West), Port Welshpool, Central Coast, Northern Beaches, and Sutherland Shire each had less than 10% probability. <u>10-20m water depth</u> In the 10-20 m and 20-30m depth layer, exposure pattern is quite similar to the top layer. <u>20-30m water depth</u> In 20-30 m water depth, Victoria State Waters are predicted to have a 94% probability of exposure, 87%	The Upwelling East of Eden KEF recorded a 100% probability of low instantaneous dissolved hydrocarbon exposure. Big Horseshoe Canyon (75%), Shelf rocky reefs (55%) and Canyons on the eastern continental slope (51%) showed a lower probability. Victoria and NSW State Waters are predicted to have 100% exposure, with Tasmania State Waters at 25%. East Gippsland (65%) and Beagle AMP (24%) may be exposed, with Jervis, Flinders, Central Eastern and Freycinet AMP all below 8% probability. Cape Howe MNP and New Zealand Star Bank (100% each), Point Hicks MNP (98%), Batemans MP (61%), Beware Reef (47%) and Kent Group (25%) also showed high probability of exposure, with Jervis Bay, Ninety Mile Beach, Gippsland Lakes, Wilsons Promontory MNP, Booderee NP, Nooramunga Marine and Coastal Park and Corner Inlet all below 9% probability. Of the Sub-LGAs, Bega Valley and Cape Howe / Mallacoota are predicted at 100% probability, followed by Croajingolong (West: 94%; East: 83%), Point Hicks (86%), Sydenham Inlet (56%), Cape Conran and Marlo (49% each), Corringle (34%), Eurobodalla (30%), Lake Tyers Beach (16%) and Shoal Haven (15%). McLoughlins Beach, Seaspray, Woodside Beach, Lakes Entrance, Golden Beach, Clonmel Island, Ocean Grange, Snake Island all ae below 8% probability. <u>10-20m water depth</u> Pattern is very similar in 10-20 m water depth for low instantaneous dissolved hydrocarbon exposure.

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
				for NSW State Waters and 26% for Tasmania State waters. The Upwelling East of Eden showed a 100% probability of being exposed in 20-30m water depth.	
In-water (entrained) Exposure	Low 10ppb instantaneous	<u>0-10m water depth</u> The greatest probability of entrained hydrocarbon exposure at the low threshold was 100%, predicted during seabird foraging near the LOWC location: Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, Common Diving-petrel, Antipodean Albatross and White-faced Storm-petrel. 100% probability is also predicted for the following BIAs when near the LOWC location: Pygmy Blue Whale (distribution/foraging), Southern Right Whale (migration), White Shark (distribution/foraging). The flowing seabird BIAs have a probability below 10% during foraging near the LOWC location: Little Penguin, Wedge-tailed Shearwater, Sooty Shearwater, Black Petrel, Flesh-footed Shearwater, Crested Tern, Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross, as well as following BIAs: Little Penguin (breeding), Wilsons Storm Petrel (migration) and White-faced Storm-petrel (breeding). The Humpback Whale (foraging), Grey Nurse Shark (migration/foraging) and Indo-Pacific/Spotted Bottlenose Dolphin (breeding) have 91-98% probability, while Southern Right Whale (connecting Habitat) has 18% probability. Victoria (98%), NSW (91%) and Tasmania State Waters (47%) have a high probability of being exposed. East Gippsland, Beagle and Flinders AMP have a 43-79% probability, with Freycinet and Jervis AMP 8-12% probability. Upwelling East of Eden KEF has 100% probability, followed by Big Horseshoe Canyon (91%) and Shelf rocky reefs 63% and Canyons on the eastern continental slope (55%). New Zealand Star Bank has a 100% probability of impact by low instantaneous entrained hydrocarbons, followed by Cape Howe 96%), Point Hicks 95%), Batemans 62%), Kent Group (47%), Beware Reef 32%), Warrego Rock (25%), Wilsons Promontory (10%), Ninety Mile Beach (8%), Jervis Bay (7%), Booderee (6%) and Gippsland Lakes (1%). The following Sub-LGAs have between 79-94% probability of exposure: Croajingolong (East/West), Cape Howe / Mallacoota, Point Hicks, and Bega Valley, Followed by Cape Conran (38%), Marlo (36%), Eurobodalla (32%), Corringle (32%), Shoal Haven (28%), Lake Tyers Beach (18%), Lakes Entrance (West), Ocean Grange, and Golden Beach (: 11% each), Wilsons Promontory	<u>0-10m water depth</u> The greatest probability of entrained hydrocarbon exposure at the low threshold was 100%, predicted during seabird foraging near the LOWC location: White-faced Storm-petrel, Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross, Antipodean Albatross, Buller's Albatross, Short-tailed Shearwater, Wedge-tailed Shearwater, Little Penguin, Sooty Shearwater, as well as Common Diving-petrel during breeding. 100% probability is also predicted for the following BIAs when near the LOWC location: Pygmy Blue Whale (distribution/foraging), Southern Right Whale (migration), White Shark (distribution/foraging), Humpback Whale (foraging), Grey Nurse Shark (migration/foraging). The following seabirds had an 81-83% probability when foraging near the LOWC location: Black Petrel, Flesh-footed Shearwater, Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross (83% each), Crested Tern (81%). And the following during breeding: Little Penguin (79%), Crested Tern (67%), White-faced Storm-petrel (96%). And Wilsons Storm Petrel during migration (83%). The Black-faced Cormorant (25%), White-fronted Tern (19%) and Gould's Petrel (5%) have a lower probability of exposure during foraging, as has Short-tailed Shearwater during breeding (27%). The White Shark (breeding: 64%; Aggregation: 5%), Southern Right Whale (connecting Habitat: 30%), Humpback Whale (migration: 6%) and Indo-Pacific/Spotted Bottlenose Dolphin (foraging: 3%) may be exposed to low instantaneous entrained hydrocarbons in 0-10m water depth. East Gippsland (100%), Flinders (74%), and Beagle AMP (53%) are likely to be exposed, with lower probability for Jervis (37%), Freycinet 18%), Hunter (6%) and Central Eastern AMP (2%). Upwelling East of Eden and Big Horseshoe Canyon KEF have 100% probability of exposure, followed by Canyons on the eastern continental slope (83%), Shelf rocky reefs (80%), Tasman Front and eddy field (18%) and Seamounts South and east of Tasmania 14%). New Zealand Star Bank 100%), Point Hicks (99%), Cape Howe (99%), Beware Reef (77%), Batemans (66%) and Kent Group (52%) have 52-100% probability of exposure, followed by Warrego Rock (33%), Jervis Bay (28%), Booderee (22%), Gippsland Lakes (21%), Ninety Mile Beach 17%) and Arthur Bay CA (22%).	<u>0-10m water depth</u> A number of seabirds foraging near the LOWC location have a 100% probability of exposure: White-faced Storm-petrel, Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross, Antipodean Albatross, Buller's Albatross, Short-tailed Shearwater, Wedge-tailed Shearwater, Little Penguin, Common Diving-petrel, Sooty Shearwater, as well as White-faced Storm-petrel during breeding. Black Petrel, Flesh-footed Shearwater, Crested Tern (88% each), Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel), White-capped Albatross (85% each) also have a high probability of exposure, as has Wilsons Storm Petrel (migration: 85%), and Little Penguin and Crested Tern (87% each) during breeding. The following seabirds had less than 8% probability when foraging near the LOWC location: Black-winged Petrel, Common Noddy, Grey Ternlet, Little Shearwater, Masked Booby, Providence Petrel, Red-tailed Tropicbird, Kermadec Petrel, Sooty Tern, Black Noddy, White-bellied Storm Petrel, White Tern. And Common Noddy, Black Noddy, Flesh-footed Shearwater, Grey Ternlet, Little Shearwater, Masked Booby, Providence Petrel, Red-tailed Tropicbird, Black-winged Petrel, during breeding. 100% probability is also predicted for the following BIAs when near the LOWC location: Pygmy Blue Whale (distribution/foraging), Southern Right Whale (migration), White Shark (distribution/foraging), Humpback Whale (foraging), Indo-Pacific/Spotted Bottlenose Dolphin (breeding), Grey Nurse Shark (migration) and Grey Nurse Shark (foraging), followed by White Shark (breeding: 95%) and Humpback Whale (migration: 10%). East Gippsland AMP has 100% probability, followed by Flinders (60%), Jervis (59%), Beagle (48%), Freycinet (21%), Central Eastern (10%), Lord Howe (8%) and Hunter AMP (7%) Upwelling East of Eden KEF has 100% probability of exposure, followed by Big Horseshoe Canyon (98%), Shelf rocky reefs (88%), Canyons on the eastern continental slope (85%), Tasman Front and eddy field 18%). Tasmantid seamount chain and Lord Howe seamount chain KEF has less than 8% probability. Victoria and NSW State Waters have 100% probability of exposure to low threshold instantaneous entrained hydrocarbons, with 43% for Tasmania State Waters. New Zealand Star Bank, Point Hicks & Cape Howe MNP, have 100% probability, followed by Beware Reef	<u>0-10m water depth</u> A number of seabirds foraging near the LOWC location have a 100% probability of exposure: White-faced Storm-petrel, Little Penguin, Sooty Shearwater, Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, Antipodean Albatross, Buller's Albatross, as well as Common Diving-petrel (breeding) and Wedge-tailed Shearwater (breeding). The following seabirds had a 65-97% probability during foraging near the LOWC location: Black Petrel, Flesh-footed Shearwater, Great-winged Petrel, Northern Giant Petrel, Southern Giant Petrel, White-capped Albatross, Crested Tern. As well as the Little Penguin, Crested Tern and White-faced Storm-petrel during breeding, and the Wilsons Storm Petrel during migration. Other seabirds had less than 6% probability. Other BIAs with 100% probability includes: Grey Nurse Shark (migration), Pygmy Blue Whale (distribution/foraging), Southern Right Whale (migration), White Shark (distribution/foraging), Humpback Whale (foraging), Grey Nurse Shark (foraging), and Indo-Pacific/Spotted Bottlenose Dolphin (breeding). Southern Right Whale (connecting Habitat) and Humpback Whale (migration) were 6011% probability. Of the KEFs, Upwelling East of Eden had a 100% probability of exposure to low instantaneous threshold entrained hydrocarbons on 0-10m water depth, followed by Big Horseshoe Canyon (97%), Canyons on the eastern continental slope (78%) and Shelf rocky reefs (75%), other KEFs were below 6% probability: Tasman Front and eddy field, Tasmantid seamount chain, Lord Howe seamount chain, Seamounts South and east of Tasmania. East Gippsland AMP has a high probability (95%), followed by Beagle (41%), Jervis (32%) and Flinders AMP (31%). Freycinet, Central Eastern AMP and Lord Howe AMP are 6010% probability. <u>10-20m water depth</u> No receptors recorded any probability of entrained hydrocarbon exposure above the high threshold, except low probability (<3%) for a number of foraging seabirds near the LOWC location (Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Short-tailed Shearwater, Shy Albatross, Wandering Albatross, Antipodean Albatross, White-capped Albatross, Buller's Albatross).

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)			
		LOWC at West Kingfish Platform	LOWC at Cobia Platform	LOWC at Marlin A Platform	LOWC at Tuna Platform
		(East/West) (10%), Seaspray (9%), Woodside Beach (7%), Lakes Entrance, Clonmel Island and McLoughlins Beach (5% each), and Shell Harbour (1%). 10-20m water depth Only the Upwelling East of Eden KEF had a small probability (2%) of low instantaneous entrained exposure at moderate levels in 10-20 m water depth.	Wilsons Promontory, Port Stephens - Great Lakes, Flood Plain Lower Ringarooma River, Corner Inlet Marine and Coastal Park. Nooramunga Marine and Coastal Park, Corner Inlet and Cape Portland CA have less than 9% probability of exposure. Victoria State Waters have a 100% probability of exposure, followed by NSW (99%) and Tasmania State Waters (52%). Of the Sub-LGAs, Croajingolong (West: 99%; East: 93%), Cape Howe / Mallacoota 98%), Bega Valley 98%), Cape Conran (81%), Marlo (70%), Eurobodalla (52%) and Corringle (46%) are likely to be exposed, followed by Lake Tyers Beach (33%), Ocean Grange (27%), Golden Beach (27%), Lakes Entrance (22-24%), McLoughlins Beach (17%) and Clonmel Island (13%). Central Coast, Northern Beaches, Kiama, Mid-Coast, Lake Macquarie, Newcastleand Corner Inlet have less than 9% probability of exposure. 10-20m water depth The pattern is similar in 10-20m water depth to that in 0-10m water depth, although at lower probability. Victoria State Waters have a 96% probsility of exposure, followed by NSW (55%) and Tasmania State Waters (32%). Upwelling East of Eden has 100% probability, followed by Big Horseshoe Canyon (72%), Canyons on the eastern continental slope (29%) and Shelf rocky reefs (11%). East Gippsland AMP has 48% probability, followed by Beagle (31%) and Flinders AMP (11%).	(95%), Batemans (87%), Jervis Bay 59%), Gippsland Lakes (40%), Kent Group (40%), Booderee (38%), Warrego Rock (35%) and Ninety Mile Beach (35%). Wilsons Promontory, Corner Inlet, Nooramunga Marine and Coastal Park, Shallow Inlet Marine and Coastal Park, Bunurong, Port Stephens - Great Lakes, Lord Howe Island, East Coast Cape Barren Island Lagoons, and Elizabeth and Middleton Reefs Marine National Nature Reserve are below 16% probability. East Gippsland AMP has 100% probability of exposure, followed by Flinders 60%), Jervis (59%), Beagle 48%), Freycinet (21%), Towra Point (13%), Central Eastern (10%), Lord Howe (8%), Hunter AMP (7% and North Sydney Harbour (3%). Of the Sub LGAs, Croajingolong (West/East), Cape Howe / Mallacoota, Point Hicks, and Bega Valley have 100% probability. Sydenham Inlet (96%), Cape Conran (94%), Marlo (90%), Eurobodalla (73%), Shoal Haven (69%), Corringle (68%), Lake Tyers Beach (55%), Lakes Entrance (West) (46%), Lakes Entrance (42%), Ocean Grange (41%), Golden Beach (34%), Shell Harbour (28%), Kiama (28%), Seaspray (25%), Wollongong (25%) and Woodside Beach (20%) may be exposed, with 19% or less for Clonmel Island, McLoughlins Beach, Sutherland Shire, Wilsons Promontory, Port Welshpool, Waratah Bay, Corner Inlet, Snake Island, Wilsons Promontory (NE), Cape Liptrap (NW), Randwick, Waverly, Woollahra, Northern Beaches, Central Coast, Lake Macquarie, Newcastle, Port Stephens, Venus Bay, Mid-Coast and Kilcunda. 10-20m water depth In the 10-20 m depth layer, the extent of instantaneous entrained hydrocarbon levels at low threshold is substantially less than in 0-10m water depth. Exposure by seabirds during foraging is less than 80%, with many seabird BIAs below 12% probability. Pygmy Blue Whale (foraging/distribution), Southern Right Whale (migration), White Shark (foraging/distribution) are below 80%, with 5-63% for Humpback Whale (foraging), Grey Nurse Shark (foraging/migration, and Indo-Pacific/Spotted Bottlenose Dolphin – and White Shark during breeding. Upwelling East of Eden KEF has an 80% probability for exposure, flowed by Canyons on the eastern continental slope (10%), Shelf rocky reefs (4%), and Big Horseshoe Canyon (2%). Victoria State Waters have a 57% probability of exposure in 10-20 m water depth, with 36% for NSW and 3% forTasmania State Waters.	And Wedge-tailed Shearwater, Common Diving-petrel, Indo-Pacific/Spotted during breeding; and Pygmy Blue Whale (distribution/foraging), Southern Right Whale (migration), White Shark (distribution/ foraging), Bottlenose Dolphin (breeding), Humpback Whale (foraging), and Grey Nurse Shark (foraging).

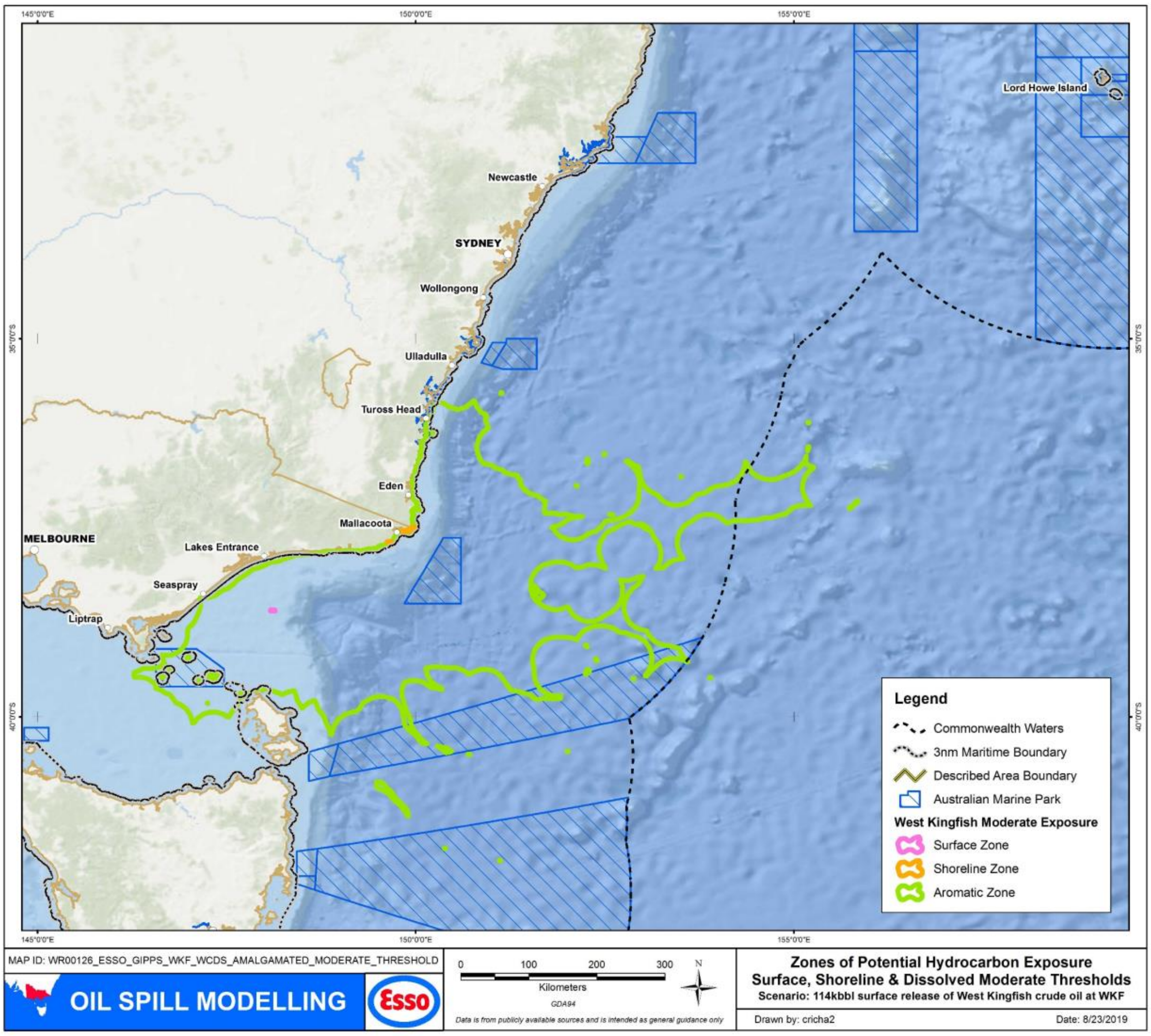

Figure 6-11 LOWC light crude stochastic modelling output for West Kingfish WCDS. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m^2, shoreline: 100 g/m^2, and In-water (dissolved): 50 ppb instantaneous)

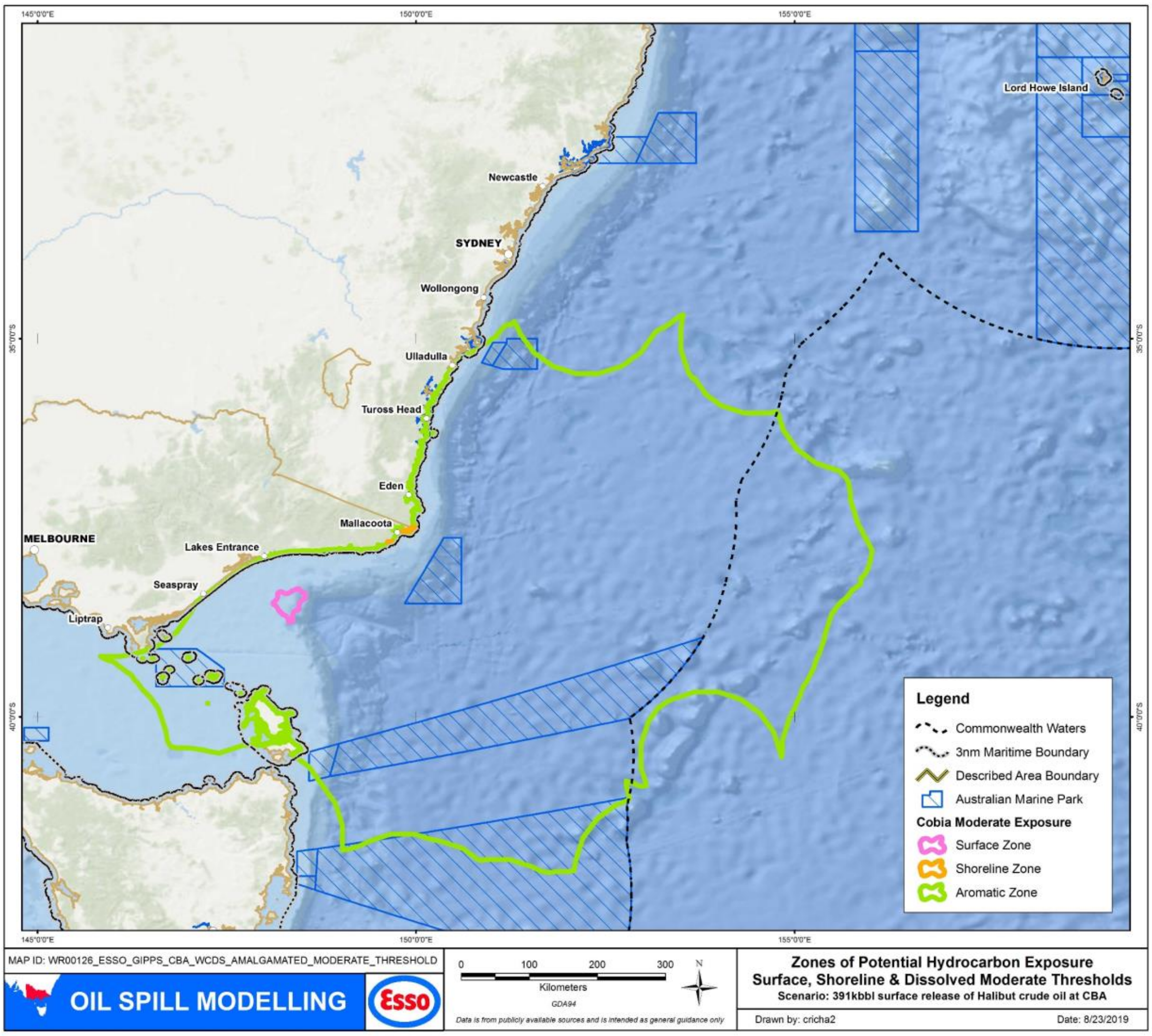

Figure 6-12 LOWC light crude stochastic modelling output for Cobia WCDS. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m², shoreline: 100 g/m², and In-water (dissolved): 50 ppb instantaneous)

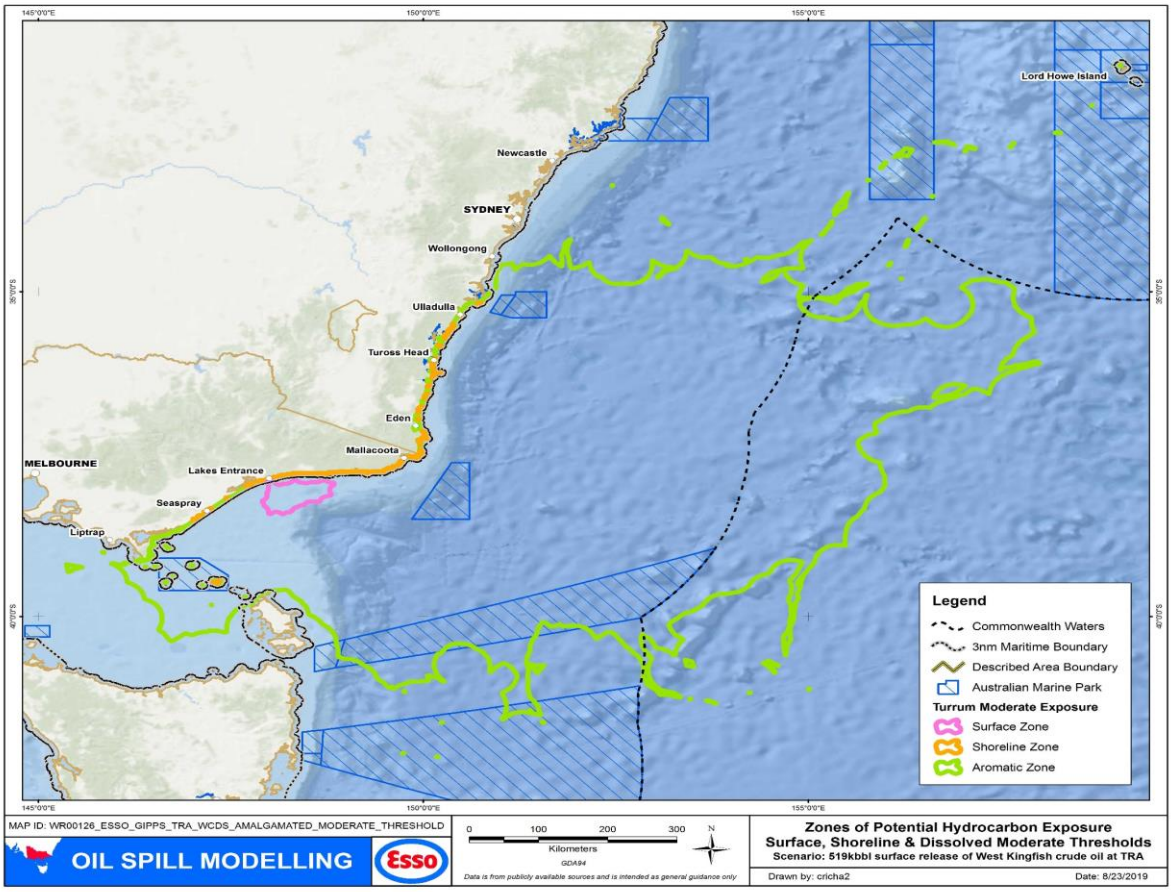

Figure 6-13 LOWC light crude stochastic modelling output for Marlin (Turrum) WCDS. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m^2, shoreline: 100 g/m^2, and In-water (dissolved): 50 ppb instantaneous)

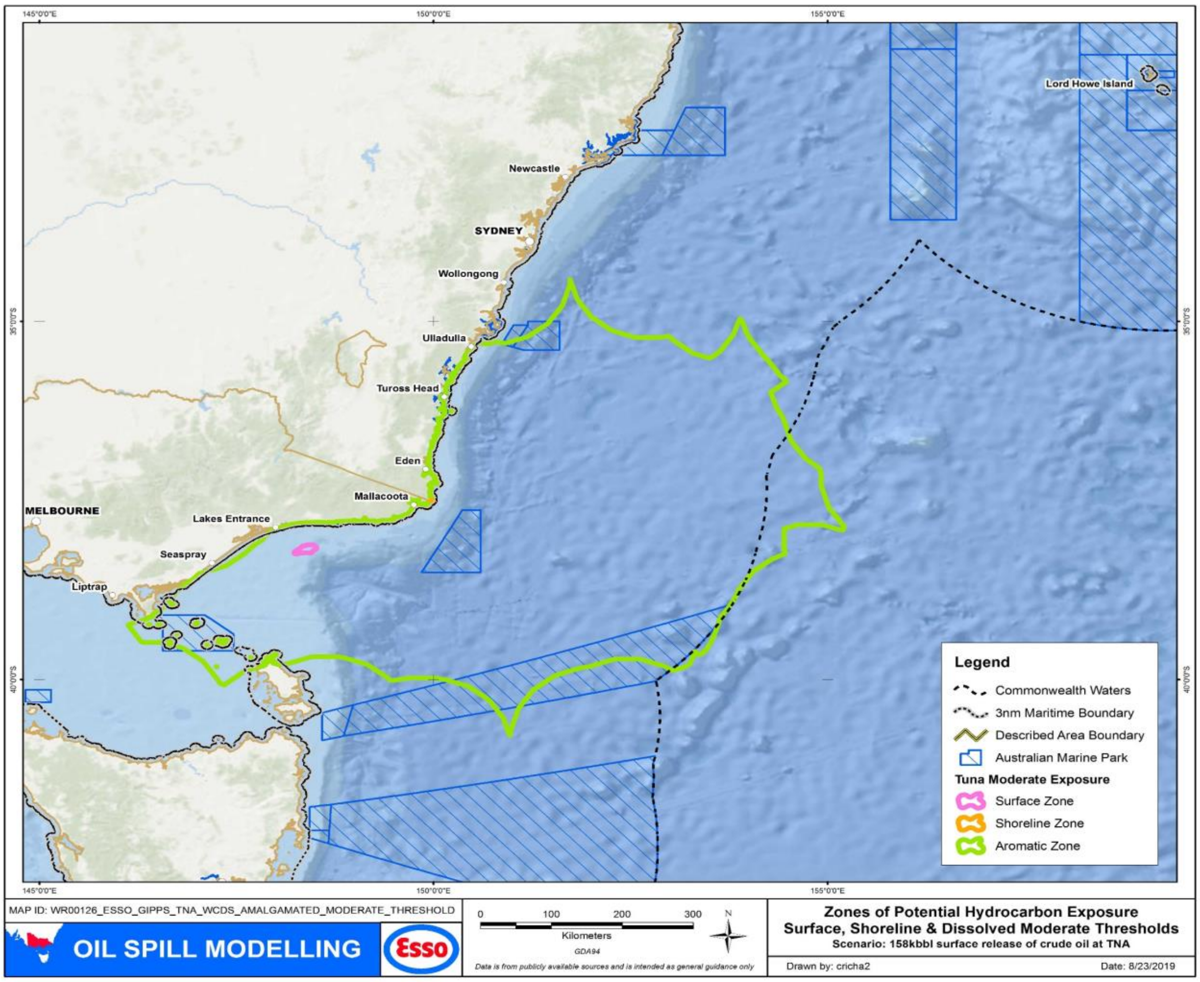

Figure 6-14 LOWC light crude stochastic modelling output for Tuna WCDS. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m^2, shoreline: 100 g/m^2, and In-water (dissolved): 50 ppb instantaneous)

6.7.3 Risk Assessment

An accidental release of reservoir hydrocarbons as a result from Loss of Well Control (LOWC) has the potential to result in the following impacts:

- Change in water quality;
- Change in habitat.

As a result of change in water quality and / or habitat, further impacts may occur which include:

- Injury / mortality to fauna;
- Change in fauna behaviour
- Change to the function, interests or activities of other users.

Receptors that could be affected by a LOWC are identified in Table 6-

Table 6- Receptors Potentially impacted by a LOWC

Impacts	Water quality	Benthic Habitats	Plankton	Fish	Birds	Marine Reptiles	Marine Mammals	Australian Marine Parks	KEFs	Heritage	Commercial Fisheries	Tourism
Change in water quality	✓							✓	✓	✓		
Change in habitat		✓							✓	✓		
Injury / mortality to fauna			✓	✓	✓	✓	✓			✓		
Change in fauna behaviour				✓	✓	✓	✓			✓		
Change to the function, interests or activities of other users										✓	✓	✓

6.7.3.1 Consequence Evaluation

Consequence evaluation of potentially exposed receptors in the event of a LOWC are described in Table 6-15.

Table 6-15 Risk of surface, shoreline and in-water hydrocarbon exposure from LOWC

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
Water quality	A release of reservoir hydrocarbons has the potential to result in a change in water quality. Weathering graphs demonstrate that the West Kingfish, Halibut and Flounder crudes tend to persist on the sea surface for approximately 20 days under low wind conditions, while a large portion of the spill volume could potentially remain entrained in the water column for extended times in the presence of winds greater than 10 knots. Evaporation rates will increase with temperature. However, volatile components (BP <180°C) are expected to evaporate within the first 12 hours, semi-volatile components (180 °C < BP < 265 °C) within the first 24 hours; and low volatility components (265 °C < BP < 380 °C) are expected to evaporate over several days.	Modelling predicts that surface, shoreline and in-water (dissolved) exposure will occur as a result of a LOWC. The worst individual release event modelled predicts a maximum distance of 78 km from the release site of moderate surface exposure. Due to the potentially persistent nature of the hydrocarbon and the potential area of impact, the consequences to water quality are assessed as **Level III** (Potential Short Term, Minor Effects).
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	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 hydrocarbon exposure	Exposure risk assessment
	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. 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	

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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). 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	

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	(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 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	

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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 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).	

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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 immediate mortality or declines in egg	Plankton are likely to be exposed to in-water (dissolved) hydrocarbons above the moderate exposure threshold 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 hydrocarbon exposure	Exposure risk assessment
	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	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 high probability that the zone of moderate exposure to dissolved hydrocarbons will contact the White shark distribution BIA. 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 hydrocarbon exposure	Exposure risk assessment
	waters will increase the likelihood of exposure to surface slicks and elevated hydrocarbon concentrations beneath slicks. In-water oil 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 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.	
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). Sea surface oil 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	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. 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

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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 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,	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).

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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 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). Surface oil 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	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).

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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. <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 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).	

Receptor	Impact of hydrocarbon 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,	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 hydrocarbon exposure	Exposure risk assessment
	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 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	

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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.	
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	Several threatened, migratory and/or listed cetacean species may traverse the condensate spill plume. The distribution and foraging BIAs 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

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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 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	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 hydrocarbon exposure	Exposure risk assessment
	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.	
AMPs	A reduction in water quality will lead to a breach in management objectives for AMPs.	The zones of moderate in-water (dissolved) exposure intersect Beagle, East Gippsland, Flinders and Freycinet AMPs. Given the nature of the exposure to foraging habitats, and transient nature of migrating and foraging marine fauna, the consequence level is considered **Level III** (Potential Short Term, Minor Adverse Effects).
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).
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).
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	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,

Receptor	Impact of hydrocarbon exposure	Exposure risk assessment
	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	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 hydrocarbon exposure	Exposure risk assessment
	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).	
Tourism	Tourism and recreation are linked to the presence of marine fauna (e.g. whales), particular habitats and locations for recreational fishing. The modelling predicts a low probability of visible oil extending into Victorian waters. Recreation is linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values. It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, economic losses to the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed.	Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities. Refer also to: • Fish • Birds • Pinnipeds • Marine mammals (whales and dolphins) • Marine invertebrates • Recreational fisheries 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).

6.7.3.2 Likelihood Evaluation

Based on industry data, LOWC are considered rare. The SINTEF blowout database (see OGP Risk Assessment Data Directory, Blowout frequencies, Report No. 434 – 2, March 2010) puts the frequency of blowout frequencies of producing wells for offshore operations of North Sea Standard at an average of 9.7 x 10^{-5} per well year.

The likelihood for a LOWC is slightly lower for gas reservoirs (1.8 × 10^{-5} per well year) when compared with oil reservoirs (2.6 × 10-5 per well year). Here a blowout is defined as: "*An incident where formation fluid flows out of the well or between formation layers after all the predefined technical well barriers or the activation of the same have failed*." (i.e. a LOWC).

By comparison, the frequency of a Well Release (defined as: "*An incident where hydrocarbons flow from the well at some point where flow was not intended and the flow was stopped by use of the barrier system that was available on the well at the time of the incident*") is 1.1 × 10^{-5} per well year (Gas: 2.0 × 10^{-5}; Oil: 2.9 × 10^{-6}).

As all ExxonMobil wellwork activities require multiple barriers and controls during wellwork activities, any well integrity issue is likely to be restricted to a limited well release rather than a blow-out. The duration of the spill until the source is controlled is a critical factor. Here, we have assumed a 98 day duration. However, this is a conservative assumption, assuming an intervention rig needs to be mobilised from Singapore, and further ignores possible manual closing of the BOP (See volume 3 for details). Therefore, the loss of the maximum volume used in the LOWC scenarios above (Table 6-12) is unlikely, and instead a partial well release is a more likely scenario in case of well integrity issues.

Considering the inherent low likelihood of a LOWC occurring, the safeguards in place and enactment of the SMPEP and OPEP, and the rapid weathering of hydrocarbons, the probability of the impacts described above occurring is considered **Very Highly Unlikely (E)**.

6.7.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
II	E	4

6.7.5 Controls

Good Practice	Adopted	Control	Rationale
Well Operations Management Plan (WOMP)	✓	**CM32:** Well Operations Management Plan (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 Gippsland Basin Well Operations Management Plan (AUGO-PO-WEL-001) applies to existing platform and subsea wells that lie offshore within the title areas held by the Titleholders (“Gippsland Basin Wells”). The Gippsland Basin WOMP describes Esso's 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; and • Suspension of operations if barrier fails resulting in fewer than two independent barriers remaining in place.

Good Practice	Adopted	Control	Rationale
Regular BOP testing	✓	**CM33** WellWork Execution Manual (WEM)	The WellWork Execution Manual (WEM) defines BOP testing schedule (WEM Chapter 5.12: “Well control tests are performed at the start of every wellwork job, after any alterations are done to the BOP stack or once every 14 days). Note: Where local regulations allow, the Wellwork Superintendent can provide exception approval to exceed the 14-day BOP pressure test requirements by seven additional days for surface BOPs (21-day maximum test interval).
Implementation of a Safety Case	✓	**CM36** NOPSEMA accepted Safety Case	Under the OPGGS(S)R, NOPSEMA requires each facility to operate in accordance with an accepted safety case. The safety case details controls and barriers to prevent major incidents and achieve safe operation of the facility.
OPEP	✓	**CM12:** OPEP	Under the OPGGSE Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place (Reg. 14(8). In the event of a LOWC, the OPEP will be implemented.
OSMP	✓	**CM35:** OSMP	The OSMP is a key part of an integrated package of environmental management documentation that also includes the environment plan (EP) and the oil pollution emergency plan (OPEP). It is defined under (Reg. 14(8) of the OPGGSE Regulations. The OSMP is the principle tool for determining the extent, severity and persistence of environmental impacts from an oil spill, and allows titleholders to determine whether their environmental protection goals are met.

6.7.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Wellwork operations are a standard offshore activity. The risks associated with a loss of well control are well understood. Esso is experienced in the implementation of industry requirements through their existing ongoing operations. Good practise control measures are considered sufficient to reduce the impacts and risks associated with LOWC to ALARP. In the unlikely event of a spill, Esso's well-practiced oil spill response systems would be activated per the OPEP and the impacts minimised as described in Volume 3 of the EP. No stakeholder objections or claims were raised with regards to the risk of LOWC. On this basis Esso believes **ALARP Decision Context A** should apply.

6.7.7 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)	✓	Although impacts have the potential to be widespread, impacts are expected to be temporary, with no long-term affects to biological diversity or ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	Impacts to receptors from LOWC are assessed as Consequence Level III, with potential minor impacts to ecological and social receptors. Serious or irreversible environmental damage is not expected.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Legally required documentation, including approved Environment Plans, OPEP, OSMP, WOMP and Facility Safety Cases are in place.
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 LOWC 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 6-3 Well Management, detailing Wellwork Execution Manual (WEM). 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 loss of well control.

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8 Appendix A – Bass Strait Operations Inventory

Table 8-1 Bass Strait Operations – Inventory listing

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
Platforms						
Barracouta (BTA)	Barracouta platform is an eight-leg steel piled jacket. Staffed facility. 10 conductor slots, 10 conductors and 10 wells drilled. One well injects LPG into the reservoir for storage when gas demand exceeds LPG processing capacity.	VIC/L02 (38° 17’ 53" S; 147° 40’ 28" E)	23 km	46 m	Operating	S572(2)
Whiting (WTA)	Whiting platform. Four leg steel piled jacket with 6 conductor slots, provision for 8 wells but 5 wells drilled. Day-only accommodation The conductor for the A1 well has broken away from the platform and is located amongst the other wells (as confirmed via ROV survey in 2019).	VIC/L02 (38° 14’ 29" S; 147° 72’ 20" E)	34 km	54 m	Production has been shut in since November 1997. Surface facilities have been depressured, drained and disconnected from wells and pipelines. All wells have been plugged and secured. Connecting pipelines have been filled with inhibited water.	S572(2)
Marlin A (MLA)	Marlin A platform is an eight-leg steel piled jacket. MLA and MLB are connected by an upper and lower walkway bridge. Staffed facility. 24 slots, 24 conductors and 24 wells drilled. The majority of wells in service are classified as gas producers, with a few wells classified as oil producers and reinjectors.	VIC/L03: (38° 13’ 54” S, 148° 13’ 09” E)	42 km	59 m	Operating	S572(2)
Marlin B (MLB)	Marlin B platform is an eight-leg steel piled jacket. MLA and MLB are connected by an upper and lower walkway bridge. No accommodation facilities on Marlin B. 18 conductor slots with 7 conductors installed. Wells include oil production wells, gas production wells and gas re-injection wells.	VIC/L03: (38° 13’ 46” S, 148° 13’ 16” E)	42 km	59 m	Operating	S572(2)

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
West Tuna (WTN)	West Tuna platform is a three-leg concrete gravity structure (CGS). Staffed facility. Northern legs of the CGS are each designed with 24 well conductor slots. In total 48 conductors and 47 wells drilled. The majority of wells are classified as oil producers; however, they do also produce gas. A minority of wells are gas injectors and gas producers. WTN is connected to the KPA subsea facility via WTN350 pipeline and MLB via WTN450 pipeline. These pipelines are attached to WTN via a Riser Access Tower (RAT), located approximately 60 m to the north-east of WTN and connected by a bridge.	VIC/L04: (38° 11' 37" S, 148° 23' 15" E) **RAT** VIC/L04: (38° 11' 29" S, 148° 23' 23" E)	45 km	61 m	Operating	S572(2)
Halibut (HLA)	The Halibut platform is made up of two steel piled jacket structures, each consisting of eight legs. Staffed facility. 24 conductor slots, with 23 conductors and 22 wells drilled. All wells are classified as oil producers. HLA acts as a gathering platform. Produced oil from BMA, BMB, WKF, KFA, KFB, MKA, CBA and FTA platforms is combined with HLA produced oil and transferred to shore via the HLA-Shore 600 pipeline. HLA receives fuel gas from MLA through MLA-MKA100. Fuel gas from this pipeline is also exported to CBA (HLA-CBA100) and FTA (HLA-FTA100).	VIC/L05: (38° 24' 20" S, 148° 19' 07" E)	62-68 km	69-93 m	Operating	S572(2)
Fortescue (FTA)	Fortescue platform is an eight-leg steel piled jacket. Staffed facility. 31 slots, 31 conductors and 31 wells drilled. All wells are classified as oil producers.	VIC/L05: (38° 28' 50" S, 148° 20' 28" E)	62-68 km	69-93 m	Operating	S572(2)

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
Cobia (CBA)	Cobia platform is an eight-leg steel piled jacket. Staffed Facility. 25 slots, 25 conductors and 25 wells drilled. All wells are classified as oil producers.	VIC/L05: (38° 24' 32" S, 148° 16' 36" E)	62-68 km	69-93 m	Temporarily shut in since January 2015 to replace the oil export pipeline (completed January 2019). Production will re-commence on completion of the maintenance program, expected in late 3Q or 4Q 2019	S572(2)
Mackerel (MKA)	Mackerel platform is an eight-leg steel piled jacket. Staffed Facility. 25 slots, 25 conductors and 25 wells drilled.	VIC/L05: (38° 27' 04" S, 148° 18' 28" E)	62-68 km	69-93 m	Shut in since February 2015. Wells have been plugged and secured, with well abandonment commenced in 2019.	
Kingfish A (KFA)	Kingfish A platform is an eight-leg steel piled jacket. Staffed facility. 21 slots, 21 conductors and 21 wells drilled.	VIC/L07: (38° 35' 51" S, 148° 08' 35" E)	77 km	77 m	Shut in since 2015. Wells have been plugged and secured.	S572(2)
Kingfish B (KFB)	Kingfish B platform is an eight-leg steel piled jacket. Staffed Facility. 21 slots, 21 conductors and 21 wells drilled. All of the wells in service are classified as oil producers except for two which are classified as water injectors.	VIC/L07: (38° 35' 54" S, 148° 11' 11" E)	77 km	78 m	Operating	S572(2)
West Kingfish (WKF)	West Kingfish platform is an eight-leg steel piled jacket. Staffed facility. 33 slots, 33 conductors and 32 wells. All of the wells in service are classified as oil producers	VIC/L07: (38° 35' 39" S; 148° 06' 15" E)	72 km	76 m	Operating	S572(2)
Tuna (TNA)	Tuna platform is an eight-leg steel piled jacket. Staffed Facility.	VIC/L09: (38° 10' 16" S; 148° 25' 05" E)	43 km	59 m	Operating	S572(2)

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
	33 slots, 33 conductors and 33 wells drilled. Wells are classified as either oil or gas producers. One well is a gas injector.					
Snapper (SNA)	Snapper platform is an eight-leg steel piled jacket. Staffed facility. 45 slots, 39 conductors and 33 wells drilled. All wells are classified as oil or gas producers.	VIC/L10: (38° 11' 42" S; 148° 01' 26" E)	32 km	55 m	Operating	S572(2)
Flounder (FLA)	Flounder platform is an eight-leg steel piled jacket. Staffed facility. 27 slots, 27 conductors and 27 wells drilled. Wells produce oil and gas.	VIC/L11: (38° 18' 44" S; 148° 26' 16" E)	58 km	93 m	Operating	S572(2)
Bream A (BMA)	Bream A platform is an eight-leg steel piled jacket. Staffed facility. 27 slots, 27 conductors and 27 wells drilled. Most wells are classified as oil producers, but also produce gas. Others are classified as gas producers.	VIC/L13: (38° 30' 03" S; 147° 46' 15" E)	48 km	59 m	Operating	S572(2)
Bream B (BMB)	Bream B platform is a fixed installation on a single leg CGS. No accommodation facilities. 18 slots, 17 conductors and 17 wells drilled. The majority of wells are classified as oil producers. One well is classified as a gas producer and is used for gas lift.	VIC/L14: (38° 31' 12" S; 147° 50' 16" E)	51 km	61 m	Operating	S572(2)
Dolphin (DPA)	Dolphin platform is a fixed installation on a steel gravity based monotower. Unstaffed facility. The DPA platform has 2 slots, 2 conductors and 2 wells drilled. Oil from DPA joins PCA-Shore 300 via a subsea	VIC/L15: (38° 29' 20" S; 147° 22' 34" E)	21 km	38 m	Shut in, wells have been plugged and secured.	S572(2)

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
	wye intersection approximately 14.5 km before the shore crossing, Flexible jumpers exist between the risers at PCA and DPA and PCA-Shore300. Each flexible jumper is 30 m long.					
Perch (PCA)	Perch platform is a fixed installation on steel gravity based monotower. Unstaffed facility. The PCA platform has 2 slots, 2 conductors and 2 wells drilled. Flexible jumpers exist between the risers at PCA and DPA and PCA-Shore300. Each flexible jumper is 30 m long.	VIC/L17: (38° 34' 15" S; 147° 19' 16" E)	24 km	42 m	Shut in.	S572(2)
Subsea Infrastructure						
Kipper (KPA)	Kipper subsea facility connect to WTA. Comprises production manifold, 4 x coolers (fitted with trawl protection frames). The Kipper wells are classified as gas producers. Additional subsea gas production wells are planned for the existing facility.	VIC/L25: (38°10' 53" S; 148° 35' 35" E) Or 38° 18' 11" S; 148° 59' 36 E" (BTW Campaign??)	41 km	95 m	Operating	S572(2)
Seahorse (SHA)	Seahorse subsea facility connected to BTA by an oil pipeline (SHA-BTA150), a 65 mm gas lift line and an electrohydraulic umbilical. The SHA subsea facility consists of one subsea well. The well is classified as an oil producer Subsea trees are planned to be removed during plug and abandonment. It is planned that the flying leads, UTA and umbilical will remain on the seabed. The SHA	VIC/L18: (38° 11' 42" S; 147° 40' 27" E)	21 km	42 m	Permanently Shut In. Plug and abandonment scheduled for 2021.	S572(2)

Item	Inventory	Location	Distance to coast	Water depth	Current Status	Status under OPGGS Act 572*
	and TWA plug and abandonment activity is the subject of a separate Environment Plan.					
Tarwhine (TWA)	Tarwhine subsea facility is connected to BTA by an oil pipeline (TWA-BTA200), a 65 mm gas lift line and an electrohydraulic umbilical. The TWA subsea facility consists of one subsea well. The well is classified as an oil producer. Subsea trees are planned to be removed during plug and abandonment. It is planned that the flying leads, UTA and umbilical will remain on the seabed. The SHA and TWA plug and abandonment activity is the subject of a separate Environment Plan.	VIC/L01: (38° 24' 12" S; 147° 31' 46" E)	21 km	42 m	Permanently Shut in. Plug and abandonment scheduled for 2021.	S572(2)
Blackback (BKA)	The three BKA wells have been plugged and abandoned and the subsea trees have been removed. Disconnected flowlines, electrical and chemical connections, UTA and PTA remain in place on seabed, as well as the TGB for one well, below the mudline.	VIC/L20: (38° 32' 26" S148° 33' 16" E)	87 km	402 m	Blackback wells were plugged and abandoned in 2019.	S572(2)
West Barracouta (BTW)	Two subsea gas production wells will be drilled in 2020 approximately 6 km southwest of the BTA platform. The subsea facility will consist of two subsea trees with trawl protection frames connected via jumpers and flying leads to a FLEM and UTA. This subsea facility will be controlled from BTA via an electrohydraulic umbilical and is to be tied back to the existing BTA450 pipeline.	VIC/L02 (38° 19' 06" S, 147° 36' 53" E)	22 km	46 m	Planned installation in 2020	S572(2)

Licence(s)	Pipeline Name	From	To	Length (km)	Nominal OD (mm)	Status	Product	Status under OPGGS Act 572*
VIC/PL1, VIC/PL1(V)	BTA450-Shore	BTA	Shore	24.5	450	In-Service	Gas	S572(2)
VIC/PL1	BTW300-BTA450Tee	BTW	BTA450Tee	5.6	300	2021 Startup	Gas	S572(2)

Licence(s)	Pipeline Name	From	To	Length (km)	Nominal OD (mm)	Status	Product	Status under OPGGS Act 572*
VIC/PL2, VIC/PL2(V)	MLA500-Shore	MLA	Shore	52.6	500	In-Service	Gas	S572(2)
VIC/PL4, VIC/PL4(V)	BTA150-Shore	BTA	Shore	24.5	150	In-Service	Oil	S572(2)
VIC/PL5, VIC/PL5(V)	HLA600-Shore	HLA	Shore	77	600	In-Service	Oil	S572(2)
VIC/PL6	KFA400-KFB	KFA	KFB	4.6	400	In-Service (flow over)	Oil	S572(2)
VIC/PL7	KFB500-HLA	KFB	HLA	27	500	In-Service	Oil	S572(2)
VIC/PL8	MKA300-HLA	MKA	HLA	8.6	300	Suspended	Oil	S572(2)
VIC/PL9	TNA300-MLA	TNA	MLA	18.7	300	In-Service	Gas, previously in oil service	S572(2)
VIC/PL10	TNA200-MLA	TNA	MLA	18.7	200	In-Service	Oil, previously in gas service	S572(2)
VIC/PL11	MLA300-HLA600Tee	MLA	HLA600Tee	1.6	300	In-Service	Oil	S572(2)
VIC/PL13, VIC/PL13(V)	SNA600-Shore	SNA	Shore		600	In-Service	Gas	S572(2)
VIC/PL14	WKF300-KFA	WKF	KFA	3.5	300	In-Service	Oil	S572(2)
VIC/PL15	CBA300-HLA	CBA	HLA	5.5	300	Removed from service, disconnected	Inhibited Seawater	S572(2)
VIC/PL15	CBA150-HLA	CBA	HLA	5.5	150	2019 Start-up	Oil	S572(2)
VIC/PL16	FTA300-HLA	FTA	HLA	4.1	300	In-Service	Oil	S572(2)
VIC/PL17	FLA250-TNA	FLA	TNA	17	250	In-Service	Gas, previously in oil service	S572(2)
VIC/PL18	FLA250-TNA	FLA	TNA	17	250	In-Service	Oil, previously in gas service	S572(2)

Licence(s)	Pipeline Name	From	To	Length (km)	Nominal OD (mm)	Status	Product	Status under OPGGS Act 572*
VIC/PL19	SNA250-MLA	SNA	MLA	18	250	In-Service	Oil	S572(2)
VIC/PL20	BMA400-WKF	BMA	WKF	32	400	In-Service	Oil	S572(2)
VIC/PL21, VIC/PL21(V)	PCA/DPA300-Shore	PCA/DPA	Shore	32	300	Suspended	Oil	S572(2)
VIC/PL22	SHA150-BTA	SHA	BTA	11.3	150	Suspended	Inhibited water	S572(2)
VIC/PL23	TWA200-BTA	TWA	BTA	17.4	200	Suspended	Gas	S572(2)
VIC/PL24	WTA250-SNA	WTA	SNA	14.6	250	Suspended	Inhibited seawater	S572(2)
VIC/PL25	WTA200-SNA	WTA	SNA	14.6	200	Suspended	Inhibited seawater	S572(2)
VIC/PL26	BMB250-BMA	BMB	BMA	6.2	250	In-Service	Oil, Gas	S572(2)
VIC/PL27	TNA100-WTN	TNA	WTN	3.6	100	In-Service	Gas	S572(2)
VIC/PL28	WTN250-TNA	WTN	TNA	3.6	250	In-Service	Oil	S572(2)
VIC/PL29	BKA200-MKA	BKA	MKA	22.5	200	Removed from service	Inhibited seawater	S572(2)
VIC/PL32, VIC/PL32(V)	BMA350-Shore	BMA	Shore	46.9	350	In-Service	Gas	S572(2)
VIC/PL39	KPA350-WTN (North & South)	KPA	WTN	36.2	350	In-Service	Gas	S572(2)
VIC/PL40	WTN450-MLB	WTN	MLB	16.5	450	In-Service	Gas	S572(2)
VIC/PL41	MLB450-SNA	MLB	SNA	18.3	450	In-Service	Gas	S572(2)
VIC/SL2	MLA100-HLA/MKA	MLA	HLA/MKA	32	100	In-Service	Gas	S572(2)
VIC/SL3	HLA100-CBA	HLA	CRA	5.5	100	In-Service	Gas	S572(2)

Licence(s)	Pipeline Name	From	To	Length (km)	Nominal OD (mm)	Status	Product	Status under OPGGS Act 572*
VIC/SL4	HLA100-FTA	HLA	FTA	4.1	100	In-Service	Gas	S572(2)
VIC/SL5	Shore-PCA/DPA100	Shore	PCA/DPA	32	100	Suspended	Gas	S572(2)
VIC/SL6	BTA65-SHA	BTA	SHA	11.3	65	Suspended	Gas	S572(2)
VIC/SL7	BTA65-TWA	BTA	TWA	17.4	65	Suspended	Gas	S572(2)
VIC/SL8	MKA65-BKA	MKA	BKA	22.5	65	Removed from service	Inhibited seawater	S572(2)
VIC/SL9	MLA150-KFB/KFA/WKF	MLA	KFB/KFA/WKF	53	150	In-Service	Gas	S572(2)

Secondary lines are not petroleum pipelines and therefore do not have separate petroleum pipeline licences

* OPGGSA 2006, Section 572: Maintenance and removal of property etc. by titleholder:

572(1) Titleholder and title area:
572 (1) (1) a petroleum exploration permit
572 (1) (2) a petroleum retention lease
572 (1) (3) a petroleum production licence
572 (1) (4) an infrastructure licence
572 (1) (5) a pipeline licence
572 (1) (6) a petroleum special prospecting authority
572 (1) (7) a petroleum access authority

572(2) MOP: Maintenance of property etc.
(2) A titleholder must maintain in good condition and repair all structures that are, and all equipment and other property that is:
(a) in the title area; and (b) used in connection with the operations authorised by the permit, lease, licence or authority.

572(3) ROP: Removal of property etc.
(3) A titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations:
(a) in which the titleholder is or will be engaged; and (b) that are authorised by the permit, lease, licence or authority.

9 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	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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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 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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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
Lamna nasus	Porbeagle		✓			LO
Manta birostris	Giant Manta Ray		✓			KO
Manta aldfredi	Reef Manta Ray		✓			KO
Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish	V	✓			BKO
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 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	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	Pacific 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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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
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	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
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 subminuta	Long-toed 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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CE				MO
Limosa limosa	Black-tailed Godwit		✓ (W)	✓		FKO
Numenius madagascariensis	Eastern Curlew	CE	✓ (W)	✓		KO
Numenius minutusf	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	FLOsouthern
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Himantopus himantopus	Black-winged Stilt (Pied 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 Monarch		✓ (T)	✓		KO
Monarcha trivirgatus	Spectacled Monarch		✓ (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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Sula dactylatra	Masked Booby		✓(M)	✓		BKO
Tyto novaehollandiae castanops	Masked Owl (Tasmanian population)	V				BKO
<u>Threatened Species</u>: *V Vulnerable* *E Endangered* *CE Critically Endangered* *<u>Migratory Species</u>:* *M Marine* *W Wetland* *T Terrestrial* *<u>Biologically Important Areas</u>:* *b Breeding* *f Foraging*	*<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* *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 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
Whales						
Balaenoptera acutorostrata	Minke Whale					MO
Balaenoptera bonaerensis	Antartic Minke Whale		✓			LO
Balaenoptera borealis	Sei 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
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
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 cruciger	Hourglass Dolphin					MO
Lagenorhynchus obscurus	Dusky Dolphin		✓			LO
Lissodelphiss peronii	Southern Right Whale Dolphin					MO
Orcaella brevirostris	Australian Snubfin Dolphin (formerly Irrawaddy Dolphin)		✓			LO
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

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Stenalla logirostris	Long-snouted Spinner Dolphin					MO
Steno bredanensis	Rough-toothed Dolphin					MO
Tursiops aduncus	Indian Ocean Bottlenose Dolphin				bc	LO
Tursiops truncatus s. str.	Bottlenose Dolphin					MO
Porpoise						
Phocoena dioptrica	Spectacled Porpoise		✓			MO
Pinnipeds						
Arctocephalus forsteri	New Zealand Fur-seal			✓		MO
Arctocephalus pusillus	Australian Fur-seal			✓		BKO
Neophoca cinerea	Australian Sealion	V		✓		KO
Sirenians						
Dugong dugon	Dugong		✓	✓		MO
<u>Threatened Species</u>: *V Vulnerable* *E Endangered* *<u>Biologically Important Areas</u>:* *bc Breeding, calving* *f Foraging* *m Migration*	*<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* *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 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
Lepidochelys olivacea	Olive Ridley Rurtle	V	✓	✓		BLO
Seasnakes						
Astrotia stokesii	Stokes' Seasnake			✓		MO
Hydrophis elegans	Elegant Seasnake			✓		MO
Pelamis platurus	Yellow-bellied Seasnake			✓		MO
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*					

10 Appendix C - EP Change Register

Date	Revision	Section Changed	Change	Trigger Resubmission

Esso Australia Resources Pty Ltd

EMERGENCY PREPAREDNESS AND RESPONSE

BASS STRAIT ENVIRONMENT PLAN

Volume 3

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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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00	SSHE Group Administrator	Docklands	Email/electronic

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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 Wildlife
EMBSI	ExxonMobil Biomedical Sciences
EMPLAN	NSW State Emergency Management Plan
EP	Environment Plan
EPA	Environmental 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	Oil 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 the Gippsland Basin as described in:

- Volume 2: Bass Strait Operations Environment Plan,
- Volume 2a: JUR Drilling Environment Plan,
- Volume 2b: JUR Plug and Abandonment Environment Plan.
- Volume 2c: JUR Whiting Plug and Abandonment Environment Plan

[Note that due to the unique properties of Moonfish crude, workovers which improve Moonfish production rates will need to be individually assessed to confirm sufficient capability is available.]

This volume 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 (MDO), 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 organisation 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. The worst case discharge scenario has been used to ensure response options and capabilities are suitable for responding to the largest credible spill volumes.

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). 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. Based on the operational zone of response, Esso has undertaken a 'preparedness NEBA' (refer Appendix A of the OPEP) to pre-plan which strategies would be appropriate for any given sensitivities within the Described Area (DA) A summary of the outcomes of the preparedness NEBA is also provided in the OPEP by the type of hydrocarbon spill.

The activity specific strategic NEBA and selection of response options are summarised in the OPEP Appendix D – Quick Reference Information.

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 the activity specific Impacts and Risks Volume (i.e. Volume 2, 2a, 2b etc) (e.g. aspects associated with vessels), therefore this volume only evaluates aspects and impacts that are unique to oil spill response activities (refer to Table 2-1).

Table 2-1 Environmental Impact Screening of Response Options

Environmental Aspect	Response Strategies	Environmental Impact Assessment
Emissions to Air	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning • Shoreline Protection and Clean-up • Oiled Wildlife Response	See Volume 2
Physical Interaction - Other Marine Users	• Source Control • Monitoring and • Surveillance • Dispersant Application • In situ Burning	See Volume 2
Physical Interaction - Nearshore and Shoreline Users	• Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.
Planned Discharge – Treated Bilge	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery	See Volume 2

	• In situ Burning	
Planned Discharge - Cement	• Source Control	Impact assessment for drilling a relief well within this volume.
Planned Discharge - Deck Drainage	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	See Volume 2
Planned Discharge - Drilling Muds & Cuttings	• Source Control	Impact assessment for drilling a relief well within this volume.
Planned Discharge - Food waste	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	See Volume 2
Planned Discharge - Operational Fluids (surface and subsurface)	• Source Control	See Volume 2
Planned Discharge - Sewage and Greywater	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	See Volume 2
Physical Presence - Seabed Disturbance	• Source Control	Impact assessment for drilling a relief well within this volume.
Sound Emissions	• Source Control • Dispersant Application	Impact assessment for drilling a relief well within this volume.
Planned Discharge – Toxicity of dispersant and dispersed oil	• Dispersant Application	Impact assessment within this volume.
Physical Interaction with Fauna and Flora (Onshore)	• Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.
Emissions to Air (Smoke)	• In Situ Burning	Impact assessment within this volume.

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 of capabilities has been undertaken and a summary of the availability of resources required to mobilise each response option is provided. Environmental performance outcomes and standards have been 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 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 Emergency Response Team (ERT) and 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 influence the source control response options selected based on technical feasibility, for example capping stacks would not be used for pipeline ruptures or may not be feasible from platform wells or shallow subsea wells. The source control options applicable for well related releases are specified and assessed within the Well Operations Management Plan (WOMP).

A description of potential source control options are detailed below.

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. Isolation of a pipeline is the primary source control of containing a pipeline rupture/failure.

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 wellhead/subsea BOP to stop flow. 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

Many environmental aspects associated with implementing source control activities (e.g. aspects associated with vessels, ROV and subsea installation) apply to multiple activities and are assessed in Volume 2. Environmental aspects associated with drilling a relief well are assessed in this revision to Volume 3. These include:

- Physical Presence – Seabed disturbance;
- Planned Discharge – Cement;
- Planned Discharge – Drilling muds and cuttings; and
- Sound Emissions.

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 Environmental Impact Assessment of Relief Well Drilling

Environmental Aspect:	Impact Assessment	Consequence Level
Physical Presence – Seabed Disturbance	Smothering and alteration to benthic habitats can occur as a result of seabed disturbance. The type of damage that could be sustained due to smothering may include destruction of habitat. Benthic habitats and communities within the Bass Strait show natural small scale variation, however the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. Seabed disturbance from relief well drilling activities will be limited to close proximity to existing infrastructure, and typically in areas which have previously been disturbed during installation of infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects. No additional controls identified.	IV
Planned Discharge – Cement.	Impacts to ambient water quality from planned discharge of cement will be highly localised and temporary, with turbidity and chemical toxicity impacts quickly ceasing following discharge. Any impacts will be inconsequential or have no adverse effect, and impacts to pelagic organisms (such as plankton, fish, and marine fauna) are not expected. Once cement has hardened, the sediment quality will be permanently changed. Any impacts to ambient sediment quality will be inconsequential or have no adverse effect and impacts to benthic habitats and communities are not expected. No additional controls identified.	IV
Planned Discharge – Drilling muds and cuttings.	Chemicals will be discharged to the marine environment resulting in a change in water quality. Due to the high energy marine environment, discharges will quickly dissipate. Impacts to ambient water quality will be localised and temporary, and any impacts will be inconsequential or have no adverse effect. Prior to discharge the chemicals 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	IV

	toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges. No additional controls identified.	
Sound Emissions.	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 rig itself. No additional controls identified.	IV

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 or 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. 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.	✓	• 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. All well specific source control activities will have an approved WOMP and comply with: • Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.
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 been initiated 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 and/or cuttings driers 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.	<u>Resource</u> 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 surveillance	<u>Resource</u> A construction support vessel sourced from the Australasian region.	Estimated 32 days from spill occurring to arrival in field.
Capping Stack	1 capping stack per well.	<u>Resource</u> Agreements with Capping Stack suppliers.	Estimated 79 days from mobilisation to installation of capping stack system.
Relief Well	1 rig per relief well.	<u>Resource</u> 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 endeavors 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 during drilling activities	A rig on standby may reduce the time required to drill a relief well.	Significant costs are associated with having a standby rig. Given the high potential cost, 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 during drilling activities.	A standby CSV may reduce the time required to install a capping stack.	Significant costs are associated with leasing a suitable vessel. Given the high potential cost, 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. The equipment is available for each operator globally and is strategically located to ensure quick deployment anywhere in the world. Given the high potential cost, 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 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.	<u>Resource</u> Esso helicopters can assist in aerial surveillance. Agreement with third party to provide fixed wing aircraft. AMSA Search and Rescue Aircraft. <u>Personnel</u> 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.	<u>Resource</u> Platform /Drilling Rig /Vessel <u>Personnel</u> 1x Observer and /or available crew.	<2 hours, from time of spill.
Manual Oil Spill Trajectory Modelling	1x trained person.	<u>Resource</u> Trajectory vectoring. Relevant set of marine charts for Bass Strait. GIS mapping. <u>Personnel</u> IMT member trained trajectory vectoring. Internal Esso GIS mapping specialists.	<4 hours of service requested.
Oil Spill Trajectory Modelling	1x contract with specialist.	<u>Resource</u> 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.	<u>Resource</u> Automated Data Inquiry for Oil Spills 2 (ADIOS2) installed on IMT computers. <u>Personnel</u> IMT personnel trained in ADIOS.	<4 hours of the service requested.
Satellite Tracking Drifter Buoys	1x buoy available.	<u>Resource</u> 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.	<u>Resource</u> 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.	<u>Resource</u> Vessel and crew (Esso). Initial Sampling kits available at various Esso locations. <u>Personnel</u> 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.	<u>Resource</u> Vessel contractor/ crew (Esso). Sampling services via environmental consultancy. <u>Personnel</u> 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 it's 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	III

	(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).	
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 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.	IV
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.	IV

	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).	
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 endorsed by the Statutory Authority.	✓	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 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.
Pre-incident dispersant effectiveness testing	✓	Laboratory dispersant effectiveness testing.	Laboratory testing of five Gippsland crude oils against three types of dispersant has been completed under summer and winter conditions. Testing shows that dispersant is highly effective on most types of fresh oil. Effectiveness of dispersant decreases significantly on weathered oils.
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	1847m^3 of dispersant for the WCDS.	Dispersant stockpiles available in Australia between Esso, AMOSC, mutual aid and AMSA. Additional dispersant available from OSRL Global Dispersant Stockpile (GDS). GDS required after 55 days.	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 10.6m^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 are 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	✓	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}).

equipment for initial response.		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	Impact Assessment	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 to be localised to the area of disturbance and for important sites and artifacts can be protected by exclusion zones.	IV
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	Impact Assessment	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.	IV

	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.	
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 behaviors 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 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.	IV
Wildlife	Physical presence may adversely affect important natural behaviors 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	✓	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

appropriate to vessel class.			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)
Incident specific Waste Management Plan.	✓	Emergency Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

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	12x vessels available for 6x strike teams.	Esso Support vessel. Agreement with third party vessel operators to supply additional vessels. Vessels of opportunity are 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.

Task	Resource Required	Resource Availability	Expected Timeframe
Containment & Recovery Equipment	Equipment for 6x 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. 5 C&R systems available in Victoria Additional 6 C&R systems available in Australia that can be mobilised to Gippsland within 72 hours.
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.
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, sulphur 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	Impact Assessment	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. 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.
Incident specific Waste Management Plan.	✓	Emergency Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

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 are 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).

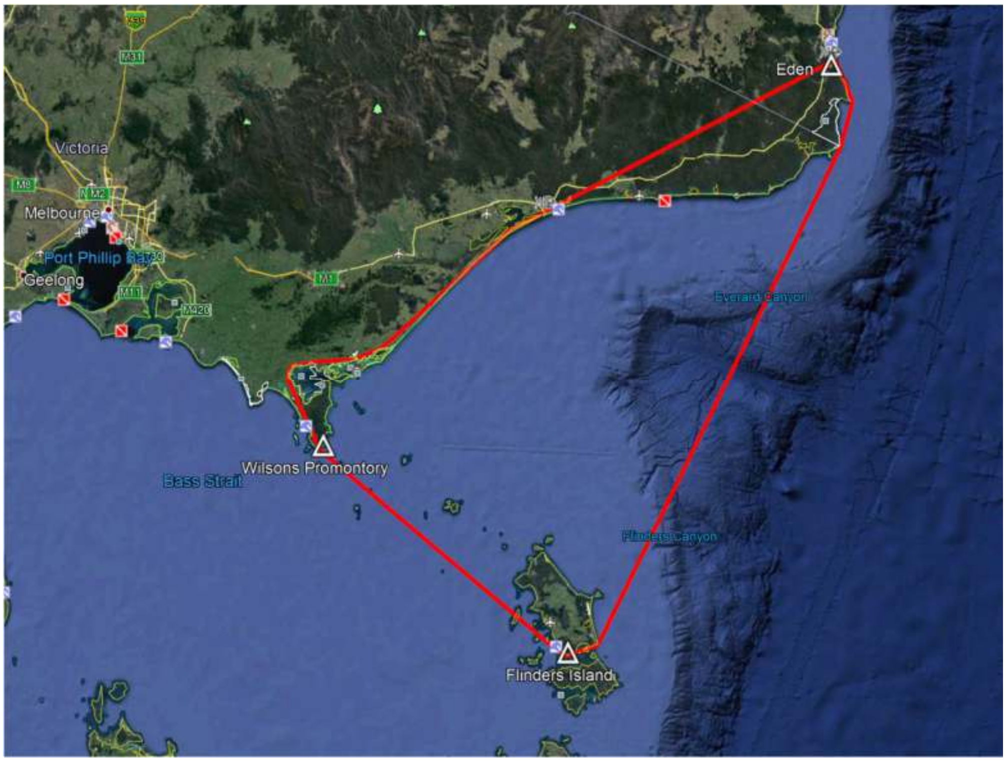

Figure 8-1 Overview of Gippsland Basin field locations

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. The locations shown in Table 8-1 have pre-drafted TRPs which should be used to guide response planning.

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.

Table 8-1 Tactical Response Plan sites

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
SITE NAME	Site Type	Latitude	Longitude
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

8.1.3 State Government Agencies

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 8-2. 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

An impact assessment for each environmental aspect has been undertaken (refer to assessments in Table 6.1 and Table 6.2) 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 8-2 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 8-3 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.
Incident specific Waste Management Plan.	✓	Emergency Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

Table 8-4 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 8-5 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 are available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	<24 hours of request for service.

Task	Resource requirement	Resource Availability	Expected Timeframe
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).	State Response Team >200 trained personnel. AMOSC Core group <120 trained personnel (inc Esso). Esso Agreements in place with labour hire companies.	State Response Team 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.	Esso Agreements in place with labour hire companies. AMOSC Core group >140 trained personnel (including Esso). State Response Team >200 trained personnel.	<24 hours of request for service.
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 8-6 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 8-7 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. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and PPE.

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.
Incident specific Waste Management Plan.	✓	Emergency Response Waste Management Plan.	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

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	<u>Resources</u> 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 <u>Agreement - Phillip Island Nature Park</u> 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	<u>Personnel</u> 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 National Plan: State/NRT Personnel (>100 persons)	Available through NATPLAN. Containers process approximately 100 units per day. Deployment of such resources to the Gippsland 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. • 4,500m^3 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

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Endorsed By:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	23 Oct 2019
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	
Approved By	Simon Kemp	Offshore Asset Manager	On file	23 Oct 2019

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

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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
DA	Described Area (see Volume 1 – Description of the Environment)
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
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
LOC	Loss of containment
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	Oil Spill 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 (see Volume 3)
WCDS	Worst Case Discharge Scenario
WOMP	Well operations management plan
WMP	Waste management plan
WMM	Waste management manual
WWV	ExxonMobil Drilling Worldwide Ventures
VM	Vessel Master

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:

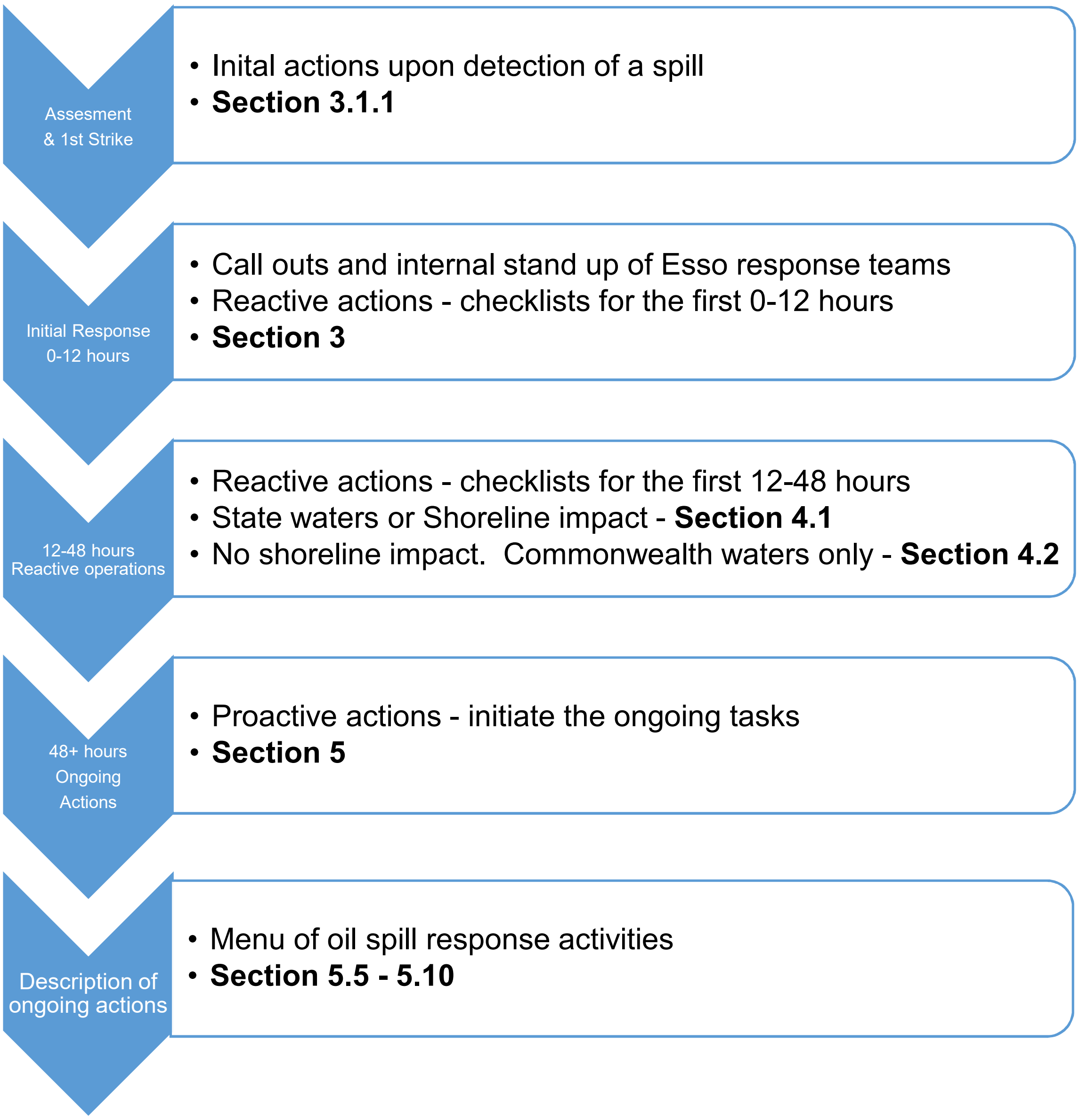


Figure 1-1 Spill Response Incident Flow Chart

Sustain spill response until termination end points (refer to Section 5.5) and environmental performance objectives are reached for each activity.

2 Quick Reference OPEP Information

2.1 Location

This OPEP applies to spills from petroleum activities linked to Esso's Gippsland Basin operations and project activities as described in Volume 2 of the Environment Plan.

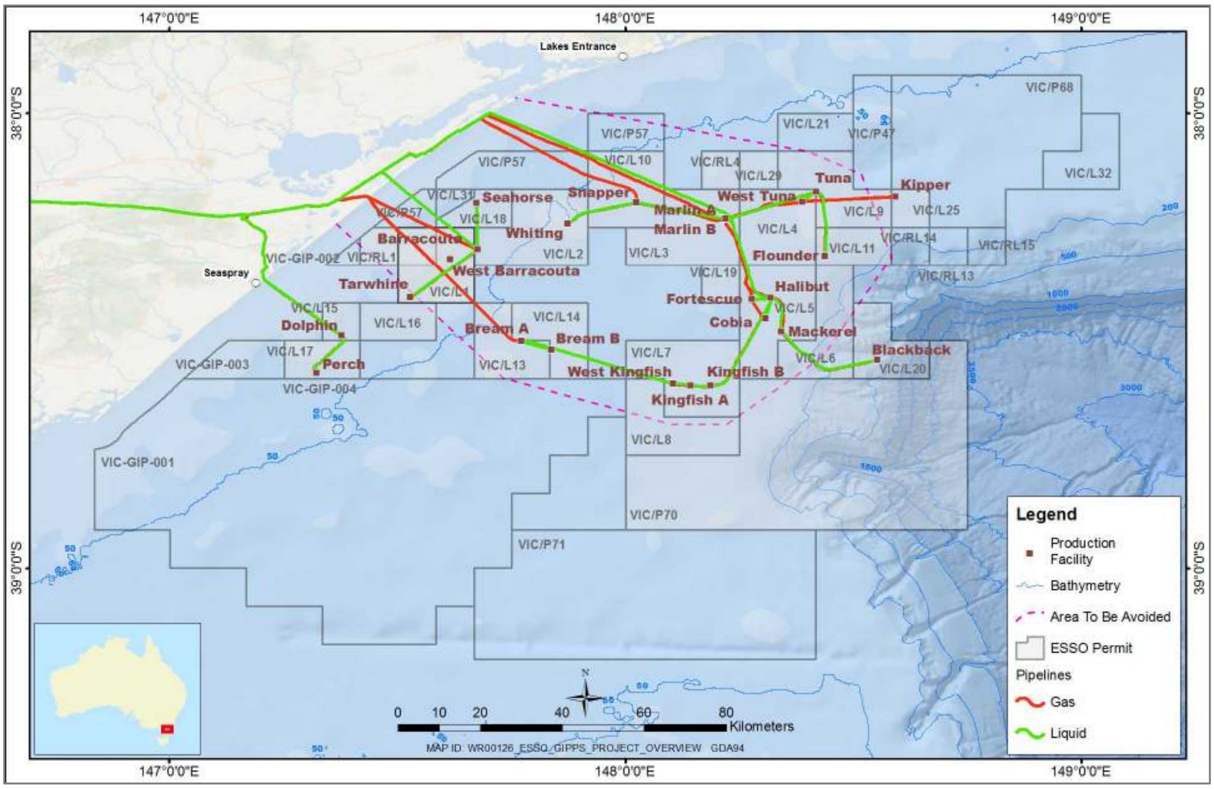


Figure 2-1 Asset Location

2.2 Potential Oil Types

- Condensates (Group I)
- Marine Diesel Oil (Group II)
- Light Crude (Group II)
- Persistent Crude (Group IV)

Properties of hydrocarbons used for modelling are detailed in Section 7.2.2.

2.3 Potentially Exposed Area

Stochastic spill trajectory modelling has been conducted to evaluate the effect of worst case discharge spills from Esso's Bass Strait petroleum activities.

In addition to the stochastic modelling, deterministic runs were also assessed and presented based on the following criteria;

1. largest volume of oil on shorelines;
2. longest length of shoreline contacted at or above 100 g/m^2 (actionable shoreline oil);
3. minimum time before contact to nearby shoreline by visible oil (0.5 g/m^2); and
4. largest swept area of oil on the sea surface above 10 g/m^2 (actionable sea surface oil).

The criteria listed above were determined for the “worst case” simulation between the modelled scenarios.

This data is displayed below:

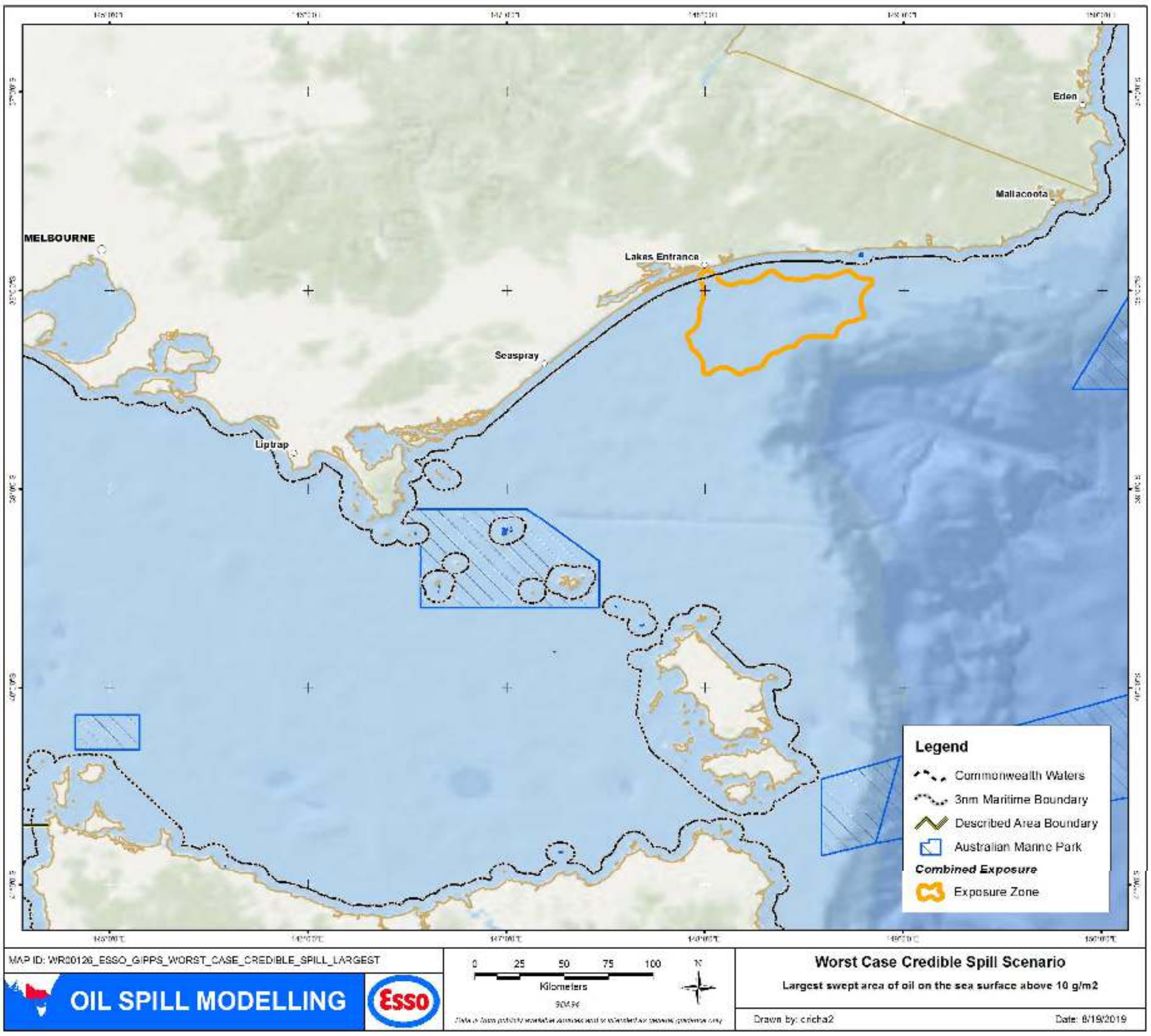


Figure 2-2 Largest swept area of oil on the sea surface above 10 g/m2 (actionable sea surface oil)

The greatest shoreline extents of a worst case spill have also been generated. These are displayed below:

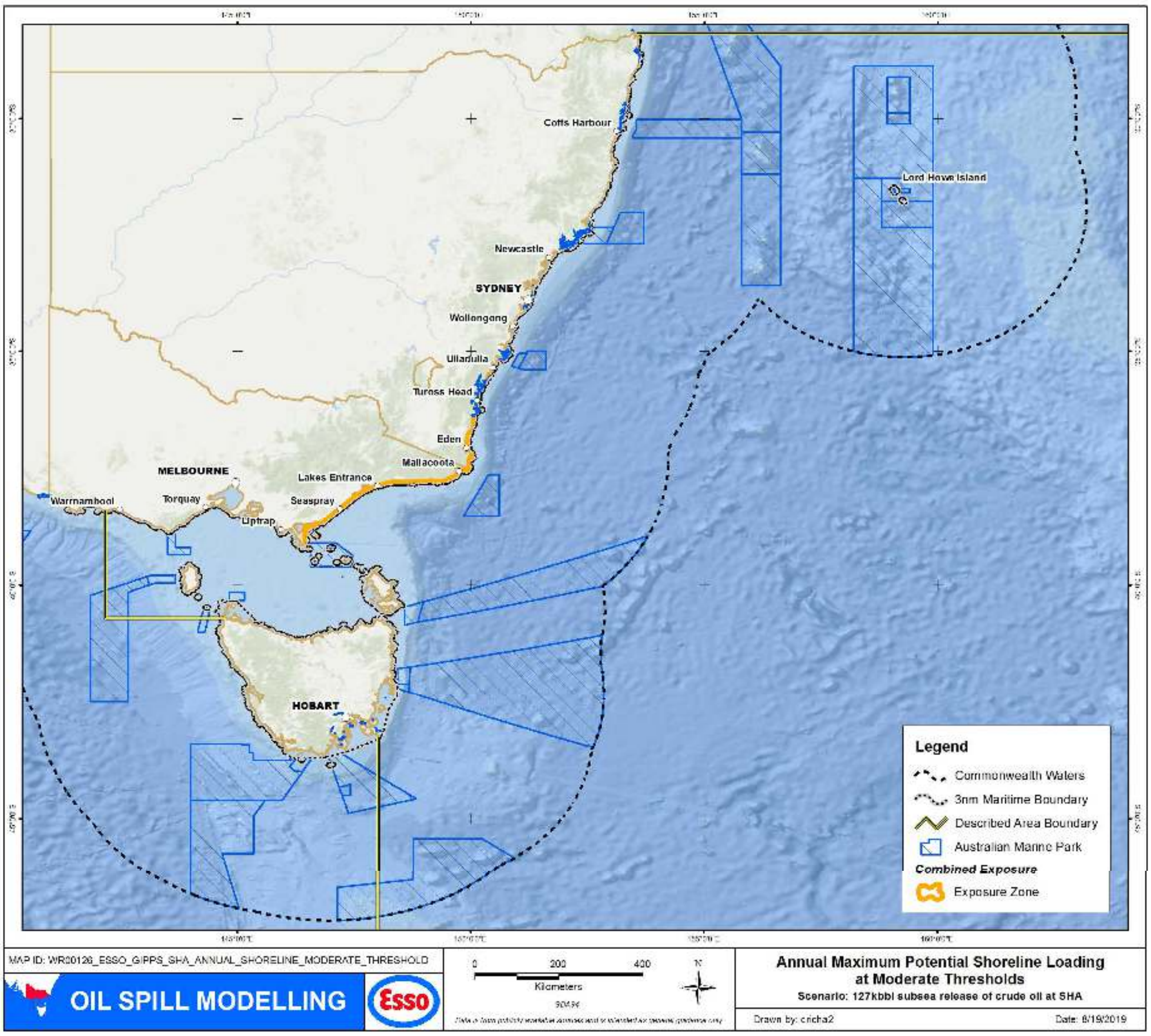


Figure 2-3 Longest length of shoreline contacted at or above 100 g/m2 (actionable shoreline oil)

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 2 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:

1. Assessment of Spill

↓

2. Notifications and Immediate Actions

↓

3. Stand Down or Monitoring or Escalation

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 3-3). Confirm this level with the on-call/duty Incident Commander.	ASAP	☐
OIM/VM	Report the incident to NOPSEMA as per Table 3-4.	ASAP and within 2hrs	☐

Once the Duty IC has been notified of the spill, go to 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 3-3 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.

**Esso activities involving other facility operators (e.g., MODU for a drilling campaign) may form agreements through bridging documents to coordinate Level 1 response activities within the assigned operating area (usually 500m radius from location).*

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 >1 bbl 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 >1 bbl. 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. 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.	<2 hours <24 hours	☐
EUL	Required for: all spills >1 bbl: Notify the DJPR ERR and NOPTA via email: Email: DJPR: Operational.reports@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 (>1 bbl). Notify the DOT EMD Duty Watch Officer: Tel: 0409 858 715 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	☐

[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	✓/✗
	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. 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: 0419 293 465	<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 preparedness NEBA and Appendix D – Quick Reference Information to identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 5.2).	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 • Contact Bhagwan Marine on +61 7 3907 3111 or 0409 979 551. • 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	☐
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 0407 846 457 Lakes Entrances 03 5116 1511 (Atoll Offshore) Airfields Esso Longford Heliport 03 5143 4256 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	☐

Who	What	Minimum time to implement	✓/✗
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 (Must be spill-size and type specific) with AMOSC, consisting of: • Equipment for three x offshore containment & recovery strike teams, each comprising: o 3 reels of Ro-boom (or a single high speed sweep system) o Skimmer package comprising an LWS500 or similar o Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges) • Equipment to execute the shoreline TRPs o Shore seal boom; fence boom; anchor kits and ancillaries. • Dispersant and National Plan aerial dispersant spraying capability. • Liason to National Plan for the use of Victorian based C&R equipment	<3 hours	☐
LSC	Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment, consisting of: • 2 x AFEDO dispersant spray sets. • 10 x 1m^3 IBCs of Corexit 9527. • 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): o Username: Esso o 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 Appendix A), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 5.2).	ASAP	☐

Who	What	Minimum time to implement	✓/✗
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	☐
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: +44 1372 223 232	<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	Mobilise a satellite tracking buoy to spill location (weather dependent).	ASAP – <12 hours	☐
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	☐
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 • Contact Bhagwan Marine on +61 7 3907 3111 or 0409 979 551. 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	☐

<table>
<tr><th>Who</th><th>What</th><th>Minimum time to implement</th><th>✓/✗</th></tr>
<tr><td>LSC</td><td>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 three x offshore containment & recovery strike teams, each comprising:
o 3 reels of ro-boom (or high speed sweep system)
o Skimmer package comprising and LWS500 or similar
o Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges)
• Equipment to execute the shoreline TRPs
o shore seal boom; fence boom; anchor kits and ancillaries
• Dispersant – 50m^3 of Corexit 9500A to be moved to West Sale Airport.

For worse case loss of well containment scenarios:

• Additional booming and skimming equipment from Fremantle and Exmouth for a further three x C & R strike teams
• Liaison to National Plan for the use of Victorian, NSW and South Australian based C&R equipment, sufficient for a further four Strike teams.</td><td><3 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>Notify the marine and aviation FOBs of the need to conduct spill response operations and prepare area and hardstand.
Marine bases
BBMT Marine Supervisor 0407 846 457
Lakes Entrances 03 5116 1511 (Atoll Offshore)
Airfields
Esso Longford Heliport 03 5143 4256
West Sale Airfield 1300 366 244
Tyabb Airfield 03 5977 4406.</td><td><6 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>Identify and call-out Esso Core Group members – establish current location and timeframe to deploy to field-based ICP</td><td><6 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>• 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.</td><td><6 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment:
• AFEDO dispersant spray set
• 15 x 1m^3 IBCs of Corexit 9527
• Waste liquid storage (vessel dependent).
Move equipment package to wharf face, ready for load out.</td><td><6 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>Notify waste contractors to prepare for potential liquid, and solid wastes – specific amounts and types to be determined.</td><td><12 hours</td><td>☐</td></tr>
<tr><td>LSC</td><td>Prepare LIP-based nearshore/shoreline oil-spill response equipment for deployment.</td><td><24 hours</td><td>☐</td></tr>
</table>

Who	What	Minimum time to implement	✓/✗
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): ○ 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 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 5.2).	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:

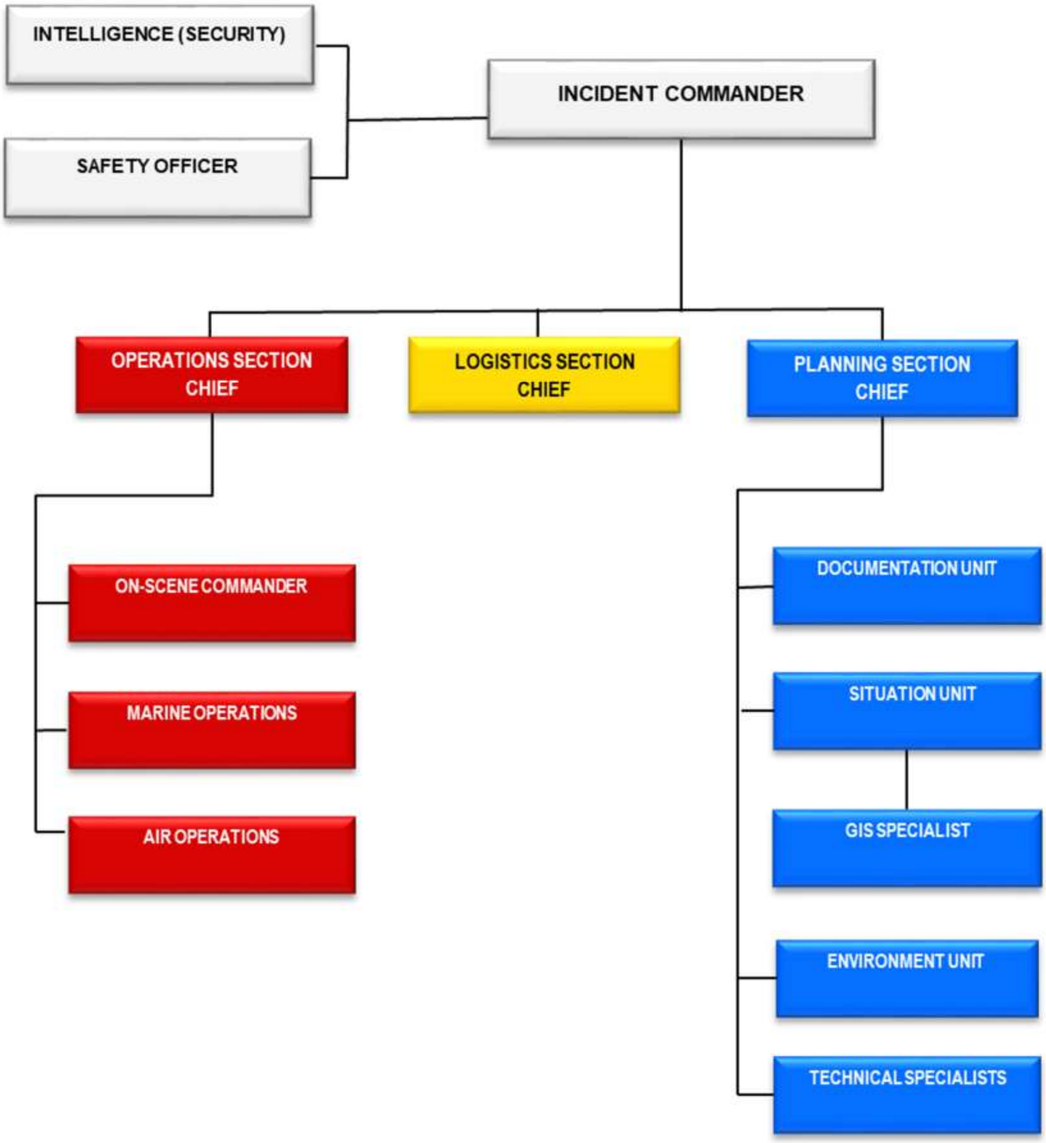
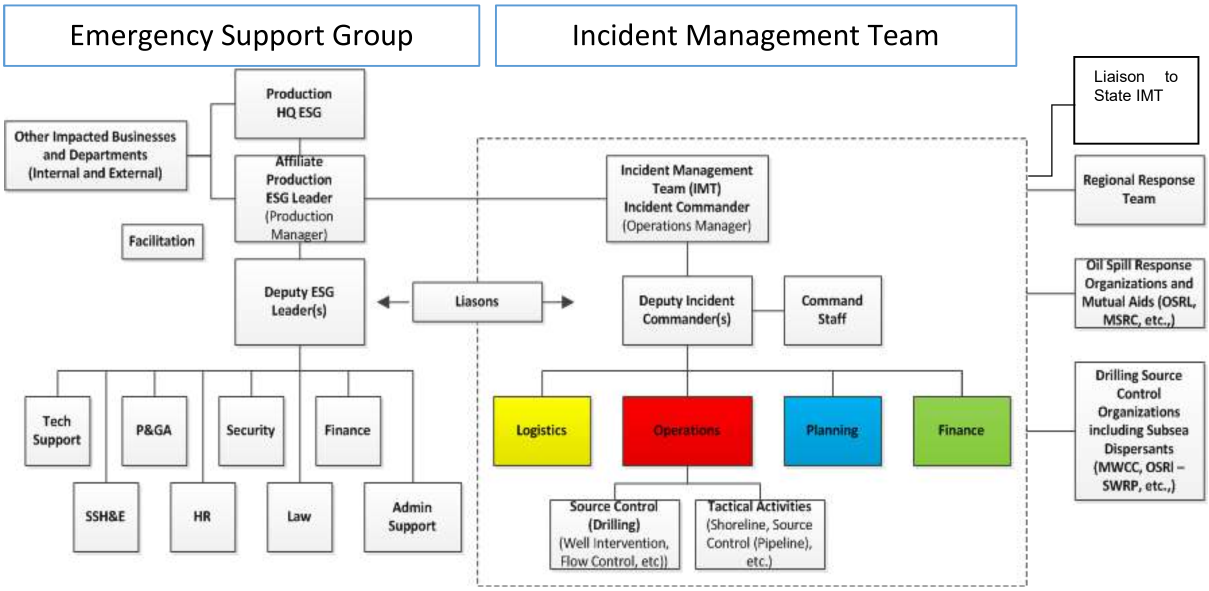


Figure 4-1 Level one – IMT for Localised Response Activities and Impacts (Offshore Incident Management Team)



(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:

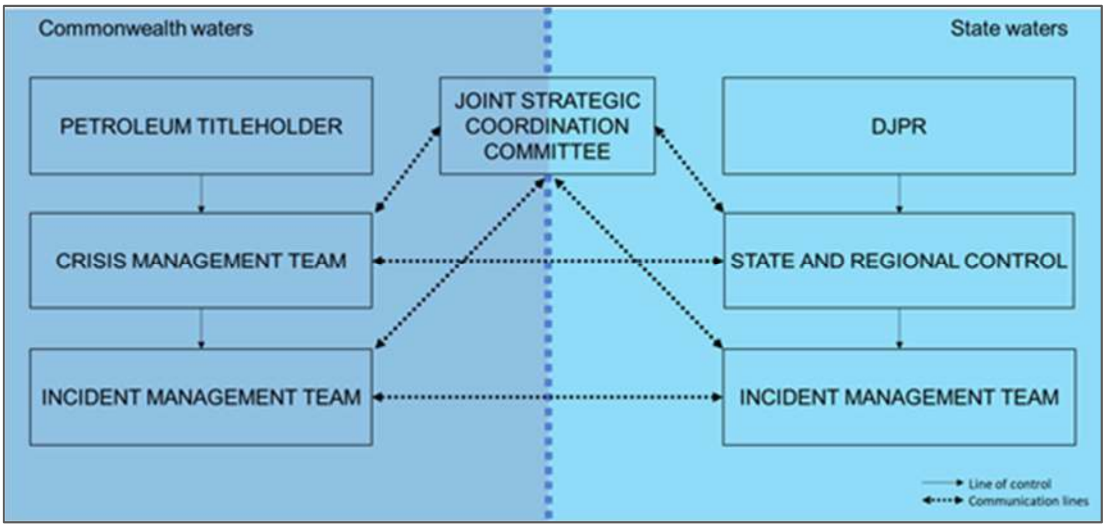
Spill Classification	Relevant Section
Level Two/Three Spills: State water & predicted shoreline impacts.	Section 4.1
Level Two/Three Spills: Commonwealth water impacts & no predicted State water or shoreline impacts.	Section 4.2
Level One Spills: localised	Section 4.3

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); o Establish current operational period aim, objectives, strategy, tactics & resources. o Draft 24, 48 & 72 incident potential worksheet (size up). o Complete NEBA. o Determine the potential shoreline impact. o 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 Table 4-3 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 o Are the aim, objectives, strategies, tactics & resources still current given the current conditions for the operational period? o Review response organisation and staffing needs. o Continue execution of previous day's plan. o 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 o Close off sensitive areas through the implementation of Tactical Response Plans (TRP). o Provide materials and personnel to state response teams to undertake shoreline SCAT surveys. o Provide materials and personnel to state response teams to undertake further shoreline protection. • Marine operations – vessel-based dispersant and containment & recovery operations, o Vessels – direct vessel of opportunity fleets. o Equipment – source from Esso, AMOSC, NatPlan and OSRL. o 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 Wells 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 • Tracking Buoy Deployment Instructions	☐
	• 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	• Commence pre-impact surveys	☐

Day 1	○ 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 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. • Direct AMOSC to shift C&R equipment from Geelong to BBMT: ○ 6 x offshore boom reels. ○ 2 x offshore skimmer unit. • If vessel tanks are <500m3 arrange 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.
	• Operations and Planning to advise how many strike teams are required. As guidance, the following requirements have been determined for worst case scenarios:
	
	LOWC Scenario: # Strike Teams
	WKF: 3
	CBA: 5
	TRA: 6
	TNA: 3
	SHA: 3
	
	• 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.
		☐

LOWC Scenario	# Strike Teams
WKF	3
CBA	5
TRA	6
TNA	3
SHA	3

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: o 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. o 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: o 1st spraying operation – Victoria-based aircraft – to fly from Tyabb Airfield as nominated airfield, close to dispersant supply at LIP. o Secondary overhead coverage aircraft to be provided by third party contractor. o Ongoing spraying operations for Air Tractor Aircraft to be from West Sale as the nominated airfield. o 2nd and subsequent operations to be undertaken from West Sale Airport. o 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: o Refer to attached draft ICS204 for operations. o Field test spray to be conducted prior to operational spraying, with results reported to the IMT. o 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: o Refer to attached drafted ICS204 for operations o 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		
LSC Day Two	• Based on dispersant dosage rates per day, predict future ten day dispersant needs. If AMOSC and Esso forward stockpiles are <50m3, request dispersant via OSRL: • Request OSRL activation of Global Dispersant Stockpiles: • Develop mobilisation plan with OSRL to shift dispersant to Australia utilisingfreight 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 Wells 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. • Tracking Buoy Deployment Instructions	☐
	• 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. • Monitor movement of tracking buoys. Fastwave Dashboard - User guide	☐
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 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. - Direct AMOSC to shift C&R equipment from Geelong to BBMT: ○ 6 x offshore boom reels. ○ 2 x offshore skimmer unit.	☐

	○ If vessel tanks are <500m3 arrange 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 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 Wells Team Tier II/III Emergency Response Plan. • Containment contracts/assistance contracts. • Activate pipeline repair. • Activate marine salvers.	☐
LSC	• Monitor asset staging:	☐

Day Two	○ 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.	☐

	• Direct AMOSC C&R offshore boom to BBMT wharf edge and load out:
	  ○ 3 x offshore boom reels
	  ○ 1 x offshore skimmer unit
	  ○ If vessel tanks are <500m3 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.

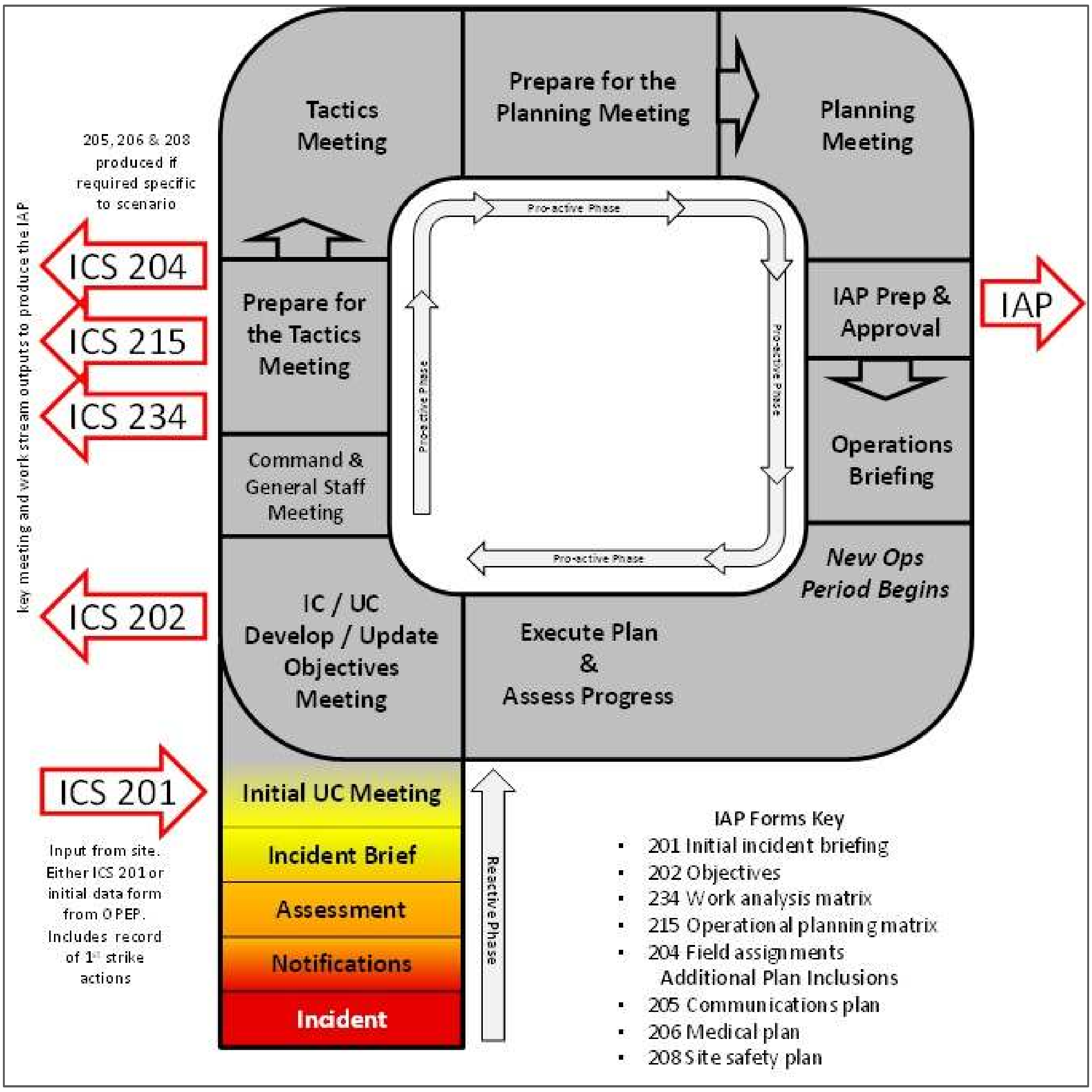


Figure 5-1 Incident Planning

5.2 Selection of Response Strategies – Net Environmental Benefit Analysis

Based on the operational zone of response, Esso has undertaken a 'preparedness NEBA' (Refer Appendix A) to pre-plan which strategies would be appropriate for any given sensitivities within the Described Area (DA). A summary of the outcomes of this NEBA are provided in the following tables by the type of hydrocarbon spill:

The activity specific strategic NEBA and selection of response options are summarised in Appendix D – Quick Reference Information.

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.

NEBA Summary - 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 (surface and/or subsurface)	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

NEBA Summary - 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 (surface and/or subsurface)	In situ burning
1. Open marine environment	P	V	P	V	V	V	NR
2. Seabed	NA	NA	P	NA	NA	NA	NR
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.	NR
11. Shoreline	P	P	P	V	V	NR	NR

NEBA Summary - 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 (surface and/or subsurface)	In situ burning
1. Open marine environment	P	V	P	NR	NR	NR	NR
2. Seabed	NA	NA	P	NA	NA	NA	NR
3. Subtidal rocky reefs	P	NA	P	NR	NR	NR	NR
4. Estuaries	P	V	P	NR	NR	NR	NV
5. Shipwrecks	P	NA	P	NR	NR	NR	NR
6-10. Fisheries	P	NA	P	V	NA	NR	NR
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:

Location	Loss of diesel, lubricating, condensate or mechanical oils	Crude oil releases
All locations	• Surveillance, monitoring, and visualisation • Exclusion zone (as driven by WHS risk assessment) • Oiled wildlife response	
Spill site	• Source control (BOP intervention, capping stacks, relief well drilling, pipeline engineering efforts) • Subsurface chemical dispersant	
Offshore environment (Commonwealth waters)	• Mechanical dispersion	• Chemical dispersant • Containment and recovery
Offshore and nearshore environments (Commonwealth and coastal waters)		• Containment and recovery
Coastlines and islands	• Protection deflection • Containment and recovery • Shoreline response – assessment and clean-up • Oiled wildlife response	

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 5-2 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[3] maps and cull non-relevant Resource Types according to the areas of the environment that are predicted to be impacted.
c. Review the protection priority of the remaining resources (using relevant sections of EP Volume 2 Section (Loss of Containment / Loss of Well Control). Also refer to Quick Reference Information for specific activities OPEP- Appendix D.
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

[3] The Oil Spill Response Atlas (OSRA) is a national database and decision support system in a computerised GIS format. It is designed to provide comprehensive information about Australia's coastal resources and spill response logistics. OSRA includes information on: shoreline geomorphology, marine habitats, environmental resources, cultural and heritage sites, commercial resources, logistics and infrastructure information to support spill response. OSRA is accessed through AMSA in emergency situations.

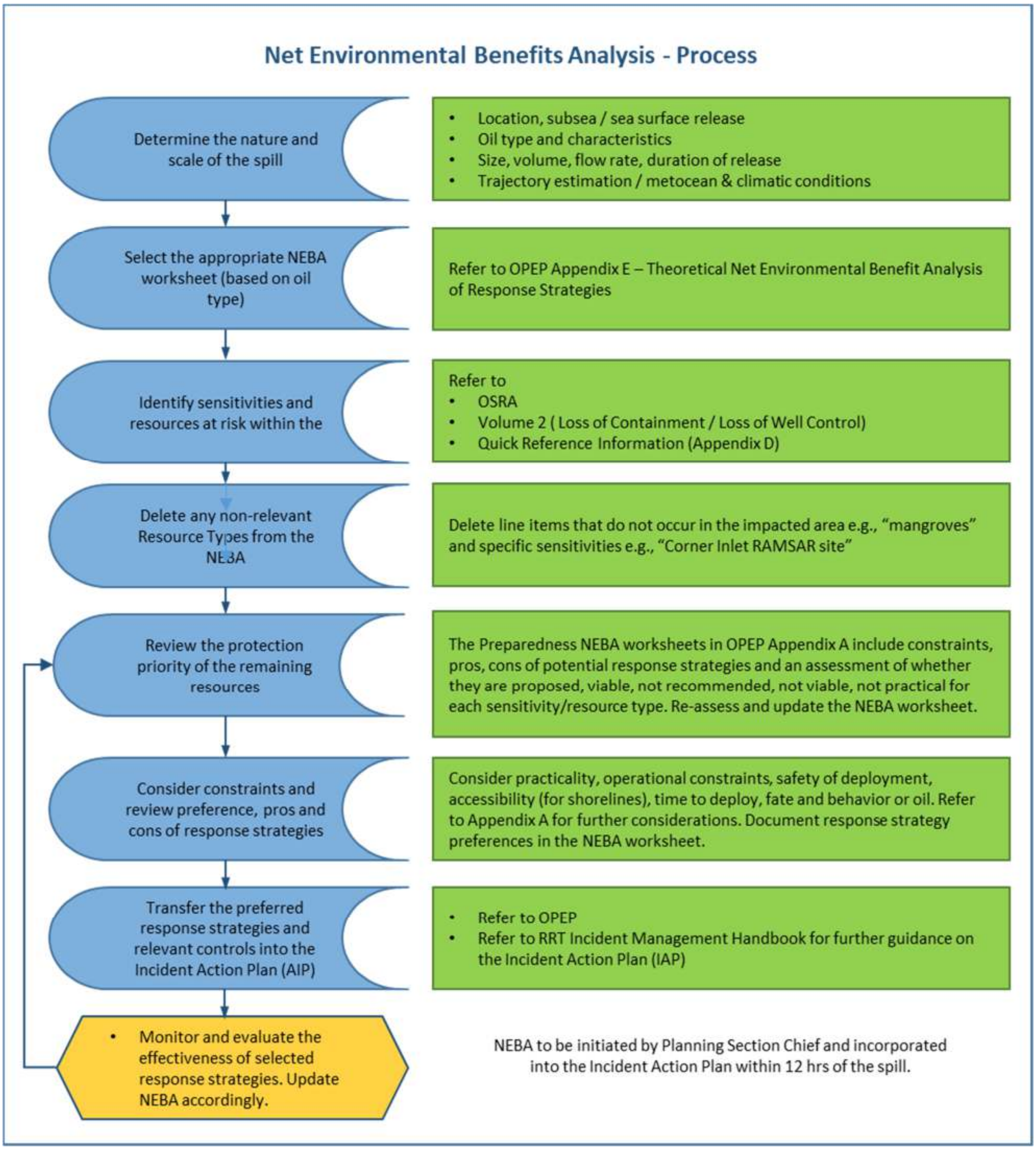


Figure 5-2 NEBA Process Flowchart

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:

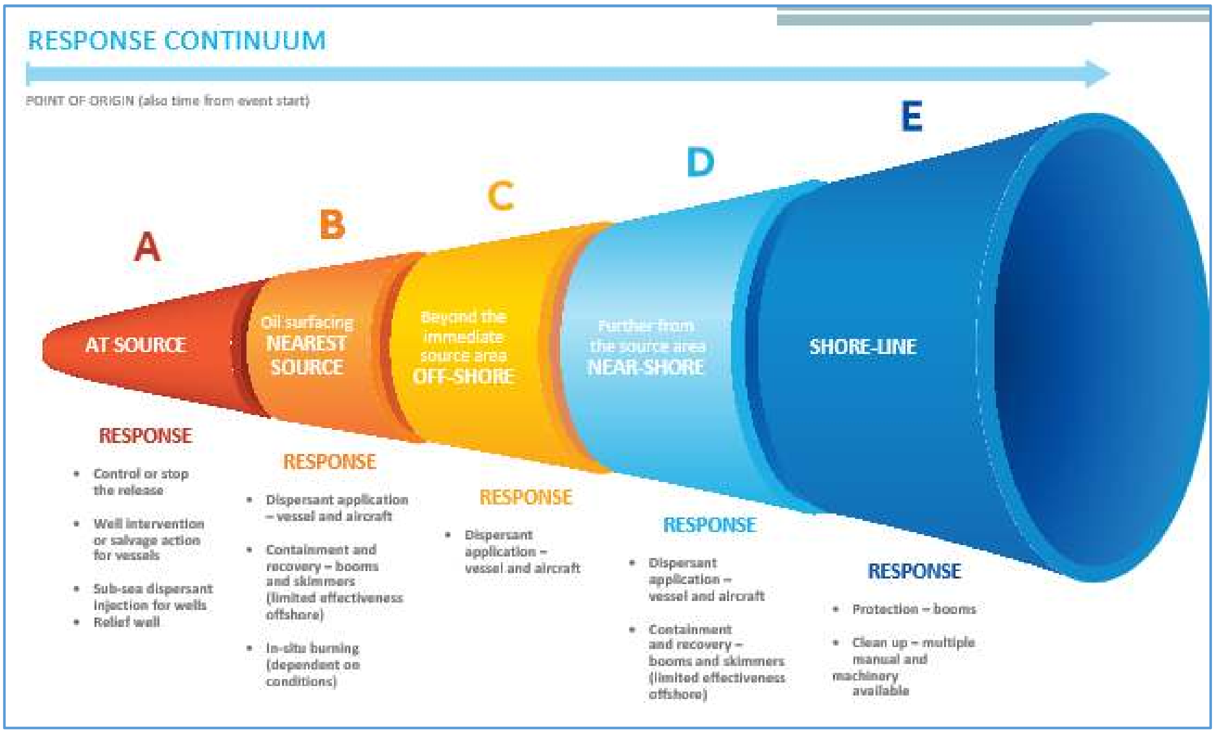


Figure 5-3 Cone of Response

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 ‘cone’ directs response resources to where maximum effectiveness will occur. Using this methodology, each tactic or strategy is executed cogniscent of the volume of remaining oil to be treated from the previous strategy.

In practical terms this means that Esso will, in priority order:

1. Maximise the use of the dispersant to reduce bulk surface and shoreline loadings; followed by
2. Maximum use of offshore and nearshore containment & recovery strike teams to recover oil not dispersed, so as to reduce bulk surface and shoreline loadings; and then
3. In coordindation with State control agency, execution of shoreline protection measures, to reduce volumes of remaining oil from reaching and impacting shore-based sensitivities.

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 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 (WOMP), 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 • 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 and Monitoring

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 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 OSMP

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 the exhaustion of Australia's dispersant supplies, global dispersant stockpiles from Singapore, may be air freighted to Australia and shifted to the operating airfields Based on the WCDS daily dispersant maximum spray requirements is calculated to be no greater than $34m^3$ 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. Chemical dispersants are not recommended for diesel or Group 1 oil spills. 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 not 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 Net Environmental Benefit Assessment 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. Refer to 2019 Esso Dispersant Testing Report for details of laboratory analysis of a range of dispersants on Gippsland crude oils. 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 rate of use. • 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. • Oil is too weathered for effective 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, up to six strike teams (each comprising two vessels) may be needed considering the volume of oil required to be collected via this method. Each 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. 1.5 metres in height or greater), or advanced booming single vessel systems (i.e. NOFI Current buster 2/4/6/8/ or SpeedSweep Systems) 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
	  ○ Marine Bases.
	  ○ 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
SITE NAME	Site Type	Latitude	Longitude
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.
	  ○ 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:
	  ○ 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.
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 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. 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. 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 WCDS 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 Potentially Exposed Area 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 WCDS 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 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 wildlife	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	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

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Waste Generation Secondary Contamination Disposal of contaminated equipment	Reduce overall impact of a spill and prevent secondary contamination.	Emergency Response Waste Management Plan	Emergency Response Waste Management Plan is implemented.	Incident management records

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 Bass Strait Oil Pollution Emergency Plan (OPEP) is to describe the actions and arrangements Esso Australia has in place to respond to an oil pollution incident from any one of the company's Bass Strait petroleum activities (refer Figure 2-1).

Spills can range from Tier One, small single event releases, to Tier Two-Three, ongoing/large releases. This plan is designed to provide the full range of available response options and plans for all spills, regardless of the Tier level and is therefore, not specific to a particular activity or scenario.

It is designed such that the Incident Management Team and Emergency Response Team have immediate access to the full suite of response action plans (from Tier One to Tier Two-Three) and can select and implement the appropriate plan based on the specific emergency situation.

This OPEP provides the processes and tools to be able to select and apply the viable response options (and therefore eliminate options that are not viable) for the specific spill event.

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)[4]
- Victorian Maritime Emergencies (Non-Search & Rescue) Plan (SERP [NSR]) [5]
- NSW State Waters Marine Oil and Chemical Spill Contingency Plan[4]
- Tasmanian Marine Oil Spill Contingency Plan (TASPLAN) [6]
- The Australian Industry Cooperative Oil Spill Arrangements (AMOSPlan)[7] 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

This OPEP provides oil spill response plans to respond to any spill from Esso's Bass Strait operations and project activities.

This includes:

- Drilling
- Well operations (platforms, both manned and unmanned)

[4] https://www.amsa.gov.au/forms-and-publications/Publications/national_plan.pdf.

[5] 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

[6] http://epa.tas.gov.au/Documents/TasPlan.pdf

[7] http://www.amosc.com.au/amosc.php

- Workovers of wells (excluding those accessing new reservoir sands of waxy crude)*
- Workovers of subsea, seabed or platform infrastructure
- Pipelines running from offshore fields to coastlines, and
- Plug and abandonment activities.

* Modelling indicates that Moonfish crude tends to accumulate on shorelines with little natural degradation. A significant increase in Moonfish production rates (and associated worst case discharge scenario), may exceed shoreline response capabilities provided under this OPEP. For this reason, workovers of wells to increase production rates of Moonfish waxy crude by accessing new reservoir sands are specifically excluded from this OPEP.

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.

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.

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:

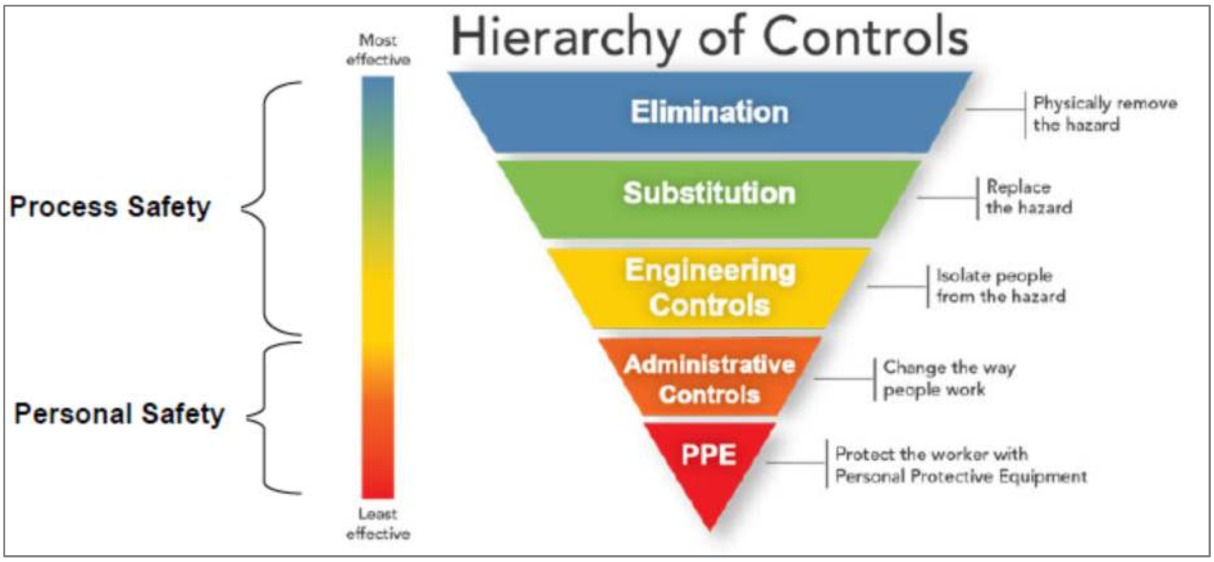


Figure 6-1 Workplace Health and Safety Hierarchy of Controls for Risk Mitigation

'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 a component of 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:

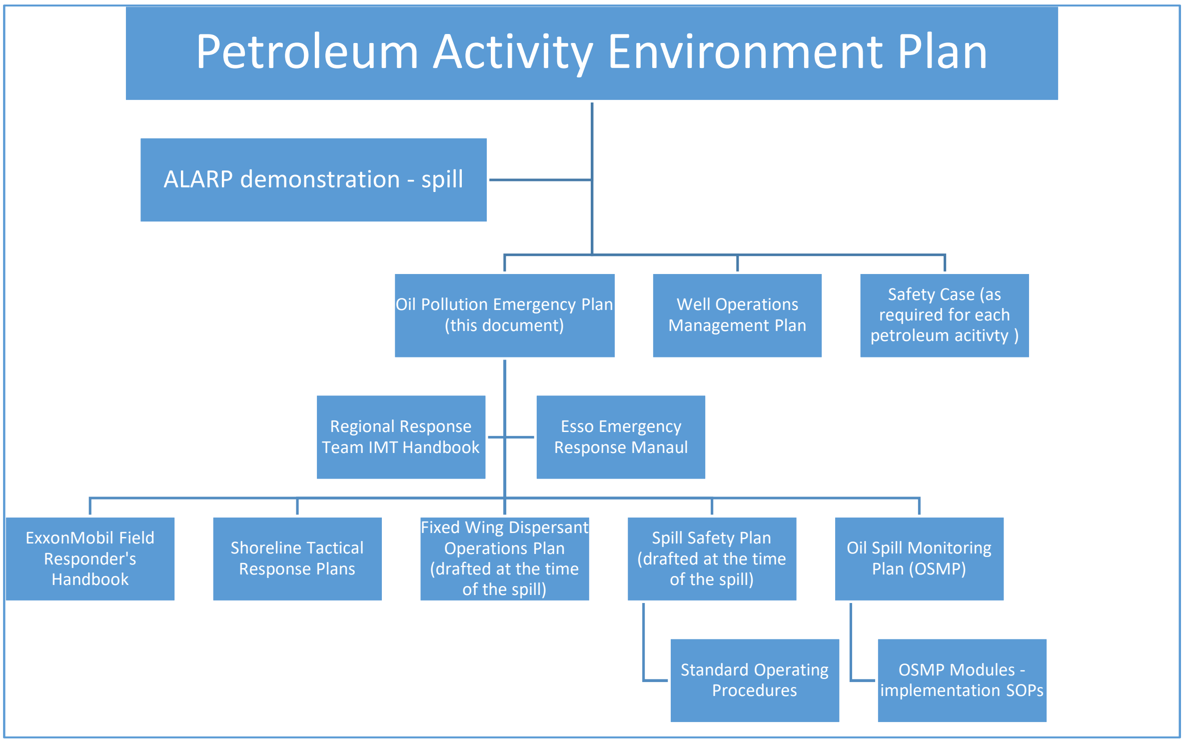


Figure 6-2 OPEP Relationship With Other Key Esso Environmental Documentation

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:

Table 6-2 External Plans That Inform and Influence Actions Under This OPEP

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.

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 an 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:

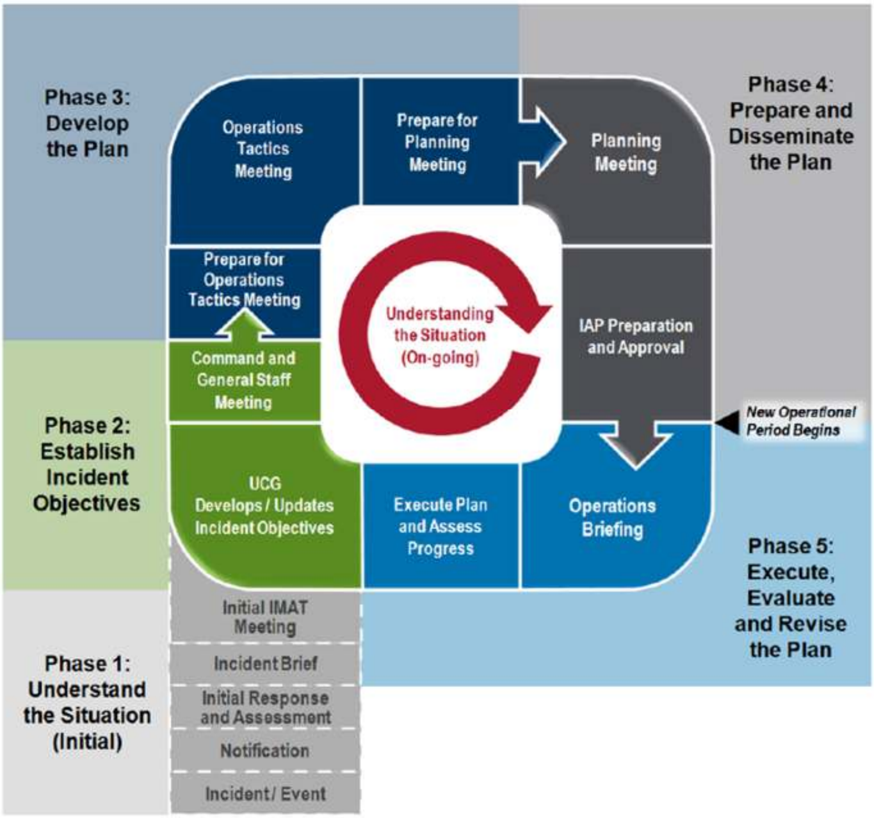


Figure 7-1 ICS Planning ‘P’

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.

Figure 7-2 outlines this intent:

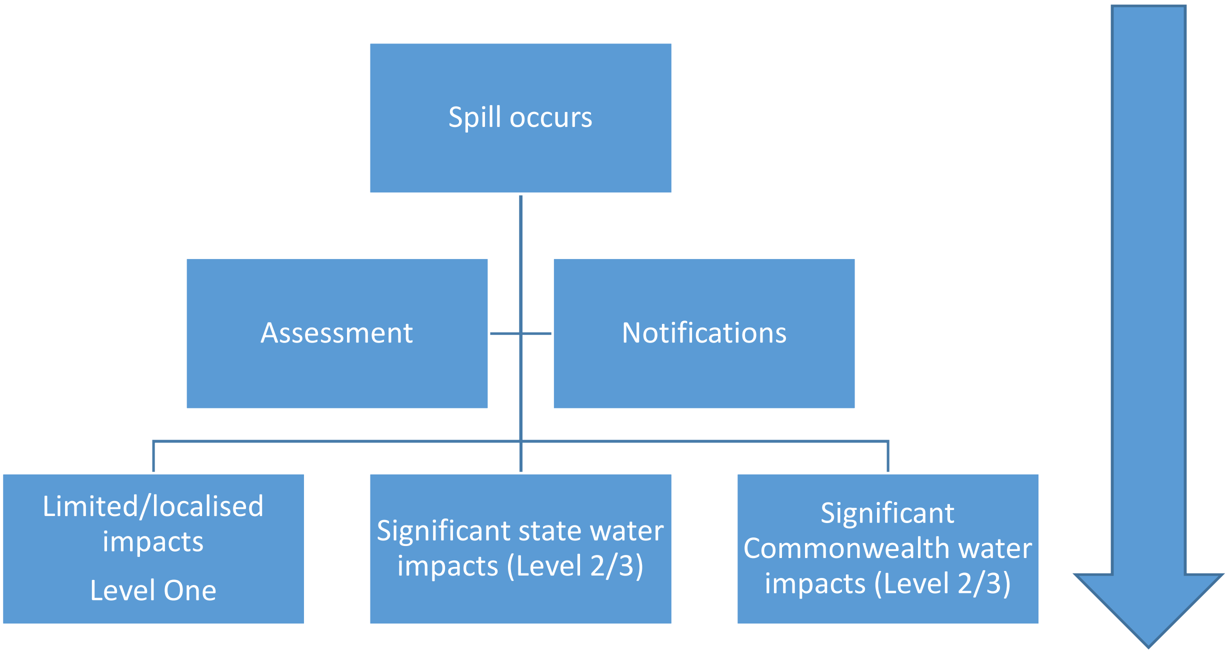


Figure 7-2 Banding Responses

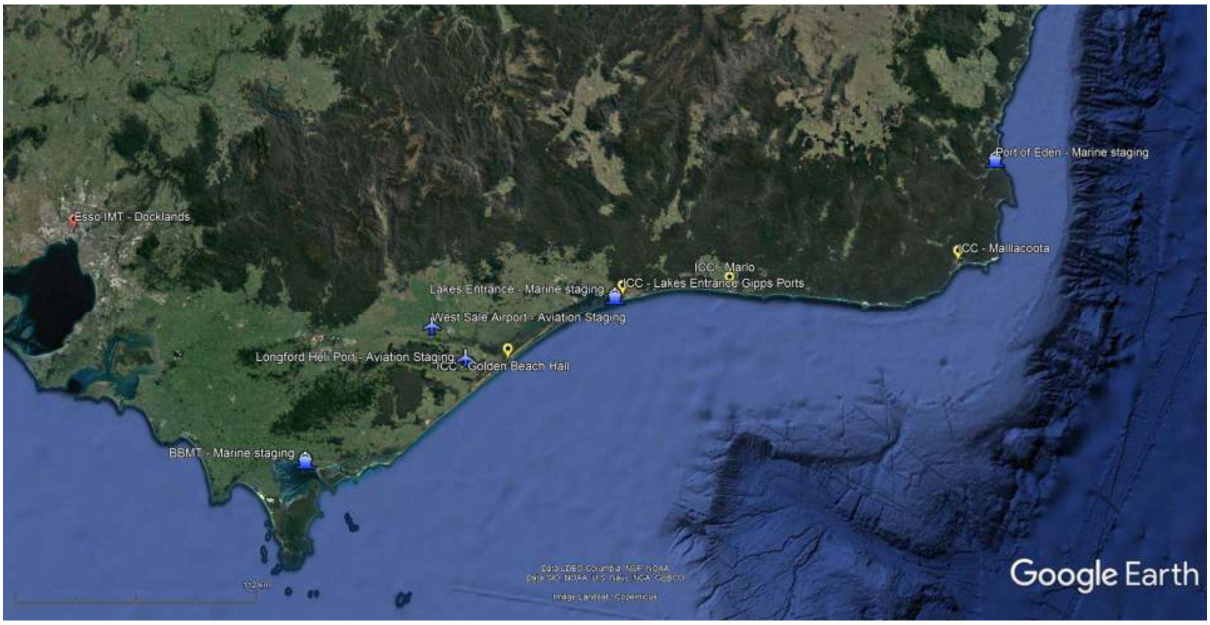
7.2.1 Command Points, Staging and Locations

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	9/644 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
Marine staging areas	Barry Beach Marine Terminal	Main Access Rd, Agnes VIC
	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[8] 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 a Group 1 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 a number of fields in the Gippsland Basin. .

Analysis of crudes indicates volatiles and semi to low volatile compunds constitute 84.8 - 86.3%. 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' 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.

[8] 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.

7.2.2.4 Waxy Crude

Waxy crudes are produced from some reserviours, including Flounder and Moonfish. These crudes contain a high proportion of wax–with a corresponding high pour point. Waxy crudes are likely to solidify in the environment as it weathers over time.

The properties of these crudes classify them as a Group IV oil due to the high pour point (above ambient temperature) according to ITOPF (2014).

Given the tendency to form solid masses at ambient sea temperatures, the opportunity to use and effectiveness of chemical dispersants is diminished.

7.2.2.5 Summary of Hydrocarbon Characteristics Used in Oil Spill Trajectory Models

The physical characteristics of the oil types that were used for modelling are as follows:

	Density @ 15˚C	API	Dynamic Viscosity	Pour Point	Wax Content	Oil Property Category
Marine Diesel Oil (MDO)	829 kg/m^3	37.6	4.0 cP @ 25°C	-14 ºC	-	Group II (light persistent oil)
Condensate (surrogate)	770.6 kg/m^3	52.15	0.14 cP @ 25ºC	-3 ºC	-	Group I (non-persistent oils)
Barracouta Condensate	772.3 kg/m^3	51.6	1.291 @ 20ºC	-39 ºC	1.8%	Group I (non-persistent oils)
Kipper Condensate	760.6 kg/m^3	54.5	0.91 @ 20ºC	-39 ºC	2.3%	Group I (non-persistent oils)
West Seahorse 3 Crude	792.5 kg/m^3	48.0	2.0 cP @ 20ºC	-15 ºC	-	Group II (light persistent oil)
West Kingfish Crude	798.1 kg/m^3	45.7	2.4 cP @ 20°C	9°C	25%	Group II (light persistent oil)
Halibut Crude	821.5 kg/m^3	40.6	3.4 cP @ 20°C	0°C	23.7%	Group II (light persistent oil)
Flounder Crude	799.9 kg/m^3	45.3	2.8 cP @ 20°C	18°C	32%	Group IV oil due to the high pour point
Moonfish Crude	887.6 kg/m^3	27.8	TBPP*	27°C	38.5%	Group IV oil due to the high pour point

*TBPP: Temperature Below Pour Point

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:

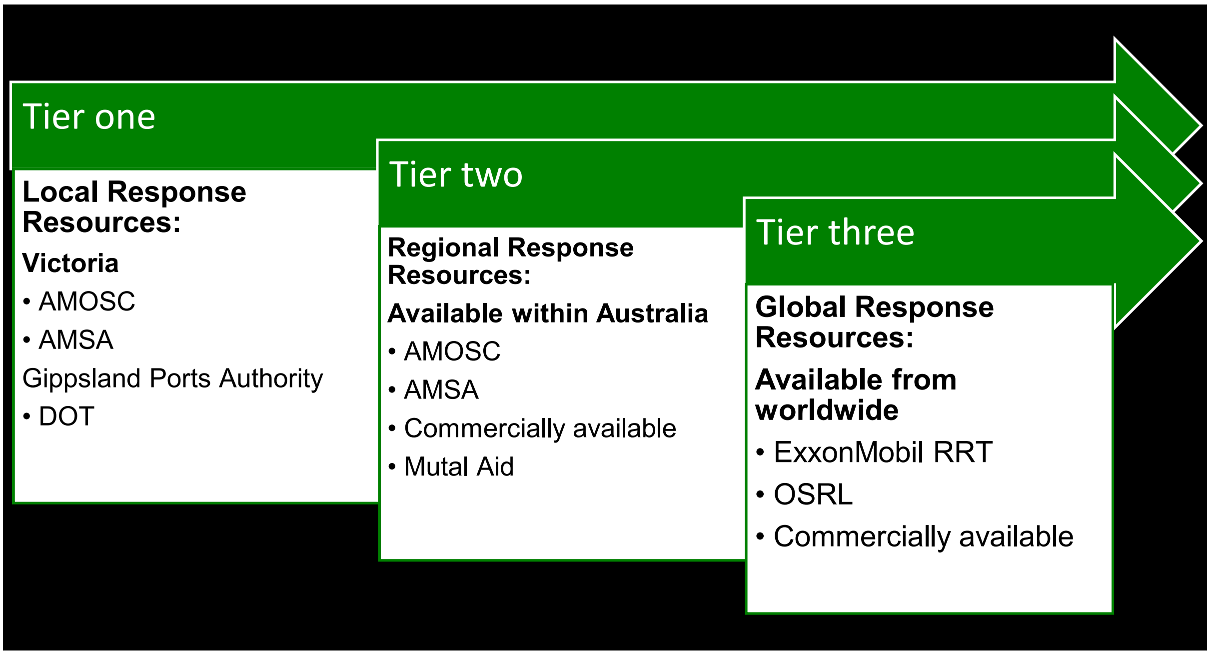


Figure 8-1 Tiered Response Arrangements

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

Appendix A – Preparedness NEBA

Preparedness NEBA

Appendix B - ICS 204 Work Assignment Templates

Appendix C – OPEP Consultation Plan

9.1 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 0-1).

Relevant control agencies will act as a single point of contact for their jurisdiction and may coordinate review and comment from other agencies.

Table 0-1 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.

9.2 Sufficient time

Four to six weeks is generally considered sufficient time for relevant control agency to complete an internal review, based on prior feedback.

9.3 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.

9.4 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 0-2).

Table 0-2 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 Esso Community Day	-
Victorian Environmental Protection Authority	-	-	Regional Marine Pollution Reference Group	-

9.5 Consultation during an unplanned event

In the occurance 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 0-3).

Table 0-3 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 (>1 bbl).		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

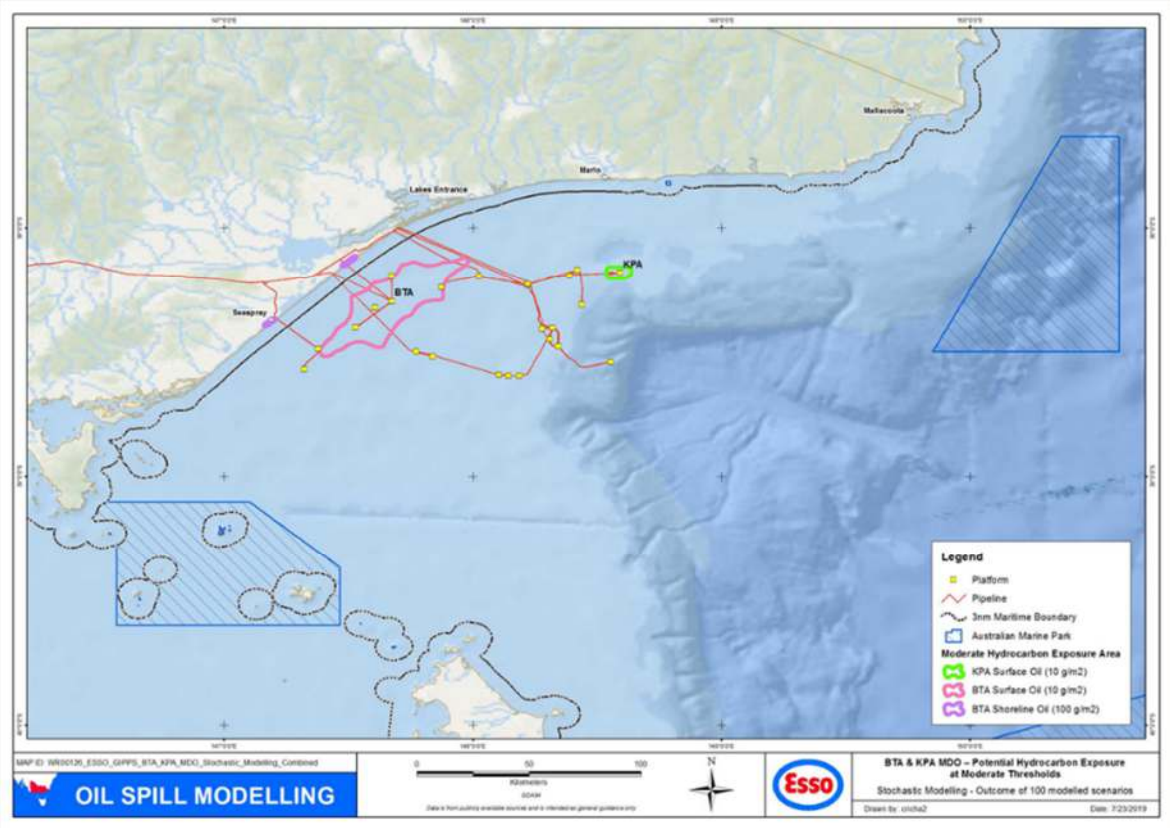
NSW Department of Primary Industries		Impact to NSW State waters or shoreline	Verbal
VIC Department Jobs, Preceincts & Regions Earth Resources Regulation	Required for: all spills (>1 bbl).	Notification requirement met	SitRep Liaison Officer JSCC
East Gipplsand Shire Council			Via State IMT
Victorian Regional Channels Authority			Via State IMT
East Gippsland Catchment Management Authority			Via State IMT
National Offshore Petroleum Titles Adminstrator	Required for: all spills (>1 bbl).		SitRep
National Offshore Safety Environmental Management Authority	Required for: all spills (>1 bbl).		SitRep

Appendix D – Quick Reference Information

Information specific to a MDO spill from a vessel collision during the Kipper (KPA) and West Barracouta (BTW) drilling campaign is provided below. For further details, refer to the JUR Drilling Environment Plan.

1. Field Location / Oil properties

Location / operational area

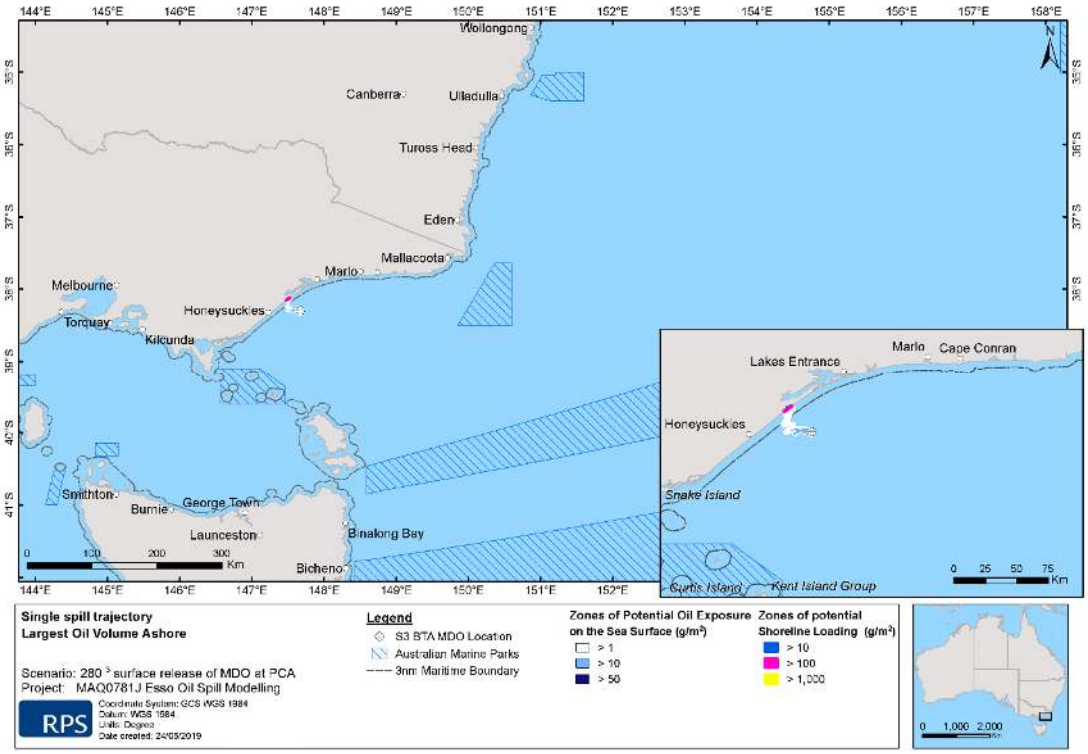


Production Licence No.	West Barracouta VIC/L1 Kipper Subsea Facility VIC/L25		
Coordinates		West Barracouta	Kipper
	Latitude	38° 19’ 06” S	38°10' 53" S
	Longitude	147° 36’ 53” E	148° 35' 35” E
	Depth	45.5 m	95 m
Oil types and name		Marine Diesel Oil (MDO)	
	Density @ 15˚C	829 kg/m^3	
	API	37.6	
	Dynamic Viscosity	4.0 cP @ 25°C	
	Pour Point	-14 ºC	
	Wax Content	-	
	Oil Property Category	Group II light persistent oil	

1. What's the worst that could happen?

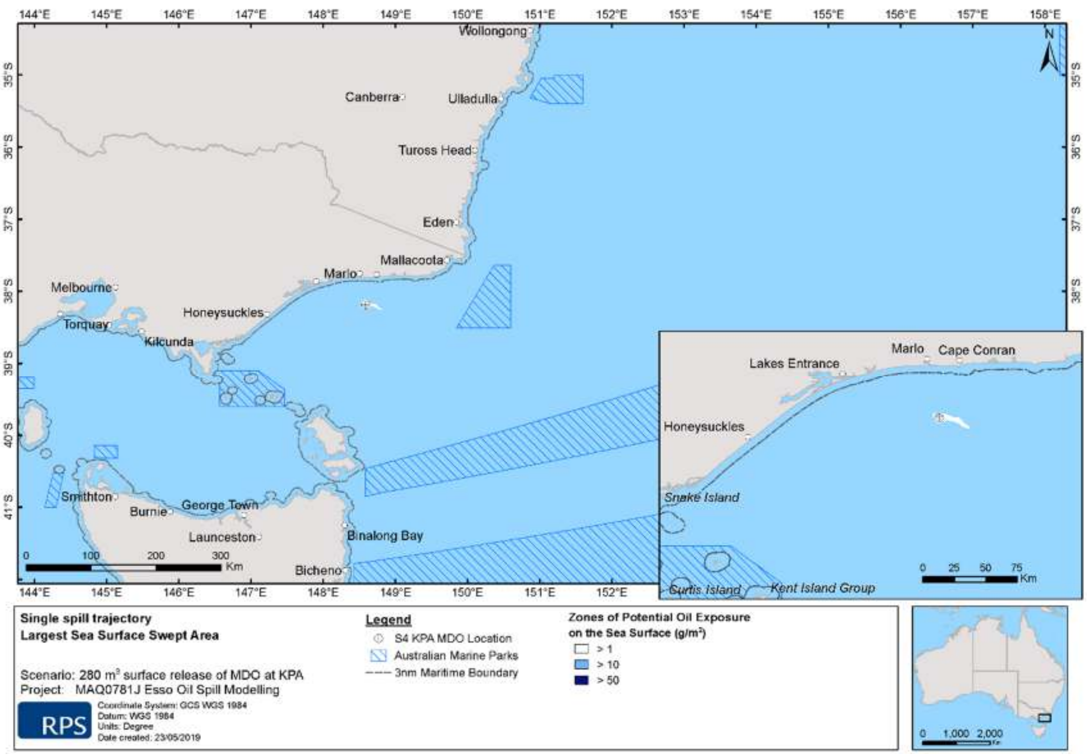
West Barracouta / Kipper	
Worst case oil pollution scenario	Level 2 Vessel collision (280 m^3 of MDO over 6 hours) at either drilling location
Dominant Weathering process	Evaporation
Approximate weathering predicted (from deterministic modelling)	Based on deterministic modelling, approximately: • 70 - 90% MDO is predicted to evaporate. • 5 – 15% MDO is predicted to remain in the water column • Shoreline impacts may occur depending on proximity to shore (8% MDO predicted to arrive ashore if the spill originates at the West Barracouta operational area)

Exposure – Sea Surface BTW



Zones of potential exposure on the sea surface and shoreline loading for the trajectory with the largest oil volume ashore, longest length of shoreline contacted above the 100 g/m^2 threshold and the minimum time before exposure to immediate nearshore waters by visible oil (0.5 g/m^2). Results are based on a 280 m^3 surface release of MDO over 6 hours at the Barracouta Platform, tracked for 30 days, 3 am 22nd of October 2011.

Exposure – Sea Surface KPA



Zones of potential exposure on the sea surface for the trajectory with the largest sea surface swept area at the 10 g/m2 threshold. Results are based on a 280 m^3 surface release of MDO over 6 hours at the Kipper Facility, tracked for 30 days, 10 am 17th of May 2011.

2. Resources at Risk

		West Barracouta	Kipper
Minimum time to oil exposure on the sea surface at moderate threshold	< 12 hours	Great White Shark distribution and breeding BIAs Southern Right Whale migration BIA Pygmy Blue Whale distribution and foraging BIAs Seabirds foraging BIAs	Great White Shark distribution BIA Southern Right Whale migration BIA Pygmy Blue Whale distribution and foraging BIAs Seabirds foraging BIAs KEF: Upwelling East of Eden
	12 – 48 hours	nil	nil
	> 48 hours	nil	nil
Minimum time to shoreline accumulation of oil	< 12 hours	nil	nil
	12 – 48 hours	nil	nil
	> 48 hours	Wellington Ocean Grange Seaspray	nil

3. Strategic NEBA and selection of response options

Response Option	Benefits	Effectiveness on MDO Spill	Viable Response?	Net Benefit?
Source Control	Limit flow of hydrocarbons to environment.	Only viable option to stop flow of oil to the marine environment.	Yes	✓
Surveillance and Monitoring	Although surveillance is not an active intervention to treat or remove oil pollution, it is critical to effective response both in the initial stages of an incident and during ongoing response operations.	Surveillance and monitoring used to observe the natural break-up and dissipation of a MDO spill without the need for active intervention.	Yes	✓
Dispersant Application	Dispersants act by allowing hydrocarbons to be mixed into the upper layers of the water column, which accelerates the biodegradation process. Removes oil from the water surface, protecting leeward shorelines and providing benefit to sea-surface air breathing fauna.	Dispersant application is not recommended for MDO as it spreads rapidly to a thin layer. Insufficient time to respond while suitable surface thicknesses are present. Dispersant droplets are known to penetrate through the thin oil layer and cause 'herding' of the oil. This creates areas of clear water but is not successful dispersion. Application of dispersant can contribute to water quality degradation through chemical application, without removing surface oil. Considered not to add sufficient benefit.	Not viable	x
Containment & Recovery (Vessel Based)	Booms and skimmers to contain surface oil where there is a potential threat to environmental sensitivities. Relies on calm sea conditions, thicknesses >10µm to collect and adequate deployment timeframes.	MDO spreads rapidly to a thickness of less than 10 µm. Containment is ineffective at these thicknesses.	Not viable	x
In-situ Burning	In-situ burning (burning oil in place) can quickly eliminate large quantities of spilled oil.	MDO spreads rapidly to a thickness of less than 10 µm. Containment, and therefore also in-situ burning, is ineffective at these thicknesses.	Not viable	x
Protection of Sensitive Shoreline Resources	Booms and skimmers deployed to protect environmental sensitivities. Environmental conditions (e.g. current, waves) limit application.	The KPA location is sufficiently far from shore that coastline impact is not expected. There is a low probability that MDO spilled at the BTW location may contact the shoreline along the Ninety Mile Beach. MDO spreads rapidly to a thickness of less than 10 µm. Corralling of surface hydrocarbons close to shore is not expected to be effective for MDO and is thus not expected to provide sufficient benefit.	Not viable	x
Shoreline Clean-up	Last response strategy to remove oil from the environment due to potential impact.	The KPA location is sufficiently far from shore that coastline impact is not expected. There is a low probability that MDO spilled at the BTW location may contact the shoreline along the Ninety Mile Beach. There are various shoreline techniques that are appropriate for this type of hydrocarbon, a shoreline clean-up may be effective for reducing shoreline loadings where access is possible, to be assessed on a case-by-case basis.	Yes	✓
Oiled Wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-emptive captive management.	Given limited size and rapid spreading of the MDO spill large scale OWR is unlikely to be required. Distance from coastline also reduces likelihood of extensive wildlife oiling, however individuals may become oiled in the vicinity of the spill. OWR may be implemented if required, to be assessed on case-by-case basis.	Yes	✓

4. Response Resources Required

Response Option	Strategy	Resource	Timeframe
Source Control	As per vessel SOPEP	-	-
Surveillance and Monitoring	OSMP O1.1 Weather and Sea State	1 x observer (to conduct 2 hour watch)	<2 hours from time of spill
	OSMP O1.2 Trajectory Estimation	1 x contracted modeller.	< 4 hours of service requested.
	OSMP Module O1.3 and O4.1 Aerial surveillance	1x observer per aircraft. Aircraft to have 100nm range and 3 hour duration.	Initial overflight <4 hours service requested. Trained observer <12 hours of spill occurring.
	OSMP Module O1.4 Tracking buoy	1x buoy available.	Deployed <12 hrs of spill occurring (dependent on weather conditions) (Level 2 & 3 spill).
	OSMP Module O2.1 and O2.3 Water and Oil Sampling	1x vessel. 1x initial sampling kit. 1x contract with laboratory.	Samples obtained <24 hrs of spill occurring. Analysis initiated <24 hours of receipt in laboratory.
Shoreline Clean-up	Provision of personnel to support CA	15m^3 recovery per team per day based on 33 teams of 15 people	< 24 hours from request for services
Oiled Wildlife Response	DEWLP will make the decision to stand up resources which are based in Victoria	DEWLP 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.	Available <24 hours from request for services

Relevant Tactical Response Plan (TRP)	Merriman Creek (Seaspray)

5. Oil Spill Monitoring

		West Barracouta	Kipper
Sensitivities – Probability of contact with dissolved hydrocarbons at moderate threshold	> 90%	nil	nil
	50 - 90%	nil	nil
	50 – 75%	nil	nil
	25 – 50%	nil	nil
	10 – 25%	nil	nil
	< 10%	nil	nil
Marine Parks – Probability of contact with entrained hydrocarbons	> 90%	nil	nil
	75 - 90%	nil	nil
	50 - 75%	Point Hicks Marine National Park	nil
	25 - 50%	Cape Howe Marine Park	nil
	10 – 25%	Beware Reef Marine Sanctuary	Cape Howe Marine National Park Point Hicks Marine National Park
	< 10%	Beagle AMP East Gippsland AMP Batemans Marine Park Ninety Mile Beach Marine National Park Gippsland Lakes Ramsar wetland	Beagle AMP East Gippsland AMP Flinders AMP Freycinet AMP Beware Reef Marine Sanctuary Batemans Marine Park

OSMP - Summary of relevant OSMP modules. Refer to OSMP for further detail.

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 seat)	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	P	P	P	P

Given the size and rapid dispersion of a MDO spill, scientific monitoring would only be implemented to demonstrate to stakeholders that the impacts from the spill were short term and localised as predicted. Thus, water and sediment sampling could potentially be undertaken.

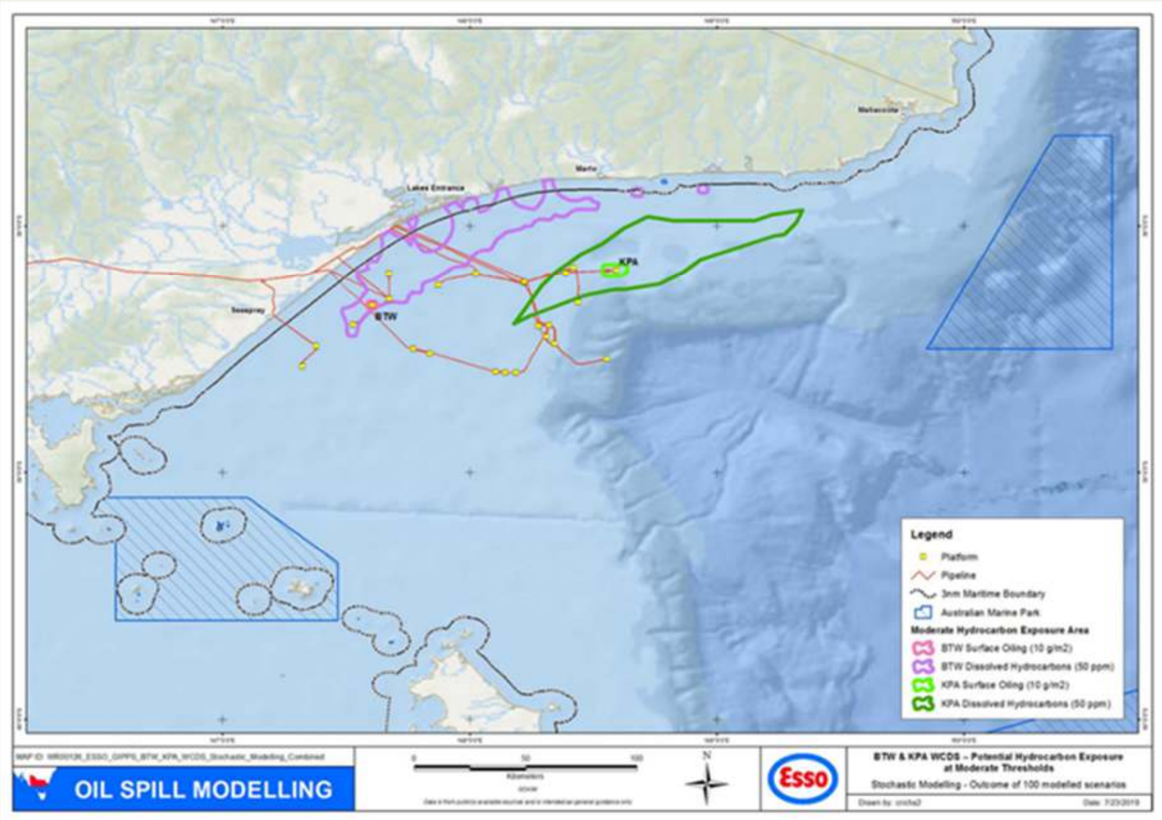
Spill Event	S1: Hydrocarbons in intertidal sediments and water		S2: Hydrocarbons in offshore sediments and water		S3: Fish and shellfish taint and toxicity for human consumption	S4: Short-term impacts to oiled fauna and flora				S5: Recovery of commercial and recreational fisheries	S6: Recovery of fauna	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 (vessel-	Fauna surveys (land-based)	Oiled fauna hydrocarbon testing	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

Key: X = always required; P = possibly required, dependent on the outcomes of O1.

Information specific to the Kipper (KPA) and West Barracouta (BTW) drilling campaign is provided below. For further details, refer to the JUR Drilling Environment Plan.

1. Field Location / Oil properties

Location / operational area

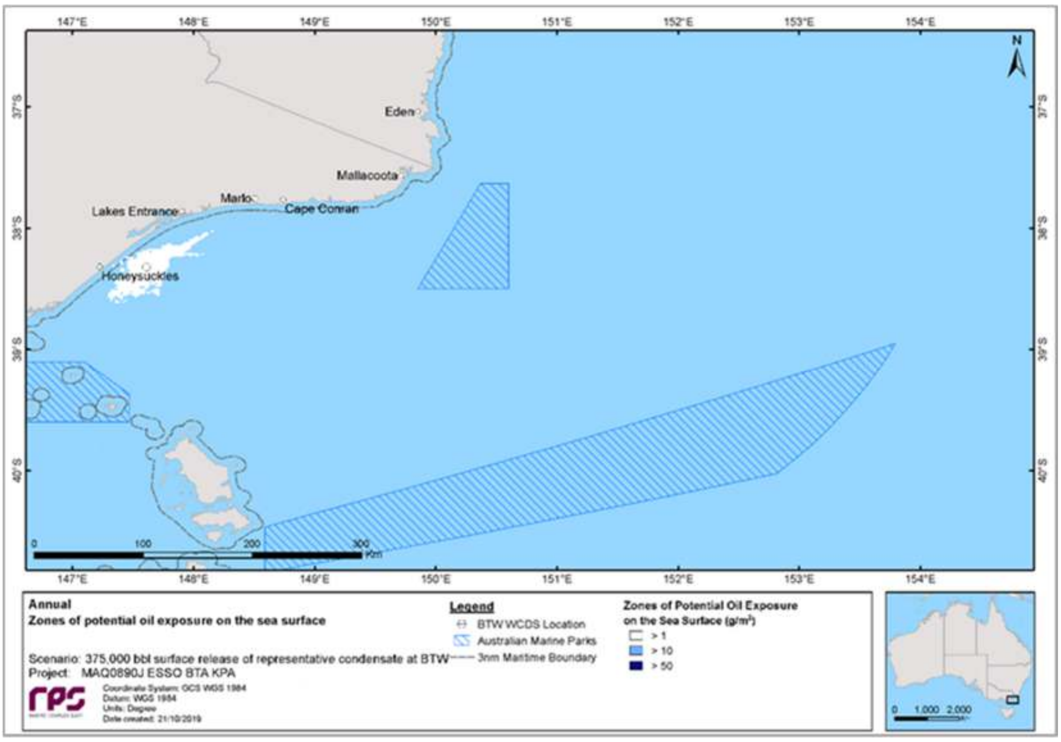


Production Licence No.	West Barracouta VIC/L1 Kipper Subsea Facility VIC/L25		
Coordinates		West Barracouta	Kipper
	Latitude	38° 19’ 06” S	38°10' 53" S
	Longitude	147° 36’ 53” E	148° 35' 35” E
	Depth	45.5 m	95 m
Oil types and name		Barracouta Condensate	Kipper Condensate
	Density @ 15˚C	772.3 kg/m^3	760.6 kg/m^3
	API	51.6	54.5
	Dynamic Viscosity	1.291 @ 20ºC	0.91 @ 20ºC
	Pour Point	-39 ºC	-39 ºC
	Wax Content	1.8%	2.3%
	Oil Property Category	Group I non-persistent oils	Group I non-persistent oils

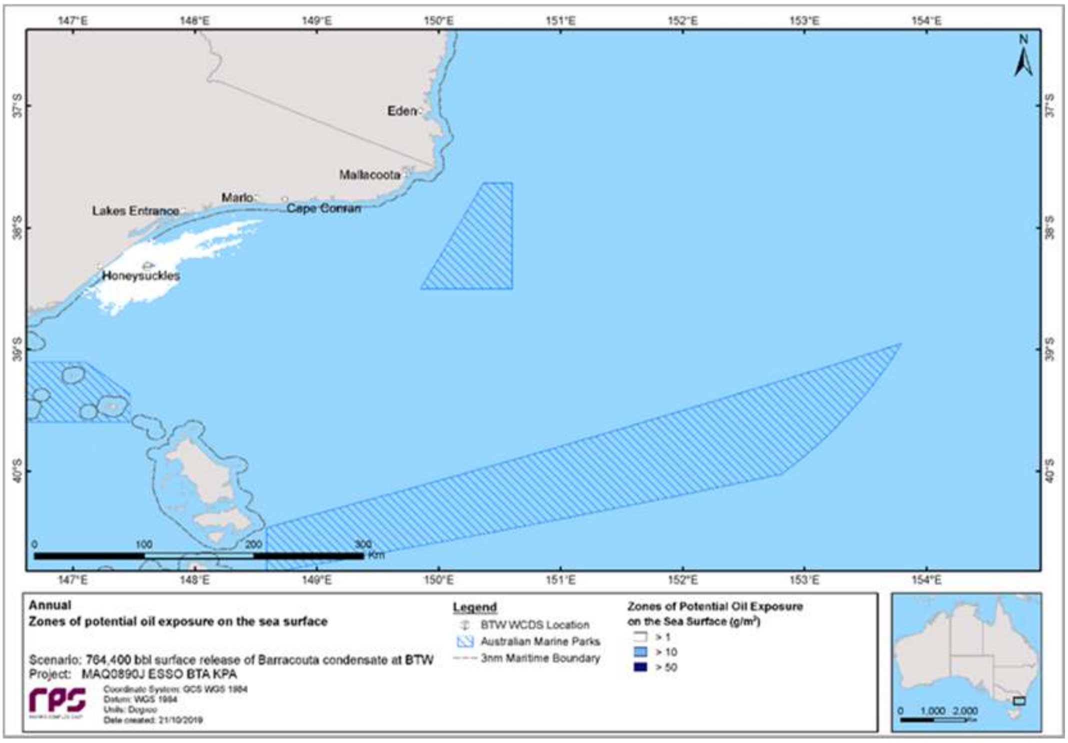
2. What's the worst that could happen?

	West Barracouta	Kipper
Modelled Oil Pollution Scenarios	Level 3 Spill A complete loss of well control (drillpipe in hole) resulting in a release of: 375.0 kbbl condensate until source control is effective (98 days).	Level 3 Spill A complete loss of well control resulting in a release of: 676.2 kbbl condensate until source control is effective (98 days).
Worst Case Discharge Scenario	A complete loss of well control (no drillpipe in hole) resulting in a release of: 764.0 kbbl condensate until source control is effective (98 days).	A complete loss of well control (no drillpipe in hole) resulting in a release of: 1842.0 kbbl condensate until source control is effective (98 days).
Dominant Weathering process	Evaporation	Evaporation
Approximate weathering predicted (from deterministic modelling)	• 93% condensate evaporates • 6% decay/ biodegrade • 1% remain within the water column	• 91% condensate evaporates • 7% decay/ biodegrade • 1% remain within the water column

Exposure – Sea Surface BTW

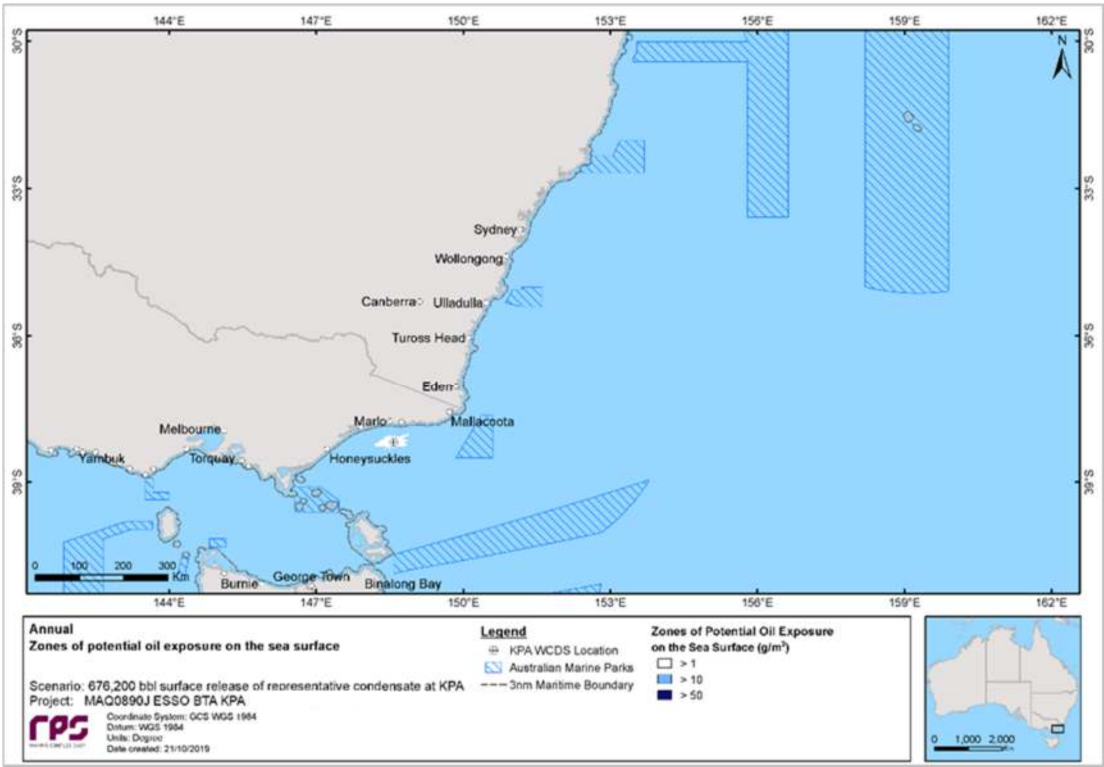


Zones of potential exposure on the sea surface for the trajectory with the largest sea surface swept area at the 1 g/m^2 threshold. Results are based on a 3.8 kbbl/d surface release of condensate over 98 days at the West Barracouta well, tracked for 118 days.

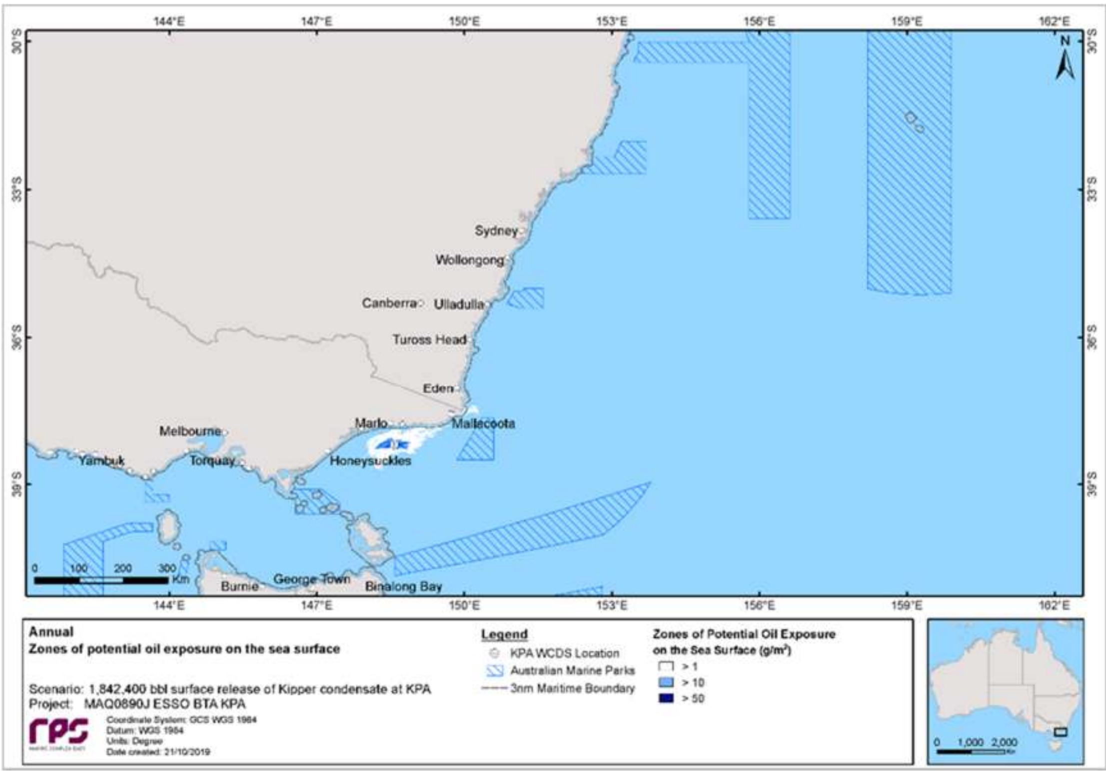


Zones of potential exposure on the sea surface for the trajectory with the largest sea surface swept area at the 1 g/m^2 threshold. Results are based on a 7.8 kbbl/d surface release of condensate over 98 days at the West Barracouta well, tracked for 118 days.

Exposure – Sea Surface KPA



Zones of potential exposure on the sea surface for the trajectory with the largest sea surface swept area at the 1 g/m^2 threshold. Results are based on 6.9 kbbl/d surface release of condensate over 98 days at the Kipper Subsea Facility, tracked for 118 days.



Zones of potential exposure on the sea surface for the trajectory with the largest sea surface swept area at the 1 g/m^2 threshold. Results are based on 18.8 kbbl/d surface release of condensate over 98 days at the Kipper Subsea Facility, tracked for 118 days.

Resources at Risk

		West Barracouta	Kipper
Minimum time to oil exposure on the sea surface at moderate threshold	< 12 hours	nil	Great White Shark distribution BIA Southern Right Whale migration BIA Pygmy Blue Whale distribution and forgaing BIA Seabirds foraging BIAs KEF: Upwelling East of Eden
	12 – 48 hours	Great White Shark distribution and breeding BIAs Southern Right Whale migration BIA Pygmy Blue Whale distribution and foraging BIAs Seabirds foraging BIAs	nil
	> 48 hours	nil	nil
Minimum time to shoreline accumulation of oil	< 12 hours	nil	nil
	12 – 48 hours	nil	nil
	> 48 hours	nil	nil

3. Strategic NEBA and selection of response options

Response Option	Benefits	Effectiveness on Condensate Spill	Viable Response?	Net Benefit?
Source Control	Limit flow of hydrocarbons to environment.	Only viable option to stop flow of condensate to the marine environment.	Yes	✓
Surveillance and Monitoring	Although surveillance is not an active intervention to treat or remove oil pollution, it is critical to effective response both in the initial stages of an incident and during ongoing response operations.	Surveillance and monitoring used to observe the natural break-up and dissipation of a condensate spill from the BTW and KPA wells without the need for active intervention.	Yes	✓
Dispersant Application	Dispersants act by allowing hydrocarbons to be mixed into the upper layers of the water column, which accelerates the biodegradation process. Removes oil from the water surface, protecting leeward shorelines and providing benefit to sea-surface air breathing fauna.	Condensate from the BTW and KPA wells is highly volatile and will be removed from the sea surface by evaporation. Dispersant is ineffective on Group I oils due to the very low viscosity and high volatility. Application of dispersant can contribute to water quality degradation through chemical application, without removing surface oil. Moreover, the drilling locations are located far enough offshore for a worst-case condensate spill not to pose a threat to the coastline. Considered not to add sufficient benefit.	Not viable	x
Containment & Recovery (Vessel Based)	Booms and skimmers to contain surface oil where there is a potential threat to environmental sensitivities. Relies on calm sea conditions, thicknesses >10µm to collect and adequate deployment timeframes.	Condensate from the BTW and KPA wells is removed rapidly from the surface through evaporation. Suitable thickness for recovery will be present for only a very short period, making containment and recovery option ineffective. In Bass Strait sea conditions likely to be suitable for containment and recovery operations only 50% of the time.	Not viable	x
In-situ Burning	In-situ burning (burning oil in place) can quickly eliminate large quantities of spilled oil.	Condensate from the BTW and KPA wells is removed rapidly from the surface through evaporation. Suitable thickness for burning will be present for a very short period, making in-situ burning option ineffective. In Bass Strait sea, conditions likely to be suitable only 50% of the time.	Not viable	x
Protection of Sensitive Shoreline Resources	Booms and skimmers deployed to protect environmental sensitivities. Environmental conditions (e.g. current, waves) limit application.	The BTW and KPA drilling locations are sufficiently far from shore that coastline impact is not expected.	Not required	-
Shoreline Clean-up	Last response strategy to remove oil from the environment due to potential impact.	The BTW and KPA drilling locations are sufficiently far from shore that coastline impact is not expected.	Not required	-
Oiled Wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-emptive captive management.	Given rapid removal from surface through evaporation and therefore limited surface exposure, OWR is unlikely to be required. Distance of drilling locations from coastline also reduces likelihood of wildlife oiling. OWR may be implemented if required, to be assessed on case-by-case basis.	Unlikely to be required	-

4. Response Resources Required

Response Option	Strategy	Resource	Timeframe
Source Control	ROV debris clearing / subsea intervention	1 x ROV and 1 x vessel SFRT (via AMOSC) and 1 x vessel 1 x contract well control specialists (WWC/OSRL)	Estimated 5 days (from call out request to arrival in Victoria) Estimated 7 days (from Perth to BBMT via road transport) 2 days (from Singapore)
	Relief well	1 x MODU (via APPEA mutual aid agreement) 1 x contract engineering support (WWC/OSRL) Well construction material	Estimated 85 days (via HLV from Singapore)
Surveillance and Monitoring	OSMP O1.1 Weather and Sea State	N/A	
	OSMP O1.2 Trajectory Estimation	1 x contracted modeller.	
	OSMP Module O1.3 and O4.1 Aerial surveillance	1x observer per aircraft. Aircraft to have 100nm range and 3 hour duration.	Initial overflight <4 hours service requested. Trained observer <12 hours of spill occurring.
	OSMP Module O1.4 Tracking buoy	1x buoy available.	Deployed <12 hrs of spill occurring (dependent on weather conditions) (Level 2 & 3 spill).
	OSMP O1.5 Satelite Imagery	1 x contract.	
	OSMP Module O2.1 and O2.3 Water and Oil Sampling	1x vessel. 1x initial sampling kit. 1x contract with laboratory.	Samples obtained <24 hrs of spill occurring. Analysis initiated <24 hours of receipt in laboratory.

Relevant Tactical Response Plan (TRP)	N/A – no shoreline surface contact predicted

5. Oil Spill Monitoring

		West Barracouta	Kipper
Sensitivities - Probability of contact with dissolved hydrocarbons at moderate threshold	> 90%	nil	nil
	75 - 90%	nil	Great White Shark distribution BIA Southern Right Whale migration BIA Pygmy Blue Whale distribution and foraging BIA Seabirds foraging BIAs KEF: Upwelling East of Eden
	50 – 75%	nil	nil
	25 – 50%	nil	nil
	10 – 25%	nil	nil
	< 10%	Great White Shark distribution and breeding BIAs Southern Right Whale migration BIA Pygmy Blue Whale distribution and foraging BIAs Seabirds foraging BIAs KEF: Upwelling East of Eden Victorian waters off Lakes Entrance / Corringle	Great white shark foraging BIA
Marine Parks – Probability of contact with entrained hydrocarbons at the low threshold	> 90%	Cape Howe Marine Park Point Hicks Marine National Park Beware Reef Marine Sanctuary	East Gippsland AMP Cape Howe Marine Park Point Hicks Marine National Park
	75 - 90%	nil	nil
	50 - 75%	East Gippsland AMP Ninety Mile Beach Marine National Park Gippsland Lakes Ramsar wetland	Batemans Marine National Park Beware Reef Marine Sanctuary
	25 - 50%	Beagle AMP Batemans Marine National Park	Beagle AMP Flinders AMP
	10 – 25%	Flinders AMP	Gippsland Lakes Ramsar wetland
	< 10%	nil	Freycinet AMP Ninety Mile Beach Marine National Park

OSMP **-** Summary of OSMP modules relevant to KPA / BTW. Refer to OSMP for further detail.

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 seat)	Fauna observation (onshore)	Personnel and area monitoring	Laboratory analysis	Sediment samples (onshore)	Sediment samples (offshore)
Level 1	X	X	X			P							X	P	P	P		
Level 2	X	X	X	P		X	P	X					X	P	P	P		P
Level 3	X	X	X	P	X	X	P	X					X	P	P	P		P

Given the rapid evaporation and dispersion of a condensate spill scientific monitoring would only be implemented to demonstrate to stakeholders that the impacts from the spill were short term and localised as predicted. Thus, water sampling could potentially be undertaken. Sediment sampling not required as no shoreline impacts.

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 (vessel-	Fauna surveys (land-based)	Oiled fauna hydrocarbon testing	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													
Level 3	P	P	X	P	P													

Key: X = always required; P = possibly required, dependent on the outcomes of O1.

Appendix B – Bass Strait Oil Spill Monitoring Plan

Esso Australia Resources Pty Ltd
Bass Strait Oil Spill Monitoring Program

Document Number: AUGO-EV-EPL-001

OIMS MANUAL - DOCUMENT CONTROL DETAILS

TITLE:	Bass Strait Oil Spill Monitoring Program
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REVISION STATUS:	NOPSEMA JUR Drilling EP RFFWI
DATE OF ISSUE:	29 October 2019
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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 1	Name	Position	Signature	Date
Prepared by:	Natasha Carroll	Senior Environmental Advisor		
Endorsed By:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	23 Oct 2019
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor		
Approved By	Simon Kemp	Offshore Asset Manager	On file	23 Oct 2019

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

REVISION HISTORY

Rev	Revision / Status	Date	Prepared by	Approved By
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0	Issued for acceptance	15 August 2019	Natasha Carroll	Simon Kemp
A	Issued for Review (IFR)	July 2019	Natasha Carroll	

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

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/m^2; 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;	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 24 hours 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)			
	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.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	~~Expected~~ Activation Time[1]	~~Expected~~ Implementation Time
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~~;~~	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 24 hours 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 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		✓ 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;			
	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.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	~~Expected~~ Activation Time[1]	~~Expected~~ Implementation Time
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 (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson et al. 2013)	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) United States Food and Drug Administration (USFDA).	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 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	S4.1 Fauna surveys (vessel-based)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal	PSC (or delegate)	✓ Disturbance parameters (e.g. mortality, percentage oiled fauna/flora) have returned to within the	EUL, in agreement with the Jurisdictional	Within 24 hours of initiation	Draft sampling and analysis plan to be ready for peer review within 24 hours of

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	~~Expected~~ Activation Time[1]	~~Expected~~ Implementation Time
oiled fauna and flora	S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O4 has confirmed the presence of oiled fauna.		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.	Authority 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.
	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.		✓ 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	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	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
		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 alleged or possible damage.		the studied species have returned to baseline levels;			
	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.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	~~Expected~~ Activation Time[1]	~~Expected~~ Implementation Time
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	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 2 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 benthic habitat	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	PSC (or delegate)	✓ 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**	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 2 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
		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.		✓ **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**	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 S8 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	~~Expected~~ Activation Time[1]	~~Expected~~ Implementation Time
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	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 (intertidal)	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	P	P	P	P
Level 3	X	X	X	X	X	X	X	X	P	P	P	P	X	P	P	P	P	P

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 (vessel-based)	Fauna surveys (land-based)	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	P
Level 3	P	P	X	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

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
AUV	Autonomous underwater vehicle
BACI	Before After Control Impact
BoM	Bureau of Meteorology
BTEX	Benzene, toluene, ethylbenzene and xylene
CASA	Civil Aviation Safety Authority
DA	Described Area
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 Bass Strait Oil Spill Monitoring Plan (OSMP) is a key component of the environmental management framework (which also includes activity-specific Environment Plans (EP) and the Bass Strait 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 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 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.

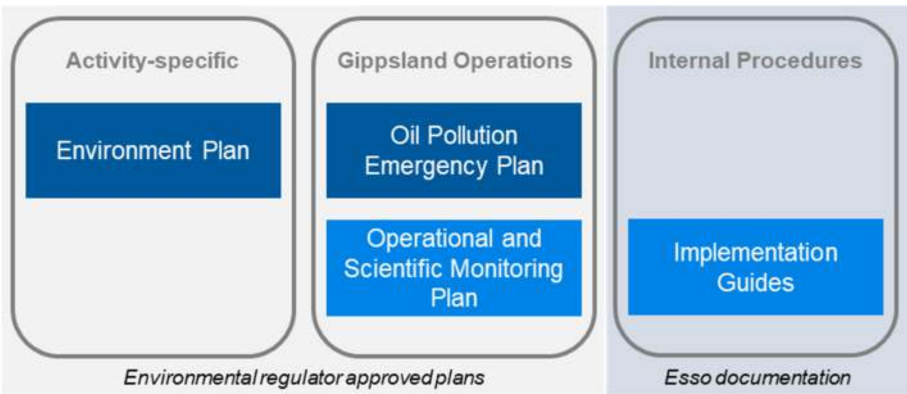

Figure 1-1: Environmental management framework for offshore petroleum activities in the Gippsland region

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.

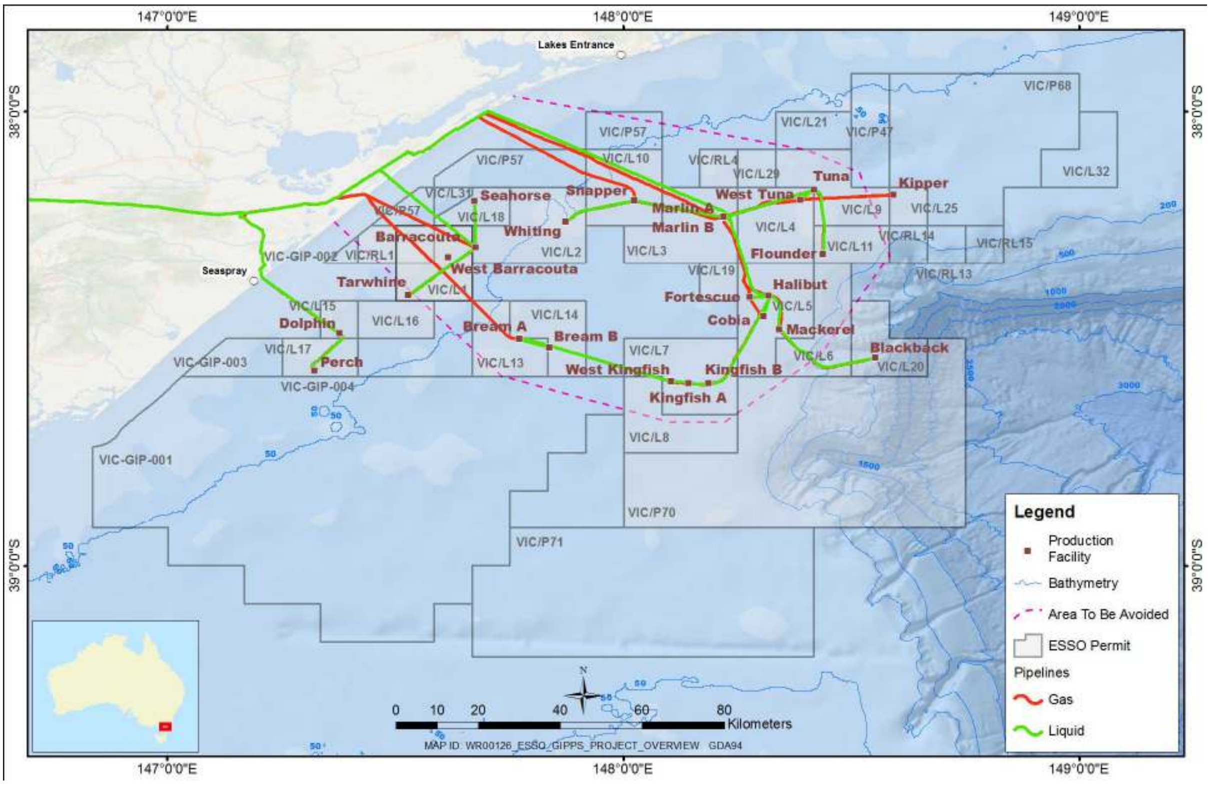

Figure 1-2: Esso assets within with Gippsland region

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 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 and experience for key OSMP-specific roles for the operational and scientific modules are detailed in the "Responsibilities, competencies and resources" section of each module in this OSMPThe OSMP Specific team will be scaled up according to the serverity of the incident based on external capabilities.

The Esso ERT/IMT have completed oil spill response competency and training in accordance with Table 2-4 of the EP. In addition to this the Environment Unit Lead is required to have a relevant tertiary degree in engineering, environment science, environmental management or similar. 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.

Based on the severity of an oil spill additional resources may be brought in from the ExxonMobil Regional Response Team to support the IMT.

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 2-3).

In the activation of the OSMP substantial resources may be required for an extended period of time. Although it is more likely that discontinuous deployment periods are likely this has not been assumed in developing this resourcing strategy (i.e. continuous requirement assumed). The resourcing needs are based on the likely requirements for information.

The operational modules together with S1, S2 and S4 will commence at notification of a spill. Scientific modules have slightly differing needs as their aim is to assess the potential impacts and recovery from a spill. As such much of the work in the scientific modules will be done following the cessation of the operational modules. However in some circumstances there is a need to collect reactive baseline data prior to oil contacting the environment and causing impacts on that environment. The baseline data for many of the environmental sensitivities which are being examined by the OSMP are poor or non-existent and as such reliable data would greatly enhance the reliability and efficiency of the scientific modules. There are a number of scientific modules that are therefore initiated soon, if not immediately, after notification of a spill in order to collect a reliable reactive baseline dataset.

Generally, the following resourcing procedure will be adhered to:

- The third party OSMP Consultant will develop Survey Plan(s) to meet the objectives of OM(s) survey(s) that are provided by Esso. Surveys may entail acquiring information for multiple OMs with individual ground, vessel and aerial survey teams on the same plant (vessel/vehicle/aircraft) to optimise synergies and efficiencies;
- A preliminary plant resources register is summarised below;
- Field personnel and office-based personnel will be sourced from the organisations that comprise the OSMP team. Thereafter, during escalation and/or maintenance of the Operational and Scientific modules, staff across the pool of field personnel pool will be selected on the basis of capabilities and availability to meet the survey(s) objectives.
- The Task Leaders in consultation with the third party OSMP Consultant will be responsible for organising equipment and laboratory supplies (if needed) for their respective modules.
- Office-based personnel will be mobilised on an ‘as needed’ basis for data analysis and reporting for all Operational and Scientific modules to ensure timely information flow to Esso for response planning and assessment.

Table 2-2: Initial Response Field Resources from the third party

Module	Resource/Provider	Personnel/Equipment/Service
O1	Third party OSMP Consultant	Field and office personnel in Victoria (marine scientists, wildlife observers) with additional resources available throughout Australia 4WD vehicles available Laboratory for basic WQ analysis and biological analysis Aircraft management Marine monitoring equipment

Module	Resource/Provider	Personnel/Equipment/Service
O2	Third party OSMP Consultant	Field personnel Office personnel Vessel-based wildlife observers Vessel management Water/sediment/plankton sampling and equipment Equipment
O3	Third party OSMP Consultant	Field personnel Office personnel Vessel-based wildlife observers Vessel management Water/sediment/plankton sampling and equipment Equipment
O4	Third party OSMP Consultant	Field personnel Office personnel Vessel-based wildlife observers Vessel management Water/sediment/plankton sampling and equipment Equipment
O5	Vessels (Third party OSMP Consultant)	MV Orca Inshore vessel Inshore vessel
O6	Air	Fixed wing aircraft

Vehicles

The third party OSMP Consultant has sufficient resources in terms of personnel to meet the vehicle needs of the monitoring program in both the immediate and longer term.

Vessels

There is requirement for both large and small vessels to allow the monitoring to be completed as per the program.

Four inshore vessels from the third party OSMP Consultant which can operate in daylight hours only are immediately available.

The third party OSMP Consultant has an in principal agreement that the following vessels capable of operating offshore 24 hours per day can be used.

- *RV Orca II*
  - A trailerable 8 metre aluminium Oceaneer powered by twin 150 hp Yamaha four stroke engines. It is in Class 2C commercial survey, licensed to carry 12 passengers and 2 crew. We have two in-house coxswains with endorsements for operating in Port Phillip Heads. RV Orca II has a dry cabin for electronics and instrumentation as well as a large deck space for diving and instrument deployments.
- *Bass Rover*
  - 17 m long
  - Aluminium offshore twin screw patrol vessel
  - Speed of 22 knots
  - Max fuel consumption 120 litres per hour
  - Deck load carrying capacity of 5 tonnes
- *Silver Star*

- Alloy aluminium catamaran
- 20 tonne extendable A frame
- 8 tonne Hiab crane
- Max speed of 12 knots
- Clear deck area of 15 m x 10 m
- Length of 33.4 m
- Beam of 11 m
- Draught of 1.8 m

- *Calypso Star*
  - Twin hull, alloy aluminium catamaran
  - Two upper decks, a bulbous bow, transom stern and transverse and longitudinal framing
  - 3 tonne crane
  - Max speed of 12 knots
  - Clear deck area of 100 m^2
  - Length of 23.8 m
  - Beam of 11 m
  - Draught of 2.2 m
- *Turning Point MSV 11642*
  - Westcoaster 68’, 20’ beam. Powered by two 480HP diesel motors
  - Cruise speed 13 –14 knots, top speed 17 knots
  - 8 m x 5 m flush work deck to accommodate cargo bins plus 132 m of covered deck
  - Cargo to 8 tonnes
  - Water desalinator, sullage tanks and generous below-deck storage
  - Line hauler and 1.9 tonne crane with winch and 70 m spectra-rope available
  - Towing bollards to 5 tonne
  - Large transom doors opening onto dive platform
  - Vessel surveyed for: 2C - 22 passengers to 30 mile off shore and 2B – 12 overnight passengers to 100
- *Seapride MB883*
  - Steber 47’, 16’ beam
  - Powered by two 450HP diesel motors
  - Cruise speed 16 knots, top speed 20 knots
  - Large, stable work deck – 6 m x 3.8 m
  - 6.5 kva gen set
  - 2.2 tonne Hiab seacrane with 14’ reach. 400 kg lift capstan side hauler
  - 400 kg pull drum reel over transom or from vessel’s side
  - Cargo to 3 tonnes
  - Vessel fitted with radar, differential GPS giving accuracy to 2-3 metres

– Large DGPS plotter incorporating details of Ninety Mile Beach reef system
– Vessel surveyed for: 2C - 10 passengers to 30 mile off shore and 2B – five overnight passengers to 100 miles offshore intrastate

Sampling Equipment

The third party OSMP Consultant has its own wet laboratory in Victoria and has available the required sampling equipment for water quality and sediment quality. The third party OSMP Consultan also has a suite of ROVs, an automated underwater vehicle (AUV) and drones (with CASA certified operators) for rapid survey of intertidal reefs. The third party OSMP Consultant has fully certified divers with all required equipment including a suite of underwater cameras as well as side scan sonar units for mapping undersea habitats. All these resources are available for immediate deployment pending other commitments.

Table 2-3: NATA accredited laboratories

Laboratory	Contact Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Ph: 03 5176 4170
Ecotox Services Australia	27/2 Chaplin Drive, Lane Cove NSW 2066 Ph: 02 9420 9481
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166 Ph: 03 8564 5000
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167
Longford Plants Laboratory	Garretts Road, Longford VIC 3851 Ph: 03 5149 6259
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888

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.

If the spill may impact Tasmanian waters then consultation will occur with:

- the Environment Protection Authority Division of the Department of Primary Industries, Parks, Water, and Environment.

If the spill may impact New South Wales waters then consultation will occur with:

- NSW Environment Protection Authority;
- Transport for NSW

2.7 Review and revision

Regulation 19 of the OPGGS(E) Regulations provides for the revision of this OSMP. Review and update of the OSMP may be initiated through findings from drills/exercises, actual events, internal or external assessments, audits, changes to regulation, or via planned periodic review. As per the EP&R Guide, this document is subject to:

- an annual review
- a mid-cycle (i.e. 2.5 – 3 years) comprehensive update
- 5 yearly revision and resubmission (in accordance with resubmission of Environment Plans)

Any changes made during review and revision must be tracked and documented in order to demonstrate continued compliance with regulatory accepted versions of this document. Changes made to the OSMP should be reviewed against *OPGGS (Environment) Regulations 2009* (Reg 7, Reg 8, Reg 17) to determine if a resubmission is required.

The annual review should be a general review of the OSMP to ensure it remains applicable to current operations. Table 2-4 describes the topics that should be considered when completing a mid-cycle update of the OSMP.

Table 2-4 Scope of revision of OSMP

Topic	Useful Links / References
Reference to most recently published NOPSEMA guidance documents	https://www.nopsema.gov.au/environmental-management/environment-resources/
Values and sensitivities within the DA including:	
• KEFs	https://www.environment.gov.au/sprat-public/action/kef/search http://www.environment.gov.au/marine/publications/ south-east-marine-region-profile http://www.environment.gov.au/topics/marine/marine-bioregional-plans/temperate-east
• MNES	https://parksaustralia.gov.au/marine/ parks/south-east/ https://parksaustralia.gov.au/marine/ parks/temperate-east/
• Species Profile and Threats Database	http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
• BIAs	https://environment.gov.au/marine/ marine-species/bias
• Ramsar Wetlands	http://www.environment.gov.au/cgi-bin/wetlands/alphablist.pl
• Marine protected areas	https://parkweb.vic.gov.au/explore/ find-a-park/marine-protected-areas https://www.parks.tas.gov.au/index.aspx?base=397 https://www.dpi.nsw.gov.au/fishing/marine-protected-areas
Environmental Baseline Information	Refer to Implementation Plans for a summary of existing baseline data available in the Gippsland Region. Refer to linked references to review existing baseline data and establish if updates to existing baseline data is required.
Stakeholder Consultation	Consult with the Stakeholder Engagement Advisor for guidance on any relevant items to be considered.

Topic	Useful Links / References
Lessons Learned	Refer to Exercise reports for lessons learned to be considered. EP&R SharePoint – Offshore Drills and Exercises

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	• Visual surveillance; • Remote sensing.	• Visual observations of the location, extent, and appearance of the spill.

Sub-module	Sampling technique	Data collection and/or analysis
Aerial or underwater observation		• 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~~ in 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. • A least 10 years' experience in the collection and analysis of water quality samples. • 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)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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. • A least 10 years' experience in shoreline survey including the analysis of data. • 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)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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. • A least 10 years' experience in the collection and analysis of fauna data. • Level 2/3 - Doctorate in environmental science

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 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 • A least 10 years' experience in the collection and analysis of air quality measurements and data. • 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)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
Longford Plants Laboratory	Garretts Road, Longford VIC 3851 Phone: 03 5149 6259

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 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. • A least 10 years' experience in the collection and analysis of sediment quality samples. • 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)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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. The management plans for both Commonwealth and State Protected Areas that may be impacted by a spill do not provide guidance as to the levels of acceptable change nor do they state acceptable levels of contaminants including hydrocarbons.

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**
	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 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.	• Doctorate in environmental science; • At least 10 years' experience in the collection of environmental samples from water and sediments; • 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)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166 Ph: 03 8564 5000
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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;
	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;
	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 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	• Doctorate in environmental science; • At least 10 years experience in the collection of environmental samples from water and sediments; • 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)	4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166

NATA accredited laboratory	Details
	Phone: 03 8564 5000
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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 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.	• Doctorate in environmental science; • At least 10 years experience in the collection of fish and shellfish for laboratory analysis; • 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)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

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 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	• Doctorate in environmental science • At least 10 years' experience infauna survey including the survey of marine fauna; • 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)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888

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;
	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 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.	• Doctorate in environmental science; • At least 10 years' experience in the collection and anaylsis of fishery data; • 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
	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 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	• Doctorate in environmental science • At least 10 years' experience in the survey and analysis of fauna data; • 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;
	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 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	• Doctorate in environmental science • At least 10 years' experience in the collection and analysis of data relating to marine infauna; • 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;
	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 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	• Doctorate in environmental science • At least 10 years' experience in the collection and analysis of data on flora including coastal flora; • 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 that are important to the ECD* 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.

* as described in relevant Ramsar site documents prepared per the National ECD Framework

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 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	• Doctorate in environmental science • At least 10 years' experience iin dealing with Ramsar values including the analysis of changes to thoise values; • 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.

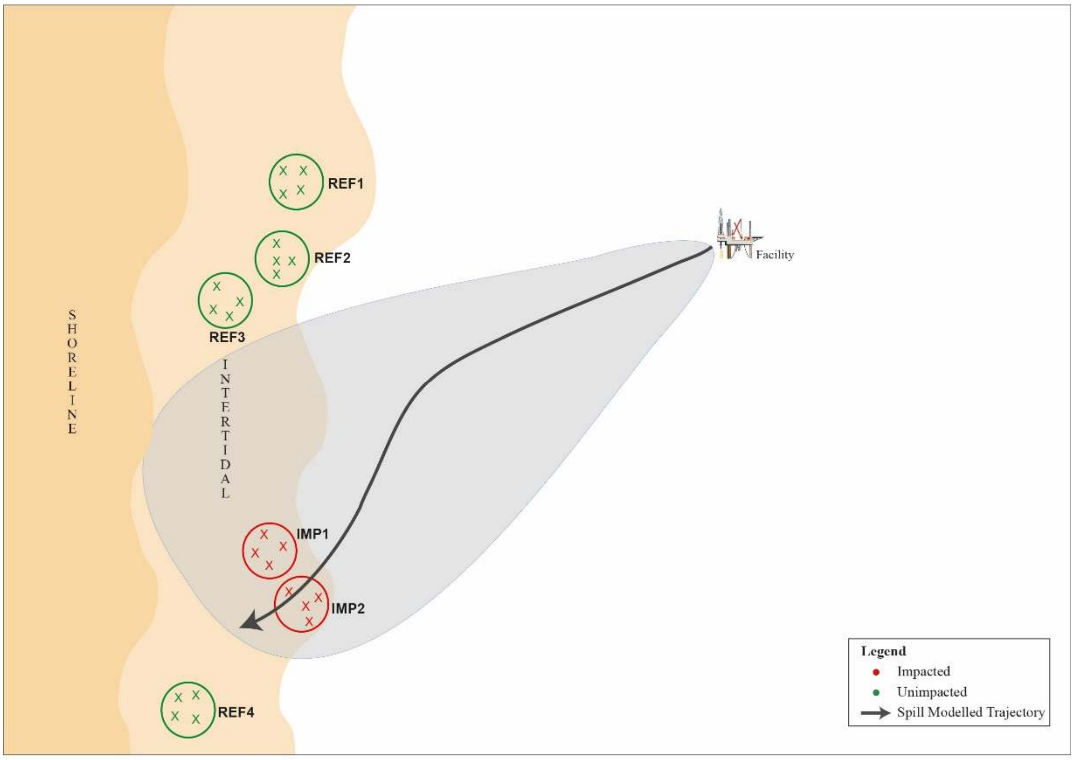
Note: data collection can depend on several constraints (as outlined above) and on access given logistical and safety constraints applicable to a particular spill event. Therefore, the survey designs recommended within the implementation guides for each scientific monitoring module, may not be able to 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:

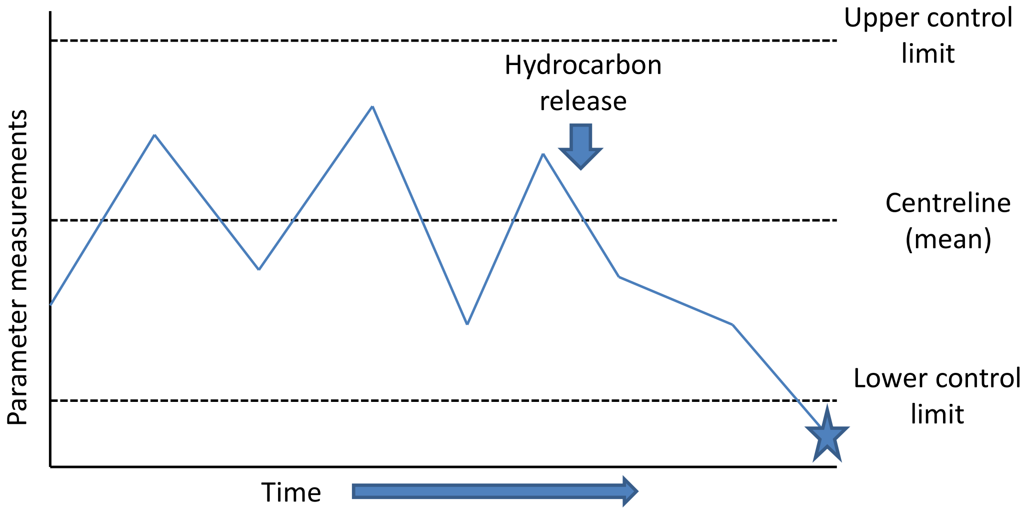
- When long-term (multi-year) datasets exist for the measured parameter;
- When a large amount of natural variation exists in the measured parameter;
- When predicting the expected range of outcomes from an impact.

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

Scientific monitoring provides for the quantitative assessment of the environmental impacts associated with a Level 2 or Level 3 spill. The primary goal of the scientific monitoring program is to document the overall impact (short and long term) of the spill on habitats, species and ecosystems and the subsequent post spill recovery.

In the event of a Level 2 or Level 3 spill, scientific monitoring will be activated and individual modules selected and implemented appropriate to the nature, scale and duration of the spill. Activation of these scientific modules during the spill operational response phase may be required to collect pre-contact baseline data or spill impact data at identified receptors. The appropriate scientific modules will be implemented to assess the extent, severity and persistence of environmental impacts associated with the oil spill event.

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.

The design of the scientific monitoring program adopts the following framework:

- Where adequate and appropriate baseline data exists, then scientific modules for species and habitats will commence if and when initiation triggers are reached. In this instance given the adequacy of baseline, the scientific modules will not document the decline of the habitat or species, but will quantify impacts and monitor post-spill recovery;
- Where adequate and appropriate baseline data is not available, the options which will be considered include the following:
  - Collect baseline data prior to hydrocarbon contact and meet the requirements for a Before/After Assessment[1]; or
  - Collect environmental data during the spill event, if practicable, to determine potential impacts[2];
- In all cases, undertake post-spill scientific monitoring to determine the overall impact of the spill and document post-spill recovery.

An assessment of available baseline data for environmental receptors within the DA is contained in each of the scientific modules. Within each of those modules there is an assessment of the scientific monitoring approach which respect to baseline, obtaining data and determining impacts.

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.

[1] Application of the simple BACI sampling design and data analysis programs can be applied to the quantification of oil spill related impacts. See Appendix A

[2] Spill impact and post impact monitoring data will be collected following 'beyond-BACI' principles which is amenable to statistical techniques that can detcte significant difference in recorded parameters (i.e. asymmetrical analysis of variance following procedures described by Underwood (1994).

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; 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.

Baseline monitoring

Baseline information for the environment has been sourced from existing data and is summarised in each scientific monitoring module. In the event of a spill, where insufficient baseline exists information will be augmented with ‘reactive’ baseline studies at control sites or using pre-impact data at the receptor site where appropriate.

Control sites (i.e. similar to the impact or disturbance location) are often more relevant than reference sites (undisturbed or natural sites) for determining the impact of an oil spill as separate from other human or natural stressors (Downes *et al.* 2002). In the event of a spill existing baseline information will 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 DA, but outside the impacted area for any given single spill and will be selected post spill event on the basis of their representativeness to the potentially impacted site and their ability to provide a reliable comparison against which to compare the potentially impacted environmental values that are being measured.

The number of samples and/or sampling locations for a particular spill will depend on the extent of the spill, and the statistical power necessary to determine whether there has been an impact and the ability of the monitoring program to determine recovery and termination criteria.

Existing data

Baseline data characterises the existing environment and its variability both in affected sites and unaffected (control or reference) sites.

The EP contains desk study baseline environmental, social and economic values within the DA at a level deemed suitable for risk assessment and identification of mitigation and contingency planning measures as set out in the EP and OPEP.

In the event of a Level 2 or 3 spill relevant specific existing data will be obtained as the starting point to scientific monitoring, by the following process:

- Relevant scientific monitoring studies are catalogued for identified sensitive locations along with the custodian’s contact details;
- The monitoring methodology, monitoring sites, and sampling duration and frequency of monitoring studies are provided when appropriate in a tabular format to identify methodological differences, and spatial and temporal gaps in accrued baseline data information;
- In the event of a spill data custodians will be contacted and datasets requested. As a contingency, ‘data mining’ from publically available information will occur simultaneously for baseline database establishment; and

- Data gaps will be used by the PI to refine the SAP to further optimise the design of the study.

Within each module is a summary of the available baseline information together with implementation strategy to address the assessment of impacts is provided.

Monitoring survey type

Establishment of baseline is conducted according to Table B1.

Table B1 Baseline data types

Type	Description
Baseline field surveys	Field surveys undertaken in advance of the full implementation of the investigations in the modules where baseline information is required. Since the DA is very large and actual spill trajectory dependent on many variables, it is not possible to devise a study programme in advance of a spill that would provide a useful, representative baseline that would cover all spill scenarios.
Reactive baseline surveys	Monitoring surveys mobilised rapidly after a spill to assess baseline conditions at sensitive locations potentially affected by the spill but before spill contact. Esso recognises that reactive baseline monitoring surveys alone may not be sufficient to serve as a baseline dataset, but can provide an important contribution to augment existing ‘baseline’ with a ‘current pre-exposure’ condition.
Baseline studies at control sites	Monitoring at sites chosen from within the DA but where spill trajectory estimation predicts no contact.

Impact surveys

Impact surveys examine the immediate aftermath of a spill on specific receptors.

Recovery surveys

Recovery surveys examine the long term effects on specific receptors following the spill recovery.

Use of operational monitoring data

Findings of operational monitoring will be incorporated into the datasets gathered by scientific monitoring.

Monitoring methods

Survey and analytical methods are specific to the environmental value or receptor to be monitored. Methods selected for each module are set out in the relevant subsection of each module.

Monitoring sites

Reactive baseline monitoring sites

Selection of reactive baseline survey sites will depend on a range of site-specific, scientific criteria depending on the module. However in general sites must be:

- Representative of the spill-specific DA area;
- Coincide in proximity to locations with long-term (or recent) monitoring (notably in Victorian Marine Conservation Areas); and
- Be free from obvious anthropogenic impacts.

Reference sites

Reference sites are those that are representative of undisturbed / natural conditions of similar type, habitat, community etc. to those affected. Although reference sites for most types of affected environment will exist within the DA, control sites may be more representative in many cases.

Control sites

Control sites (i.e. unaffected sites similar to those affected by the spill) are used to determine the impact of an oil spill as separate from other human or natural stressors. In the event of a spill existing baseline information will be used to select relevant control sites outside the impact area of a single spill and must be selected post spill. Control sites will be selected and details of distribution and number of replicates will be decided after detailed appraisal of baseline data such that an understanding of the variability of the data can be obtained.

Monitoring indicators

Indicators are specific species, communities or habitats where changes reflect impacts on the wider environment. Indicators for scientific monitoring were identified and chosen based on the following criteria.

Typical – representative of ecological characteristics of the DA

Monitoring of spill impacts is focussed on species that are known to regularly occur within the DA and for which the DA provides vital habitat. This accords with the ecological principle of 'regularly supports' (United Nations 1971).

Sensitive – are sensitive to the impacts of oil spills

Species and communities can be impacted by both the oil spill and by associated response actions. The mechanisms and cumulative impacts to species and communities have been explored using a stressor model. This does not cover the entire myriad of complexities and pathways associated with oil and response actions in marine, coastal and estuarine environments but provides an overview of the main linkages (Gross 2003).

Determining impacts

Data on impacted sites will be compared with baseline data from reference or control locations to determine impacts. Multiple reference / control locations will be selected to provide a robust assessment of the impacts.

If there is sufficient statistical power in the data collected then post-impact monitoring will be analysed using statistical models such as Analysis of Variance (ANOVA). The data collected during the monitoring may be too variable to establish statistical trends. Such a situation is not uncommon in monitoring programs where limited 'before' data are available.

Generally determination of an impact involves an experimental approach with sampling before and after the purported impact at both potentially impacted and control (non-impacted) sites – the BACI (Before – After – Control – Impact) approach. The BACI approach allows for the detection of impacts that can be identified as statistically separable from the background natural variation that could be causing the observed phenomenon. The soundness of the approach stems from the ability to combine a range of design elements (an assessment of the before situation, replication, use of controls) to ensure the robustness of the assessment.

In many cases, and this situation pertains to an oil spill is one of them, where there is an inability to be able to collect information about the pre-impact situation. This may be as a result of adverse weather conditions not allowing a reactive baseline survey to be conducted safely. Thus a situation can arise there is insufficient information available as to what the before situation was and indeed what the situation was at any control location either before or after the action. There is also potentially no replication. In such cases an evaluation of the available evidence can be undertaken to see whether there is support for a particular hypothesis or not. Downes *et al*. (2002) in their book on monitoring of aquatic environments present a detailed review of this technique, the Weight (Levels) of Evidence approach. The use of multiple lines of evidence consistent with the integrated assessment philosophy of the revised ANZECC/ARMCANZ (2000a) guidelines as discussed in the CSIRO Handbook for Sediment Quality Assessment (Simpson *et al*., 2005).

A weight of evidence approach can be taken when there is no definitive experimental evidence available to support or not support an hypothesis. This approach is not widely used in the environmental sciences but an important tool in biomedical science where replication and experimental proof of cause and effect are often difficult if not impossible.

Esso Australia Resources Pty Ltd

Bass Strait Environment Plan Volume 4 (Operations)

ENVIRONMENTAL PERFORMANCE AND IMPLEMENTATION STRATEGY

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Approved By:	Simon Kemp	Offshore Asset Manager	On file	6 Sept 19

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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

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
COMI	Crane Operations, Maintenance and Inspection
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
EBP	Environmental Business Planning
EMS	Environmental Management System
EP	Environment Plan
EP&R	Emergency Preparedness and Response
EPBC	Environment Protection and Biodiversity Conservation
EPI	Environmental Performance Indicator
EPOs	Environmental Performance Objectives
EPS	Environmental Performance Standards
ERM	Emergency Response Manual
ERP	Emergency Response Plan
ESG	Emergency Support Group
ETS	Environmental Tag System
FIMS	Facility Integrity Management 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
LEM	Lifting Equipment Manual
LOWC	Loss of well control
LSC	Logistics Section Chief
m	Metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Management Committee
MDO	Marine Diesel Oil
MOC	Management of Change
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum of Understanding
t	MetricTon
NAF	Non-Aqueous Fluid
NEBA	Net Environmental Benefit Analysis
NGER	National Greenhouse and Energy Reporting
NGO	Non-Governmental Organisation
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
OCNS	Offshore Chemical Notification Scheme
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
PFW	Produced Formation Water
PLONOR	Pose Little Or No Risk
POM	Platform Operating Manual
PMeT	Procedures Management Electronic Tool
PMS	Planned Maintenance System
PNG	Papua New Guinea

PSC	Planning Section Chief
PSF	Process Safety Framework
PS&O	Platform Surveillance and Optimisation
PSZ	Petroleum Safety Zone
PTW	Permit To Work
PTWS	Permit To Work System
QA	Quality Assurance
RA	Risk Assessment
RC	Required Competency
ROC	Residual Oil on Cuttings
RRT	Regional Response Team
SAP	WIMS - System Application Product
SCAT	Shoreline Clean-up and Assessment Technique
SCB	Source Control Branch
SETVIA	South Eastern Trawl Fishing Industry Association
SFRT	Subsea First Response Toolkit
SIMOPS	Simultaneous Operations
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
WIMS	Well Integrity Management System
WMM	Waste Management Manual
WMS	Work Management System
WOMP	Well Operations Management Plan
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 impacts and risks identified in Bass Strait Environment Plan Volumes 2 and 3.

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; and

Measurement criteria (not defined in the regulations) – defines how environmental performance will be measured such that the measurement can be used to determine whether the EPS and EPO have been met.

1.2 Environment Performance – Operations

Table 1-1 Environmental Performance - Operations

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Platform Operations	Emissions to Air	Change in air quality Injury / mortality to fauna	Undertake the activity in a manner that will not: • result in a substantial change in air quality which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • result in a substantial change in climate which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • lead to a long-term decrease in the size of a threatened or migratory listed species population. • impact the long-term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction.	**CM1:** Facility Integrity Management System	Platform combustion equipment is maintained as per equipment strategy.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
				CM2: Flaring occurs for safety reasons or during equipment malfunction, emergency situations, commissioning / start up and for maintenance reasons	Flaring only occurs for safety reasons or during equipment malfunction, emergency situations, commissioning / start up and for maintenance reasons.	Flaring records demonstrate that flaring has only occurred for safety reasons or during equipment malfunction, emergency situations, commissioning / start up and for maintenance reasons.
Platform Operations Subsea facilities operations	Planned Discharge - Operational Fluids	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not • result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM3:** Chemical Assessment Process	Fluids planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemicals approved for use and discharge list confirms the fluids meet criteria for discharge.
Platform Operations	Produced Formation Water	Change in water quality Change in sediment quality	Undertake the activity in a manner that will not • result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM10:** Water Handling System	Oily water treatment system is operational to ensure oil has been removed to below 30mg/L oil-in-water daily average (or 50 mg/L daily average during water handling	Records showing the daily average oil in PFW, as measured by the online monitor, confirm concentration equal to, or less than, 30mg/L (or 50

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
		Injury / mortality to fauna	• have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution beyond a 2 km mixing zone		start-up) before discharge to the sea.	mg/L daily average where operations logs report water handling start-up).
				CM11: Annual Produced Water Sampling Program and toxicity assessment (msPAF)	PFW discharge impacts less than 5% of species beyond 1000 m.	msPAF prediction based on annual sampling of platform PFW composition.
				CM3: Chemical Assessment Process	Fluids planned for discharge in PFW are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemicals approved for use and discharge list confirms the fluids meet criteria for discharge.
Platform Operations	Accidental Release - Dropped Objects	Change in habitat	Undertake the activity in a manner that will not result in a dropped object that causes disturbance to sensitive benthic habitat.	**CM1:** Facility Integrity Management System	Cranes and lifting gear are maintained in accordance with the relevant equipment strategy.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
Platform Operations Subsea facilities Operations Pipeline Operations	Accidental Release – LOC (chemicals / hydraulic fluids)	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM1:** Facility Integrity Management System	Topsides equipment is maintained in accordance with its relevant equipment strategy in order to reduce the risk of failure and accidental release of chemicals and hydraulic fluids.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process
				CM12: 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.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Platform Operations	Accidental Release - Waste	Change in habitat Injury / mortality to fauna	Undertake the activity in a manner that will not result in accidental overboard release of waste (garbage) that causes: • disturbance of sensitive benthic habitat. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM13:** Platform induction process (Greencard)	All personnel are aware of waste management requirements and have access to relevant waste receptacles.	Greencard demonstrates that waste management requirements and location of receptacles are communicated to all offshore personnel.
Platform Operations	Accidental Release - Bulk Transfer	Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM1:** Facility Integrity Management System	Bulk transfer hoses are maintained as per equipment strategy.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
				CM14: Procedures for bulk transfer of fluids from supply vessels.	Bulk transfer of fluids from supply vessels undertaken in accordance with relevant procedures.	PTW records for liquid bulk transfers.
Pipeline Operations	Accidental Release – LOC (pipeline)	Change in water quality Injury / mortality of fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM1:** Facility Integrity Management System	Pipelines maintained in accordance with its relevant equipment strategy in order to reduce the risk of failure and accidental release of hydrocarbons.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
				CM12: 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.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Platform Operations	Accidental Release - LOC (bulk storage)	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM1:** Facility Integrity Management System	Bulk storage is maintained in accordance with its relevant equipment strategy in order to reduce the risk of failure and accidental release of chemicals and hydraulic fluids.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
				CM1: Facility Integrity Management System	Leg internal storage tanks are inspected and maintained as per the relevant equipment strategy.	Maintenance exception reports demonstrate that maintenance work has been completed and if not, has been through the maintenance exception process.
				CM12: 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.
Platform Operations	Accidental Release – LOC from drain system	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a release of hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM1:** Facility Integrity Management System	Pile equipment are maintained as per equipment strategy.	Maintenance exception reports demonstrates that maintenance work has been completed and if not, has been through the maintenance exception process.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
		Change in habitat Change to the function, interests or activities of other users.	• a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution. • a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • interference with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	**CM30:** Offshore Technical Monitoring Program	Quarterly monitoring of pile trends identifies abnormalities and response actions taken to address abnormalities as required.	PS&O Technical Monitoring report documents the identification and significance of abnormalities and any action items required to address abnormalities.

Table 1-2 Environmental Performance – Wellwork

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Wireline / Workover Activities (general)	Emissions to Air	Change in air quality Injury / mortality to fauna	Undertake the activity in a manner that will not: • result in a substantial change in air quality which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • result in a substantial change in climate which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • lead to a long-term decrease in the size of a threatened or migratory listed species population. • impact the long term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction.	**CM4:** Wireline / Workover work scope or plan.	Gas will be flared / vented as per Wireline / Workover work scope or plan.	Wireline / Workover work scope or plan.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Wireline / Workover Activities (general) Conductor cutting and pulling Conductor Clean-out Sandwash	Planned Discharge – Operational Fluids	Change in water quality Change in sediment quality Injury / mortality to fauna	Undertake the activity in a manner that will not: • result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • result in a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM3:** Chemical Assessment Process	Fluids planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemicals approved for use and discharge list confirms the fluids meet criteria for discharge.
Cementing	Planned Discharge – Cement	Change in water quality Change in sediment quality				
Conductor Clean-out Sandwash	Planned Discharge – Solids	Change in water quality	Undertake the activity in a manner that will not result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM5:** Collection and onshore disposal of solids.	Solid collection equipment (such as filters, sieves and settling vessels) is used when completing wellwork activities in order to capture solids for onshore disposal, so far as reasonably practicable.	Workover program shows a plan for the collection of solids as needed. Daily records demonstrate that workover program has been followed.
Wireline / Workover Activities (general) Conductor cutting and pulling	Accidental Release - Dropped Objects	Change in habitat	Undertake the activity in a manner that will not result in a dropped object that causes disturbance to sensitive benthic habitat.	**CM1:** Facility Integrity Management System	Cranes and lifting gear are maintained in accordance with the relevant equipment strategy	Maintenance exception reports demonstrates that maintenance work has been completed and if not, has been through the maintenance exception process.
Wireline / Workover Activities (general)	Accidental Release - LOC (chemicals / hydraulic fluids)	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity,	**CM15:** Preventative Maintenance System	Equipment used for wellwork activities is maintained in accordance with the relevant PMs (contractor or Esso dependent on equipment).	Records demonstrate maintenance has been conducted in accordance with the relevant PMS.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
			ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.			
Wireline / Workover Activities (general)	Accidental Release - Loss of Well Control	Change in water quality Injury / mortality to fauna Change in habitat Change to the function, interests or activities of other users.	Undertake the activity in a manner that will not result in a release of hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution. • a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • interference with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	**CM32:** Well Operations Management Plan (WOMP)	All production wells are provided for in the Gippsland Basin WOMP.	Records confirm all wells are detailed within the NOPSEMA-accepted WOMP.
				CM33: WellWork Execution Manual (WEM)	All wellwork activities will be undertaken in accordance with wellwork execution manual.	Records confirm BOP testing
				CM34: NOPSEMA accepted Safety Case	A NOPSEMA-accepted safety case is in place for all well work activities.	Records confirm a NOPSEMA-accepted safety case.
				CM12: 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.
				CM35: 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.

Table 1-3 Environmental Performance – Inspection, Maintenance and Repair (IMR)

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Pipeline and Subsea IMR	Physical Presence - Interference with Other Marine Users	Change to the function, interests or activities of other users	Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	**CM6:** Wet storage will occur within an existing PSZ or 200m operational zone around pipelines	Equipment or infrastructure wet stored on the seabed within PSZ or 200m operational zone around pipelines.	Records showing locations of wet stored equipment and updated on relevant drawings.
Pipeline and Subsea IMR	Physical Presence – NORM	Change in habitat	Undertake the activity in a manner that will not result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM31:** Wet Storage Assessment	A Wet Storage Assessment will be undertaken which will assess technical and environmental considerations associated with management of NORM.	Wet Storage Assessment
Facility IMR Pipeline and Subsea IMR	Planned Discharge - Operational Fluids	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM3:** Chemical Assessment Process	Fluids planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemicals approved for use and discharge list confirms the fluids meet criteria for discharge.
Facility IMR Pipeline and Subsea IMR	Planned Discharge – Solids	Change in water quality	Undertake the activity in a manner that will not result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**CM7:** Abrasive blasting SWP 50.101	Abrasive blasting area is contained to capture solids and fines as far as practicable. Captured material is sent to shore for disposal.	PTW records demonstrates solids have been contained as far as practicable.
Facility IMR	Unplanned interaction with fauna	Change in fauna behaviour	Undertake the activity in a manner that will not: • Impact the long term survival and recovery of albatross and giant petrel populations	**CM16:** SWP 50.139.A1 – Drone Operation Offshore	Drone operators must check for presence of wildlife in the work area to ensure suitable flight route planning and positioning of drone.	PTW records demonstrate that Inspection Drone Operation Checklist has been completed.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
			breeding and foraging in Australian jurisdiction. • Lead to a long-term decrease in the size of a threatened or migratory listed species population. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM17**: SWP 50.313 – Sea Deck Access	All work undertaken on sea deck will require a JSA.	PTW records for work requiring sea deck access.
				CM13: Platform induction process (Greencard)	All personnel are aware of platform restricted areas, including sea deck.	Greencard demonstrates that platform restricted areas have been communicated to all offshore personnel.
Facility IMR Pipeline and Subsea IMR	Accidental Release – LOC (chemicals / hydraulic fluids)	Change in water quality Change in habitat Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM1:** Facility Integrity Management System	Equipment maintained in accordance with the relevant equipment strategy in order to reduce the risk of failure and accidental release of chemicals and hydraulic fluids.	Maintenance exception reports demonstrates that maintenance work has been completed and if not, has been through the maintenance exception process.

Table 1-4 Environmental Performance – Support Operations

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Vessel Operations Helicopter Operations	Underwater Sound Emissions	Change in ambient noise Change in fauna behaviour	Undertake the activity in a manner that will not • result in a substantial change in ambient noise which may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results. • lead to a long-term decrease in the size of a threatened or migratory listed species population. • have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM8:** Vessel Master	Vessel Master is aware and implements EPBC 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 record when cetaceans were sighted in the caution zone and interaction management actions implemented.
Vessel Operations	Emissions to Air	Change in air quality Injury / mortality to fauna	Undertake the activity in a manner that will not: • result in a substantial change in air quality which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • result in a substantial change in climate which may adversely impact on biodiversity, ecological integrity; social amenity or human health. • lead to a long-term decrease in the size of a threatened or migratory listed species population. • impact the long term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction.	**CM9:** Class certification	Fuel combustion equipment complies with the requirements of MARPOL Annex VI.	Vessels have class certification verified and issued by IACS member.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Vessel Operations	Planned Discharge - Deck Drainage & Bilge	Change in water quality	Undertake the activity in a manner that will not: • result in a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution. • adversely affect the sustainability of a commercial fishery. • lead to a long-term decrease in the size of a threatened or migratory listed species population. • impact the long term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction. • hinder the recovery of white shark in the near future, or impact on the conservation status of the species in the future.	**CM9:** Class certification	Bilge discharges from vessels comply with MARPOL Annex I requirements. Deck drainage discharges comply with MARPOL Annex V requirements.	Vessels have class certification verified and issued by IACS member.
Vessel Operations	Planned Discharge - Sewage and Grey water	Change in water quality Injury / mortality to fauna			Sewage discharges comply with MARPOL Annex IV requirements.	
Vessel Operations	Planned Discharge – Food waste	Change in fauna behaviour			Food waste discharges comply with MARPOL Annex V requirements.	
Vessel Operations	Unplanned Interaction with Fauna	Injury / mortality to fauna	Undertake the activity in a manner that will not: • lead to a long-term decrease in the size of a threatened or migratory listed species population. • have a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM8:** Vessel Master	Vessel Master is aware and implements EPBC 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 approach the vessel within the above	Daily operations reports record when cetaceans were sighted in the caution zone and interaction management actions implemented

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
					zones, the vessel will avoid rapid changes in engine speed or direction.	
Vessel Operations ROV Operations	Accidental Release - Dropped Objects	Change in habitat	Undertake the activity in a manner that will not result in a dropped object that causes disturbance to sensitive benthic habitat.	**CM18:** Preventative Maintenance System (Vessel)	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.	Records verify that inspections and testing have been conducted to schedule.
				CM19: Cargo Securing Manual	All cargo secured in accordance with approved Cargo Securing Manual to prevent loss to sea.	Pre-departure checklist verifies that cargo is securely sea-fastened.
Vessel Operations	Unplanned Introduction of IMS	Change in ecosystem dynamics Change in the functions, interests or activities of other users	Undertake the activity in a manner that will not: • result in a known or potential pest species becoming established. • modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results. • interfere with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	**CM23:** Ballast Water Management Plan	Ballast Water Management Plan approved in accordance with IMO Ballast Water Management Convention – Australian Guidelines for Ballast Water Management and Development of Ballast Water Management Plans.	Ballast Water management Plan.
				CM24: Ballast Water Certificate	Ballast Water Management Certificate approved in accordance with Regulation E-1 of the Ballast Water Convention	Ballast Water Management Certificate.
				CM25: DAWR clearance when entering Australian territory	Vessel Master to obtain DAWR clearance to enter Australian territory through pre-arrival information reported through Maritime Arrivals Reporting System (MARS).	Records confirm DAWR status.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
				CM8: Vessel Master	Vessel Master to adhere to Australian Ballast Water Management Requirements and IMO Ballast Water Management Convention.	Ballast water records show location of ballast water uptake and discharge.
				CM26: 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.
Vessel Operations ROV Operations	Accidental Release – LOC (chemicals / hydraulic fluids)	Change in water quality Injury / mortality to fauna	Undertake the activity in a manner that will not result in a spill of chemicals or hydrocarbons to the marine environment greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM20:** SMPEP	MARPOL Annex I Regulations for the Prevention of Pollution by Oil specifically require that a SMPEP (or equivalent, according to class) is in place.	Vessels have class certification verified and issued by IACS member.
				CM21: ROV pre-post dive checks	A ROV pre and post dive inspection visually check for leaks.	Records of ROV pre and post dive inspection checklist.
				CM22: ROV IMCA Audit	ROV installation inspected against IMCA Guideline.	Audit report - corrective action managed in accordance with IMC A category rating.
Vessel Operations	Accidental Release - Waste	Change in habitat Injury / mortality to fauna	Undertake the activity in a manner that will not result in accidental overboard release of waste (garbage) that causes: • disturbance of sensitive benthic habitat. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	**CM9:** Class certification	Vessel compliant with MARPOL Annex V such that waste (garbage) is not disposed of from vessels.	Vessels have class certification verified and issued by IACS member.

Activity	Aspect	Impact	Environmental Performance Outcome (EPO)	Control	Environmental Performance Standard (EPS)	Measurement Criteria
Vessel Operations	Accidental Release - LOC (vessels)	Change in water quality Injury / mortality to fauna Change in habitat Change to the function, interests or activities of other users	Undertake the activity in a manner that will not result in a release of hydrocarbons to the marine environment from drain systems greater than 1 bbl or that causes: • a substantial change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • a substantial adverse effect on a population of a marine species including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution. • a substantial change in sediment quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • interference with other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted.	**CM27:** Support vessel approach procedure	The 500m approach checklist and DP Checklist are completed prior to the vessel entering the 500m PSZ.	Records of the facility 500 m PSZ and DP operational checklists.
				CM28: ASOG / CAMO procedures	Activity Specific Operating guidelines (ASOG) / Critical Activity Mode (CAMO) procedures developed to IMCA Standard.	Implementation (AFI) procedures signed by Vessel Master.
				CM29: Support vessel DP system	All support vessels engaged in DP operations have Class recognised DP 2/3 notation.	Records of IACS member DP Notation, Failure Mode and Effects Analysis (FMEA), proving trials and Annual Trials.
					Watchkeepers in charge of watch hold DP certification.	Records of watchkeepers DP certificates.
				CM20: SMPEP	MARPOL Annex I Regulations for the Prevention of Pollution by Oil specifically require that a SMPEP (or equivalent, according to class) is in place.	Vessels have class certification verified and issued by IACS member.

1.3 Environmental Performance – Emergency Response Capability

Table 1-5 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 within 2 hours 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 Response 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	During daylight hours 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.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Support vessel	Support vessel is available to complete surveillance and monitoring when <24hours from request of service.	Record of capability testing.
	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.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Contract with third party provider to install/operate SFRT.	Current agreement for provision of personnel to install and operate SFRT equipment.	Agreement document.
	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.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Agreement in place with AMOSC	Response capabilities maintained per AMOSC Service Level Statement.	Annual assurance assessment report.
	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 Operations Integrity Management System (OIMS)

The OPGGS(E)R 14(3) requires that the implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that for the duration of the activity:

a) the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable (ALARP); and
b) control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level; and
c) environmental performance outcomes and standards set out in the environment plan are being met.

The Environmental Management System (EMS) is the method by which environmental impacts and risks are managed to ensure they are reduced to ALARP and an acceptable level for the duration of the activity. The Environmental Management System on Esso facilities is called OIMS (Operations Integrity Management System). Lloyd's Register Quality Assurance Inc. has assessed OIMS and concluded that it is consistent with the intent and meets the requirements of ISO 14001 (Environmental Management Systems).

In practice OIMS comprises of a number of separate systems each designed to meet specific expectations, which are set out within a framework of 11 separate elements. ExxonMobil's OIMS Framework (Figure 2-1) establishes common worldwide expectations for addressing risks inherent in the business. The term Operations Integrity is used by ExxonMobil to address all aspects of its business that can impact personnel and process safety, security, health and environmental (SSHE) performance.

The 11 elements of OIMS interact within a hierarchy as shown in Figue 2-1. The visible leadership and commitment of management required by Element 1 is the driver for the effective implementation of OIMS. Elements 2 to 10 provide the operations of OIMS to control the hazards associated with the operation of all facilities. Element 11 provides evaluation of the effective implementation of Elements 1 to 10 through a process of periodic audits and assessments. Element 11 also drives the feedback loop within OIMS.

Key aspects of OIMS relevant to the implementation of this Environment Plan are described in further detail below. All OIMS Management Systems contribute to the effective management of the environmental impacts and risks identified in this EP.

Figure 2-1 OIMS Framework

2.1 Compliance with Laws, Regulations and Permits (OIMS System 4-2)

OIMS System 4-2: Compliance with Laws, Regulations and Permits, addresses regulatory compliance activities during all phases of operations. Several mechanisms are in place to identify new or amended requirements that may or may not have an impact on the environment:

- 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);
- Engagement with government agencies and review of government publications of laws and regulations; and
- Participation in government-sanctioned working committees.

If new, amended or existing requirements are identified, an assessment is made as to their applicability and possible impact on Esso operations and the environment. Environmentally relevant changes could include:

- Changes to existing legislation or introduction of new legislation
- Changes to the existing environment including (but not limited to) fisheries, tourism and other commercial and recreational uses, and any changes to protective matter requirements;
- 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 incident investigations, emergency response activities or emergency response exercises.

Changes to legislation are screened 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.

Relevant changes to protected matter management are assessed on an periodic basis by the Offshore Environmental Advisor, and incorporated into the risk assessments, control measures, EPOs and EPSs and implementation strategy in the EP where required.

Changes assessed by the Offshore Environmental Advisor are reviewed and assessed in accordance with the process outlined in Section 2.7 (Management of Change (OIMS System 7-1)).

2.2 Operations and Maintenance Procedures (OIMS System 6-1)

Esso has a comprehensive library of operations and maintenance procedures (managed by OIMS System 6-1) that cover the full range of activities that are undertaken throughout the Bass Strait operation. Key manuals or procedure types are:

- Platform Operating Procedures detail procedures for operating the platform, including start up procedures, critical function test procedures, process or platform shut down procedures, managing the flare, vent and drain system, and managing the produced water handling system (CM10).
- Offshore Maintenance Procedures cover inspection and maintenance related activities on offshore platforms, pipelines and subsea facilities and include: vessel tanks and exchangers; pumps; compressors; generators and turbines; piping and valves; instrumentation and electrical systems; fire, safety and protective equipment; as well as maintenance and calibration of the produced water online analysers.
- Crane Operation, Maintenance and Inspection (COMI) procedures define the responsibilities for Crane Operators, Maintenance Technicians and the Maintenance Reliability Group. COMI procedures are available for lifts including diesel, glycol and for methanol bulk transfer from supply vessels (CM14).
- The Lifting Equipment Manual (LEM) includes guidelines for use, storage, maintenance, inspection and purchase of cargo lifting gear (such as winches, jacks, hoists and rigging) used for routine cargo handling.
- Underwater Operations Manual contains marine operations procedures, although some platform based marine operations procedures are also found in the Work Management System.

Procedures are stored and accessed via a globally mandated electronic system known as the Procedures Management Electronic Tool (PMeT). This ensures that the most recent version of a procedure is readily available for use. PMeT is supplemented by physical back-up copies of many of the manuals listed above including procedures and other documents, for situations where the PMeT system is unavailable.

Risk assessment processes are used to identify when procedures are needed to mitigate a risk, and to categorise the procedures as critical procedures, normal procedures or work aids (dependent on the level of risk when completing the work described in the procedure). This assessment process establishes the approval authority, deviation authority, review period and compliance expectations.

Water Handling System (CM10)

As described in Volume 2, produced water is handled at various stages throughout the production process. Control systems and Platform Operators adjust the parameters of oil-in-water separation equipment at each stage of the process to ensure the water handling system operates efficiently and achieves the required performance standard. Key operational adjustments that affect water separation effectiveness are:

- Well mix (which combination of wells are flowing);
- Choke settings on wells (affect production rates from each individual well);
- Separator interface levels and residence times;
- Production chemical additives (e.g. emulsion breakers or clarifiers); and

- Water rates through hydrocyclones and residence times in dissolved gas flotation vessels.

Procedures for operation of the production equipment are described in various Platform Operating Procedures.

Procedure GEN-100-102 'System Monitoring, Recording and Reporting' specifically describes the requirements for oil-in-water measurement and includes steps to be taken if oil-in-water measurement readings deviate beyond specified limits so that the overall daily average oil-in-water concentration remains below the required performance standard. Specifically, GEN-100-102 describes the methods by which oil-in-water is monitored, readings are verified and the actions to be taken to ensure oil-in-water concentration meets the required environment performance standard.

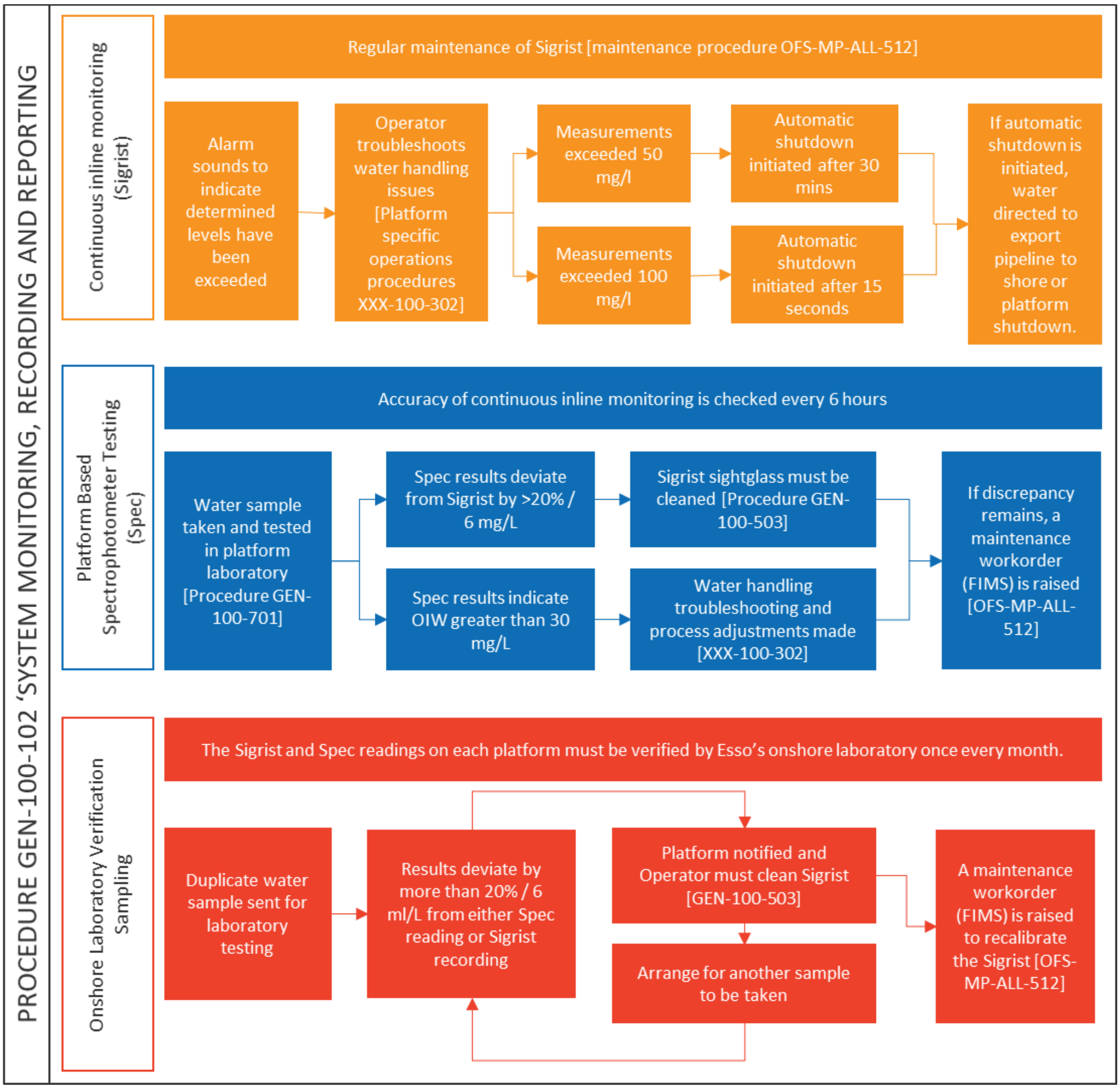


Figure 2-2 Produced Water monitoring, recording and reporting

2.3 Facility Integrity (OIMS System 6-2)

The Facility Integrity Management System (FIMS), defines the key processes, standards and tools to be applied to the integrity management of equipment. FIMS provides a structured approach to integrity management through program design, execution, stewardship and improvement, and implements central standards and performance monitoring. This system applies to all maintenance activities including regulatory, safety, repair, programmed, condition monitoring, inspection, corrective action, root-cause failure analysis, and improvements.

Programs are in place to prevent and monitor degradation of structures, production equipment, pipelines and electrical systems and to confirm the availability of protective systems including fire & gas detection, shutdown and evacuation systems.

Risk based equipment strategies identify degradation mechanisms and are developed to analyse and define the maintenance requirements for specific plant and equipment which is then used to develop preventative maintenance programs. Equipment strategies are reviewed periodically.

Individual Integrity Programs document the process applied to manage the ongoing integrity of specific equipment and/or plant. The following Integrity Programs are managed through the FIMS process:

- Corrosion Control & Chemical Injection;
- Pressure Equipment;
- Pipelines;
- Structures and structural equipment;
- Machinery;
- Subsea Equipment;
- Critical Instrumentation, Controls & Alarms;
- Electrical Systems;
- Cranes & Lifting Gear;
- Emergency Communications;
- Security;
- Fire Fighting Equipment; and
- Oil Spill Response Equipment.

Note: Well integrity is managed under OIMS System 6-3.

The outcomes of inspection and maintenance activities are analysed and appropriate repairs or actions are taken. Equipment determined not fit for service is assessed for risk, and the required mitigations put in place to enable continued safe and reliable performance. The results may also be used to determine whether a review of the integrity program (which may result in a change to the condition monitoring or inspection program and schedule) is appropriate.

Maintenance and inspection program tasks and requirements are contained within a computerised maintenance management system (IPES). Planners, Supervisors and Technicians use IPES and other tools to generate work requests and work orders, plan and schedule work, order parts & materials, write technical reports and record failure mode and other useful data.

Integrity Program compliance is monitored through the IPES Exception Reporting process which monitors if activities are carried out per the approved work plans. Potential work plan schedule deviations are subject to risk-based analysis to allow for rescheduling, or developing and implementing corrective action plans through the MOC process. Program tasks are analysed on a monthly basis to identify maintenance, inspection or testing tasks that were due during the month but not completed.

An exception report is prepared for the Operations Superintendent to review at the end of each month detailing all integrity critical equipment program tasks past their expected due date (CM1).

The Operations Superintendent, with appropriate technical and operations staff assistance, evaluates the risk to the operation. Extension of integrity critical equipment program tasks by more than 30 days past the latest acceptable completion date (referred to as exceptions >30 days) requires a plan to perform the task within a timeframe that meets the asset's safety and reliability objectives, and requires approval by the Operations Superintendent. Exceptions > 90 days require endorsement by the Operations Superintendent and approval by the Production Manager.

2.4 Well Management System (OIMS System 6-3)

The Well Management System (OIMS System 6-3) provides the structure for wellwork planning and operations as well as ongoing well integrity activities. The Well Integrity Manual describes policy, management principles, performance standards, assurance processes, procedures and practices that exist to ensure well integrity and to minimise the risk of unplanned or uncontrolled release of wellbore fluids. Monitoring and maintenance of well integrity is completed on a regular basis and includes:

- Annulus pressure monitoring and bleed down test;
- Subsurface safety valve testing;
- Wellhead and tree testing and maintenance;
- Regulatory required tests; and
- Downhole corrosion control.

The Well Integrity Management System (WIMS), which is described in the Well Integrity Manual, is used to ensure that well integrity tasks are scheduled for completion and the results are documented. A risk-based approach is used to determine well monitoring, testing and maintenance requirements and frequencies. When determining these requirements consideration is given to the well type and status, production method, mechanical condition, critical equipment installed, environmental sensitivity, well stream composition, wellhead pressure, as well as regulatory requirements. Monitoring and testing acceptance criteria are also established and routine testing or surveillance activities may identify potential issues that require further analysis.

All well integrity testing is done in accordance with the Platform Operating Procedures which outline specific steps to ensure the accuracy of tests while minimising the risk of spills or incidents. Any changes to the frequencies or the testing criteria are subject to MOC approval prior to the continuation of operations.

All production wells are managed as per the NOPSEMA accepted Gippsland Basin Well Operations Management Plan (WOMP) (CM32).

2.5 Work Management (OIMS System 6-4)

The OIMS 6-4 Work Management System has two parts: the Work Management System and Safe Work Practices.

The Work Management System (WMS) describes the different types of permits and the process for work planning, authorisation, execution and re-instatement. The WMS provides a framework for identifying hazards, planning work, actively managing the risks associated with the work and confirming that interfaces with the work activity are considered appropriately. This ensures that the activities are undertaken in a structured and controlled manner to reduce the risk of incidents.

The WMS defines controls and restrictions required when simultaneous activities are planned. In particular, simultaneous operations includes helicopter procedures and communication as they relate to platform operations and vessel authorisation to enter the 500m petroleum safety zone.

The WMS also includes the Permit to Work System. The Permit to Work System requires proposed work to be planned and reviewed by the team before starting work. It includes the use of tools to identify and mitigate possible safety and environmental risks. Permits must be reviewed and approved by the person in charge before work can commence, and must be closed out once work is complete. Permits are archived electronically for a minimum period of 3 years.

The Safe Work Practices describe additional requirements for a range of specific work activities and hazards. Safe Work Practices can be referenced when preparing permits to ensure site specific risks and requirements are addressed. Examples include guidance for accessing seadeck (CM17), abrasive blasting (CM7) and the use of drones (CM16).

2.6 Environmental Management (OIMS System 6-5)

OIMS System 6-5, Environmental Management, specifically addresses corporate requirements for environmental management, including socioeconomic and community health aspects. This includes the fundamental requirement to develop Environmental Management Plans which identify and assess all environmental aspects, impacts and risks associated with Esso's activities, facilities and ongoing operations. The Environmental Management Plans must also describe how the impacts and risks are addressed and controlled. As such, this EP meets the System 6-5 requirement for an Environment Management Plan for offshore operations and is an integral part of Esso's System 6-5 documents.

In addition, System 6-5 Environmental Management, includes processes and procedures for managing environmental impacts. Processes have been developed for waste management, chemical discharge assessment, invasive marine species risk assessment, produced water toxicity assessment (msPAF), as well as processes for calculating and reporting greenhouse gas emissions based on fuel use and flare volumes.

Waste Management

The Waste Management Manual (WMM) describes the process for labelling, storing, transporting and tracking waste. Waste is clearly labelled with the relevant EPA Victoria waste category and/or Dangerous Goods category.The WMM also details requirements for storage in accordance with EPA Victoria and/or Dangerous Goods bunding guidelines and requirements for transport to onshore including material dispatch advice (MDA).

Wet Storage Assessment (CM31)

Equipment may be wet stored on the seabed on a temporary or long-term basis. An assessment will be completed prior to wet storage, which will assess technical and environmental considerations. The assessment will consider the environmental aspects of seabed disturbance and potential presence of NORMs. The assessment will also take into account relevant OIMS 6-2 FIMS programs and any additional maintenance activities that may be required to ensure obligations under OPGGS Act s572 are achieved.

Chemical Discharge Assessment Process (CM3)

Esso assesses all chemicals that are likely to be discharged during the activities described in this EP. The chemical discharge assessment process is triggered by the MOC process. The introduction of a new chemical to Esso's facilities requires assessment for environmental and safety suitability in accordance with the Workplace Substances Manual.

Instructions for the chemical discharge assessment process are included in the calculation spreadsheet. The process evaluates chemicals on the basis of their OCNS or CHARM rating.

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 reviews 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 reviews and assesses the chemical proposed to ensure environmental risks are reduced to ALARP and an acceptable level.

IMS Risk Assessment Process (CM26)

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 all vessels 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).

The IMS-RAP is to be applied to all contracted non-trading vessels undertaking petroleum activities in the Gippsland Basin.

The Western Australian Department of Fisheries Biofouling Risk Assessment Tool will be completed for all vessels to calculate a vessel risk status. The vessel check considers many factors, for example; where a vessel has been operating, time and duration spent inshore waters, internal antifouling systems and if the vessel has antifouling paint.

If the vessel check results in the vessel not being low risk status, an IMS expert will be engaged to review risk assessment and recommend mitigation measures to bring the vessels risk status low and acceptable. Mitigation measures may include cleaning, painting, inspecting or desk top review.

Annual Produced Water Sampling Program and Toxicity Assessment (msPAF) (CM11)

An annual assessment is conducted to ensure that the impact of produced water discharge remains at acceptable levels. The assessment consists of an annual produced water sampling program and a toxicity assessment using the calculated multiple substance potentially affected fraction (msPAF).

An annual sample is collected from each platform that is discharging produced water to the marine environment. Samples are sent to a third party laboratory for compositional analysis using a comprehensive suite of tests. An Offshore Environmental Advisor analyses the sampling results to confirm that there have been no significant changes in composition. The analysis focuses on components known to have higher toxicity such as aromatic hydrocarbons, ammonia and metals. If the sampling analysis identifies any of the following, the cause of the change will be investigated:

- new components;
- significant deviations in components from prior years; or
- year on year increases in component concentrations.

The new/changed components will be included in the toxicity assessment and potential changes in environmental impact will be assessed. If warranted by the outcomes of the toxicity assessment, corrective actions will be implemented.

A produced water toxicity assessment is completed annually after the sampling results are received. Toxicity assessment may also be triggered at other times such as:

- if changes are identified as described in Section 2.1 - Compliance with Laws, Regulations and Permits (OIMS System 4-2)
- if changes are made as described in Section 2.7 - Management of Change (OIMS System 7-1); or
- if during the Chemical Discharge Assessment Process to determine if environmental risks are reduced to ALARP and an acceptable level, 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.

The toxicity assessment is completed using two lines of evidence:

- Comparison against ANZECC criteria at 1000 m; and
- Calculation of toxicity (msPAF) at 1000 m.

The predicted exposure concentration (PEC) is calculated for each component in produced water. That is, the concentration of each component at the edge of the 1000 m mixing zone is calculated using the sampling results and dilution factors derived from modelling (noting that field measurements have verified that dispersion modelling is highly conservative).

The PEC for each component at 100 m, 500 m, and 1000 m is compared to ANZECC trigger values for 95% and 99% protection levels where they exist. Corrective actions are identified and implemented if warranted. Concentrations above ANZECC trigger values at 1000 m require further investigation which may include:

- Confirmation of composition via further sampling;
- Completion of new dispersion models; and/or
- Field verification (eg. marine samples).

The PEC at 1000 m is also used to compute the proportion of species that are expected to be affected by exposure to these concentrations (ie. the predicted affected fraction (PAF)). The summation of these fractions (depending on the biological pathway for toxicity) gives the proportion of species that are expected to be affected by the combined exposure to all component concentrations, the multiple substance potentially affected fraction (msPAF). The msPAF at the edge of the mixing zone (1000 m) is compared to the environmental performance standard. If the msPAF at 1000 m > 1% (ie. 99% species protection level) further investigation will be undertaken and may include:

- Interrogation of msPAF calculation to identify causative component(s) and their source(s);
- Confirmation of composition via further sampling;
- Whole effluent toxicity (WET) testing;
- Completion of new dispersion models; and/or
- Field verification (eg. marine samples).

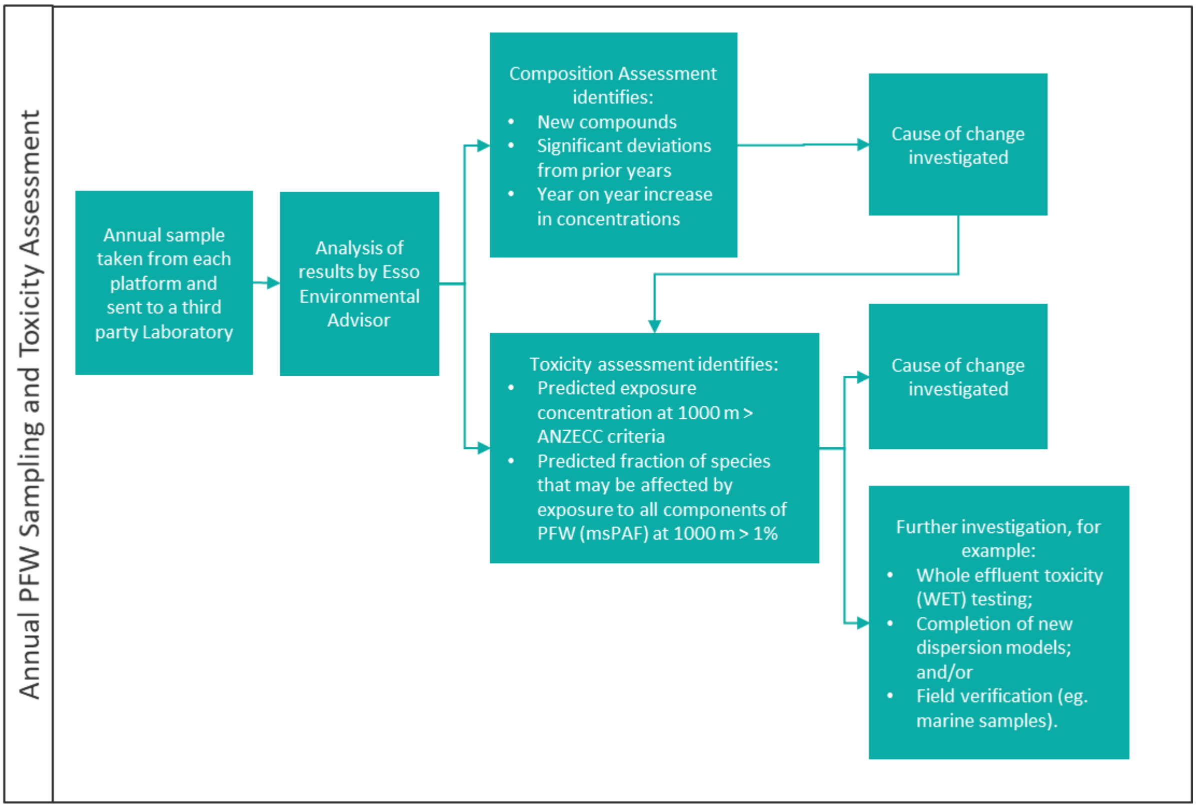


Figure 2-3 Annual PFW Sampling and Toxicity Assessment

Greenhouse Gas Calculation and Reporting

Esso calculates and reports its greenhouse gas emissions under the National Greenhouse and Energy Reporting (NGER) scheme, established by the National Greenhouse and Energy Act 2007 and administered by the Clean Energy Regulator. Esso's National Greenhouse and Energy Reporting Management Manual describes the process for tracking and collecting data for greenhouse gas emission calculation and energy reporting across Esso's operations. Esso submits a report of the total amount of greenhouse gas emissions (both emissions released as a direct result of facility activities and emissions released from indirect consumption of energy), energy consumption (including fuel gas, natural gas, electricity) and energy production (crude and condensate, LPG, natural gas, ethane) from its operations via the online Emissions and Energy Reporting System on an annual basis.

2.7 Management of Change (OIMS System 7-1)

Esso's management of change process is documented in the Management of Change Manual which sits under OIMS System 7-1 Management of Change (MOC). The objective of OIMS System 7-1 is to manage permanent or temporary changes that arise during operations 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.

OIMS System 7-1 is a structured process, involving relevant engineers, technicians, operations and maintenance personnel and SSHE specialists to evaluate the potential positive and negative consequences of the proposed change, and to seek the endorsement of all potentially impacted parties.

The MOC process is implemented electronically and requires a number of assessments which include technical, regulatory, safety and environmental assessments. A mandatory screening checklist is undertaken for all work being assessed under the MOC process to identify the potential for a change to or increase in environmental impacts. A mandatory regulatory checklist is completed to identify if proposed activities will result in a change to the Environment Plan. MOCs which identify potential environmental impacts will also complete an environmental checklist. Environmental and Regulatory checklists are reviewed and approved by an Environmental and Regulatory Advisor.

The Environmental and Regulatory Advisor reviews the MOC in accordance with OPGGS(E)R 17. A revision of the EP will be required under OPGGS(E)R 17 in the event that a proposed change:

- constitutes a new stage or significant modification; or
- introduces a significant new environmental impact or risk; or
- significantly increases an existing environmental impact or risk.

Minor changes (which do not trigger a resubmission under OPGGS(E)R 17) may result in administrative updates to this Envrionment Plan which are documented in a change register.

2.8 Contractor Management (OIMS System 8-1)

OIMS System 8-1 Third Party Services provides a systematic approach for the selection of contractors and subsequent management of interfaces between Esso and contractors to ensure work is performed in a safe, secure, and environmentally sound manner. This System applies to all service contractors (including marine operations, wireline and workover operations, crane services, provision of lifting equipment and aviation services) and suppliers of critical equipment (such as valves, seals, gaskets, lifting equipment and cranes).

The contractor selection and management processes are established to support two different phases of a contract life cycle:

- The first phase includes requisitioning for contractor services, pre-qualifying contractors, selecting the contractor, and conducting pre-mobilisation activities associated with subsequent contractor interface management.
- The second phase occurs during contract work execution and involves ongoing interface management between Esso and the contractor, as well as monitoring and stewardship activities to confirm that the contractor is meeting the Operations Integrity requirements of the agreement.

The pre-qualification process includes review of recent contractor performance results, reviews of contractor SSHE programs, and site visits to the contractor's facilities to validate reported performance results and evaluate a contractor’s capability for effective work execution. The Esso SSHE Group participates in the pre-qualification screening and bid evaluation process including contractor site assessments, as required. OIMS System 8-1 Third Party Services specifies that all contractors conducting activities with potential high SSHE impact must submit a SSHE execution plan or a bridging document for the scope of work. High SSHE impacts are activities which if poorly executed could cause significant safety or environmental impacts. These may include aviation, construction, wellwork, subsea activities and vessels.

The Contractor’s SSHE execution plan is required to address:

- Communication of SSHE expectations and requirements to Contractor crews and Subcontractors;
- Compliance with relevant regulatory obligations (including Environmental Management Plans, Safety Cases, relevant laws and regulations);
- Reporting of leading and lagging indicators;
- Incident investigation and management processes;
- Other specific requirements as dictated by the scope of the assignment or local site characteristics.

2.9 Incident Management (OIMS System 9-1)

The purpose of OIMS System 9-1 Incident Management 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, equipment reliability (with SSHE consequences), environmental impact and regulatory compliance.

OIMS System 9-1 requires that:

- The incident is reported in the IMPACT database;
- An investigation occurs, if triggered by an evaluation of actual or potential incident severity; and
- The incident is correctly documented, lessons learned are communicated, and corrective actions are followed up and tracked in the IMPACT database.

The triggers and expected deliverables for incident investigations are based on incident severity (actual and potential) and are documented in the Incident Investigation and Sharing Guideline. The triggers for an investigation of an environmental incident are a significant spill to the environment, a community complaint or a regulatory reportable incident (see Table 8-2) (or other incident at the discretion of the Asset Manager).

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.

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.

3 Platform Surveillance and Optimisation

Engineers and technical specalists support the ongoing operation of Esso's Bass Strait activities by providing technical oversight, advice and direction to offshore operators. A variety of engineers and technical specialists are responsible for monitoring and optimising the production process through surveillance of a variety of aspects of the platforms including reservoir performance, production rates, facility efficiency, and flaring rates. In addition, they are responsible for safely and effectively implementing changes and improvements to the facilties.

Operations Technical Monitoring Program (CM30)

The technical monitoring program provides a structure for undertaking process and equipment surveillance. The aims of technical monitoring are to ensure operation within the design envelope. A variety of parameters throughout the process are monitored on a monthly basis.

Pile level trends are monitored on a quarterly basis. The level trends are analysed to identify if there has been any extended period of operation outside the expected operating envelope. Deviations require investigation to establish the cause and develop a corrective plan where required.

4 Roles and Responsibilities

As required by OPGGS(E)R 14(4), this section sets out the roles and responsibilities of personnel in relation to the implementation, management and review of this EP.

4.1 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 Operations Integrity performance indicators that show the status and effectiveness of OIMS implementation and execution; and
- Periodically review Operations Integrity incidents for learning and continuous improvements to OIMS.

4.2 Environment Plan Key Roles and Responsibilities

Key roles and responsibilities for Esso and Contractor personnel relating to implementing, managing and reviewing this EP are described in Table 4-1.

The organisation structure for the activities described in this EP is illustrated in Figure 4-1.

Table 4-1 Key Roles and Responsibilities

Role	Responsibility
Operations	
All site personnel	• Follow procedures and safe work practices • Comply with requirements and expectations of the Permit to Work system, including completing JSAs • Store equipment, chemicals and oils in designated areas to prevent spills to the environment • Dispose of waste in appropriate containers • Notify relevant person in charge of all environmental incidents immediately • Record and report environmental hazards
OIM / Designated person in charge	• Encourage active employee and contractor involvement in hazard identification and risk assessment processes including Job Safety Analysis and Step Back 5x5 • Ensure platform inductions (Greencards) are completed as required • Ensure waste is managed on platforms and that it is stored and sent to shore as per relevant Waste Management Plan • Review and approve Permits to Work • Review and approve daily operations performance data (eg. water discharge, fuel and flare volumes) • Ensure periodic environmental compliance reviews are completed • Develop, track and close out corrective actions from inspections, audits or environmental monitoring in a timely manner • Ensure production operations are conducted in accordance with this EP and approval conditions • Report environmental incidents • Complete verbal notifications of Reportable incidents to NOPSEMA
Platform Services Operator	• Deliver Platform Induction Card “Green Card” • Ensure waste is transported with correct labelling • Oversee general platform housekeeping • Correspondence with helicopters and vessels from platform

Offshore Field Superintendent	• Assist Environment and Regulatory advisors to
	  ○ engage with OIMs on environmental matters
	  ○ communicate environmental expectations and guidance materials
	  ○ communicate environmental learnings
	• Ensure all personnel (including third party contractors) on platforms complete an HSE induction

Role	Responsibility
	• Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure personnel are competent to perform the work they have been assigned. • Ensure production operations are conducted as per this EP and approval conditions • Stewardship and sustainability of OIMS on platforms • Encourage active employee and contractor involvement in hazard identification and risk assessment processes including Job Safety Analysis and Step Back 5x5 • Manage change requests for the activity and submit MOC to notify the Offshore Environmental Adviser of any scope changes in a timely manner
Offshore Operations Superintendent	• Ensure sufficient competent staff to operate the platform and pipelines under normal and emergency conditions • Ensure production operations are conducted as per this EP and approval conditions • Liaise with regulatory authorities as required • Manage change requests for the activity and submit MOC to notify the Offshore Environmental Adviser of any scope changes in a timely manner • Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Review this EP as necessary and manage change requests • Verify relevant Environmental Approvals for petroleum activities exist prior to commencing an activity
Wellwork	
Wellwork Supervisor	• Manages work activities in accordance with Operations, Maintenance, Wellwork and Work Management procedures • Steward wellwork and contractor management requirements on Workover/Wireline Rig and Marine Operations while servicing Esso operations • Manage change requests for the activity and submit MOC to the Offshore Environmental Adviser for assessment of implications for this EP • Submit notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals have been obtained prior to commencing activity • Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported
Wellwork and Marine Superintendent	• Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Manage change requests for the activity and submit MOC to the Offshore Environmental Adviser for assessment of implications for this EP • Submit notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals have been obtained prior to commencing activity

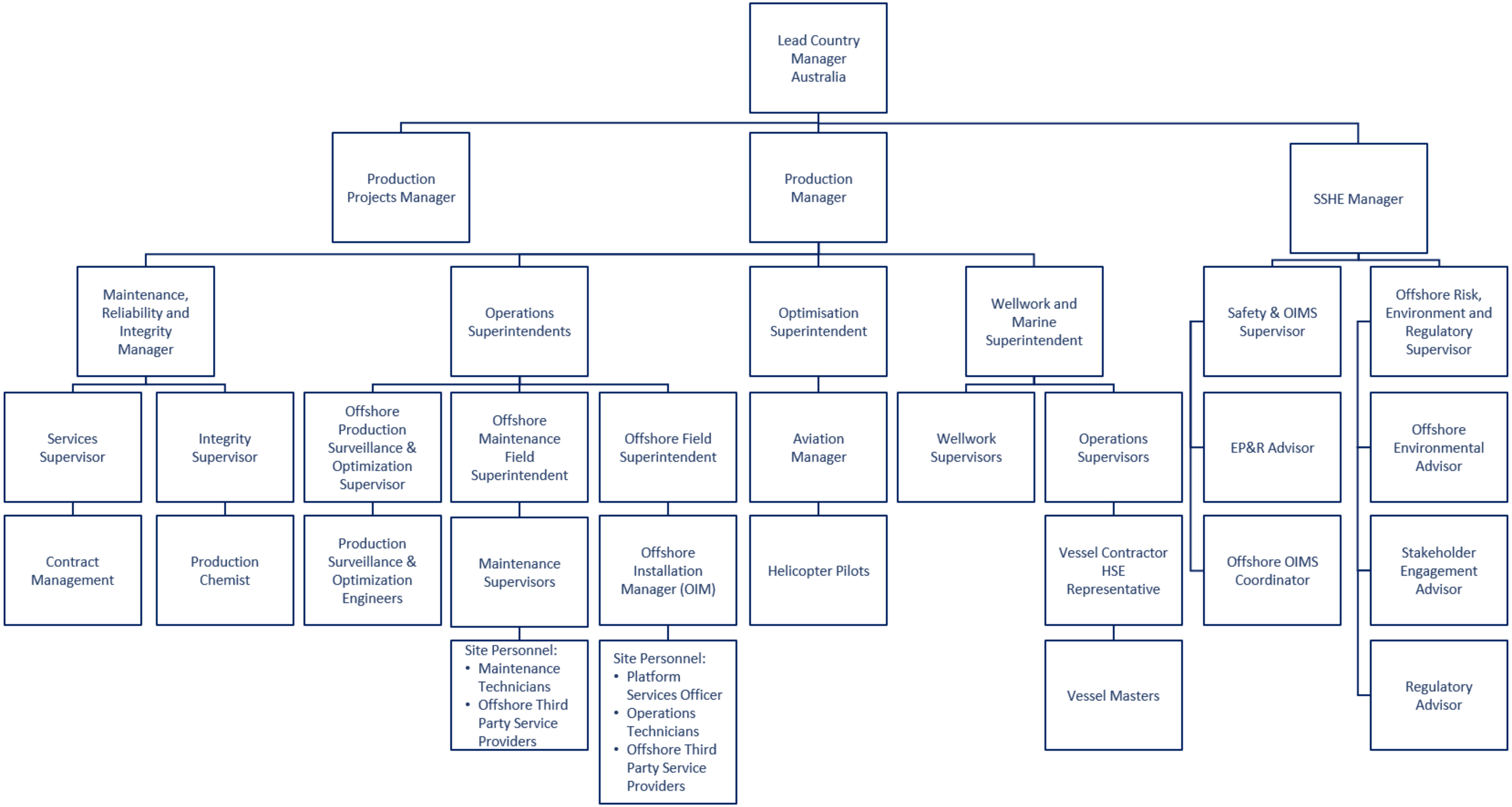
Role	Responsibility
Maintenance, Reliability and Integrity	
Emergency Preparedness & Response (EP&R) Advisor	• Ensure emergency drills are conducted as per the OPEP schedule • Maintain Production OPEP and ERM • Verify, maintain and monitor changes in oil spill capabilities (EPOs and EPSs)
IMT Duty Manager	• Establish and take control of the Incident Management Team (IMT) and establish an appropriate command structure for the incident. Implement Emergency Response Activities as required and as outlined in the OPEP
Maintenance Reliability and Integrity Manager	• Ensure maintenance and testing activities are carried out in accordance with OIMS 6-4 requirements • Ensure that a SSHE Execution plan is in place as required • Review current operations and maintenance issues with the Production Manager and the Operations Superintendent • Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Manage change requests for the activity and submit MOC to the Offshore Environmental Adviser for assessment of implications for this EP • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Ensure subsea installation activities are conducted as per this EP and approval conditions • Track and report compliance with performance outcomes and performance standards as per the requirements of this EP • Verify relevant Environmental Approvals for all petroleum activities exist prior to commencing activity • Ensure vessel management team completes an Environmental familarisation • Submit MOC to notify the Offshore Environmental Adviser of any scope changes in a timely manner
Production Chemist	• Ensure all chemicals proposed to be discharged are communicated to the Offshore Environment Advisor, assessed and approved prior to discharge • Ensure all production chemicals are used in approved concentrations • Provide relevant documentation and assist Offshore Environmental Advisor in assessment of chemicals proposed to be discharged
Production Surveillance and Optimisation	
PS&O Engineers	• Close out corrective actions identified during environmental monitoring or audits. • Ensure all chemicals proposed to be discharged are communicated to, assessed and approved prior to discharge • Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure production operations are conducted as per this EP and approval conditions • Manage change requests for the activity and submit MOC to notify the Offshore Environmental Adviser of any scope changes in a timely manner. • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals for petroleum activities exist prior to commencing activity

Role	Responsibility
Third Party Contractors	
Vessel Contractor HSE Representative	• Develop and maintan a SSHE Execution Plan which details Esso EP obligations and HSE requirements • Track and report compliance with performance outcomes and performance standards as per the requirements of this EP • Verify that contractors meet environmental-related contractual obligations • Ensure personnel are competent to perform the work they have been assigned • Ensure the vessel management system and procedures are implemented • Maintain Vessel ERP • Ensure all chemicals proposed to be discharged are communicated to, assessed and approved prior to discharge • Ensure periodic environmental compliance reviews are completed. Corrective actions from inspections must be developed, tracked and closed out in a timely manner • Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure emergency drills are conducted as per the Shipboard Marine Pollution Emergency Plan (SMPEP) schedule. • Manage change requests for the activity and submit MOC to notify the Offshore Environmental Adviser of any scope changes in a timely manner • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals for the activities exist prior to commencing activity
Third Party Contractor HSE Representative	• Develop and maintan a SSHE Execution Plan (if required) which details Esso EP obligations and HSE requirements • Track and report compliance with performance outcomes and performance standards as per the requirements of this EP • Ensure periodic environmental compliance reviews are completed. Corrective actions from inspections must be developed, tracked and closed out in a timely manner • Verify that contractors meet environmental-related contractual obligations • Ensure personnel are competent to perform the work they have been assigned. • Ensure all chemicals proposed to be discharged are communicated to, assessed and approved prior to discharge • Close out corrective actions identified during environmental monitoring or audits • Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure emergency drills are conducted as per the SMPEP schedule • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals for all petroleum activities exist prior to commencing activity
Contract Administrator	• Confirm that activities are conducted in accordance with this EP, as detailed in the approved Contactor SSHE Execution Plan (or equivalent)

Role	Responsibility
	• Ensure contracted personnel are competent to perform the work they have been assigned • Track and report compliance with performance outcomes and performance standards in accordance with requirements in this EP • Ensure that a SSHE Execution plan is in place where required • Verify that contractors meet environmental-related contractual obligations
Safety, Security, Health and Environment (SSHE)	
Offshore Environmental Advisor(s)	• Provide day-to-day environmental support and advice • Assist with reviewing, investigating and reporting environmental incidents. • Confirm environmental incident reporting meets regulatory requirements • Compile and review environmental compliance documentation • Communicate Environmental Plan obligations to relevant personnel (including contractors) • Prepare environmental component of relevant Induction Packages • Provide material and advice to relevant personnel and contractors to assist them to understand their environment responsibilities • Confirm that activities are conducted in accordance with this EP, as detailed in the approved Contactor SSHE Execution Plan (or equivalent) • Track and report compliance with performance outcomes and performance standards as per the requirements of this EP • Ensure environmental monitoring and inspections/audits are conducted as per the requirements of the EP • Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Assess change requests against the scope of the Environment Plan to ensure it meets regulatory requirements • Conduct assessment of chemicals proposed to be discharged • Assist in preparing external regulatory reports, in line with environmental approval requirements and ExxonMobil external regulatory reporting obligations • Liaise with regulatory authorities as required • Verify relevant Environmental Approvals for all petroleum activities exist prior to commencing an activity
Offshore OIMS Coordinator	• Confirm environmental incident reporting meets ExxonMobil internal event recording, investigation and learning requirements
Stakeholder Engagement Advisor	• Perform ongoing liaison and notification as outlined in the EP • Prepare and implement the Stakeholder Consultation Plan Report on stakeholder consultation
Offshore Risk, Environment and Regulatory Supervisor	• Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure ongoing engagement with government agencies and other relevant external stakeholders • Liaise with regulatory authorities as required • Monitor and steward close out of corrective actions identified during environmental monitoring or audits • Review environmental performance at Asset Leadership Team meetings. • Verify relevant Environmental Approvals for petroleum activities exist prior to commencing activity
Management	

Role	Responsibility
SSHE Manager	• Hold personnel accountable for ensuring operations are conducted as per the relevant standards and commitments in this EP • Review environmental performance at Business Unit Leadership meetings.
Production Manager	• Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately • Ensure an effective organisational structure is in place, with defined roles and responsibilities to ensure the implementation of OIMS for offshore facilities and associated pipeline operations • Hold personnel accountable for ensuring operations are conducted as per the relevant standards and commitments in this EP Verify relevant Environmental Approvals for petroleum activities exist prior to commencing activity
Production Projects Manager	• Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP are reported immediately. • Provide notification of potential new activity/modification of existing activity/change in stage of activity for new or increased risk to the Offshore Environmental Advisor • Verify relevant Environmental Approvals for petroleum activities exist prior to commencing activity

Figure 4-1 Organisational Structure



5 Training and Awareness

OPGGS(E)R 14(5) requires that the implementation strategy must include measures to ensure that each employee and contractor working on, or in connection with, the activity is aware of their roles and responsibilities in relation to the EP.

All personnel are required to be competent to perform their assigned positions. The Training and Procedures group are responsible for identifying training needs, keeping records of training undertaken, and identifying minimum training requirements of personnel. Personnel Competency is managed through OIMS System 5-1.

As part of the contracting process, Esso Procurement ensures all contractors have the appropriate qualifications, job skills and training. Additional training and familiarisation may be delivered by the Training and Procedures group or environmental and regulatory adviser.

5.1 Environment Plan Awareness

All personnel with roles and responsiblitiles (as defined in Table 4-1) will complete general environmental awareness training which outlines Environment Plan importance, structure, implementation and roles and responsibilities.

5.2 Offshore Induction

The Offshore Induction is compulsory for anyone accessing Esso's offshore facilities. The Offshore Induction describes basic requirements including identifying and reporting incidents to the OIM, work permits and waste management practices. Records of inductions are maintained by the Training and Procedures group.

5.3 Platform Induction Card "Green Card"

The Platform Induction or 'Green Card' is provided to all personnel that have not visited a platform before, or have not been to the platform in more than a year. The induction includes platform-specific information about environmental awareness, including reporting oil/chemical spills or potential spills and locating emergency spill kits. A record is kept of all completed inductions on the platform for a minimum of one year.

5.4 Vessel Management Environmental Familiarisation

Vessel Management personnel receive Esso environmental familiarisation. The familiarisation material includes specific Environmental Plan vessel requirements and definitions of an environmental incident.

5.5 Third Party Service Providers

Third party contractor requirements are addressed in OIMS System 8-1 Third Party Services. Job specific requirements are defined and communicated to third parties during the contracting process and all contractor personnel are screened, trained and suitably qualified.

Each third party service provider is required to maintain training files for their personnel. Esso verifies these records as part of the initial contracting process and at least annually for OIMS Critical contractors.

Table 5-1 Overview of Offshore Personnel Environment Plan Induction and Training

Component	Esso Office Based Personnel (inc. engineers, contractors)	Esso Facilities		Vessels
		Esso Offshore Personnel (field staff)	Third Party Service Providers	Vessel Personnel
Environmental Plan / environmental incident definition	Environment Plan Awareness	Environment Plan Awareness	Environment Plan Awareness	Vessel management environmental familiarisation
Work Management Systems (Risk Assessments, JSA, Stepback 5x5) to manage environmental risks	Offshore Induction (where relevant)	Work Management Systems Fundamentals Training Offshore Induction Stepback 5x5 and Job Safety Analysis competency (non-Visitors)	Work Management Systems Fundamentals Training (where relevant) Offshore Induction Stepback 5x5 and Job Safety Analysis competency (non-Visitors)	Contractor Management System SSHE Execution Plan
Identification and reporting of environmental hazards and incidents	Platform Induction Card “Green Card” (where relevant)	Platform Induction Card “Green Card”	Platform Induction Card “Green Card” SSHE Execution Plan	SSHE Execution Plan Vessel management environmental familiarisation
Overview of oil spill response procedures	Green Card (where relevant) Included in Esso Offshore Induction Specific training for those with a response position in an emergency	Green Card Included in Esso Offshore Induction Specific training for those with a response position in an emergency	Green Card Included in Esso Offshore Induction Specific training for those with a response position in an emergency	SSHE Execution Plan Contractor Vessel Induction Vessel management environmental familiarisation
MOC	Via use of Procedures & MOC electronic Tool (P/MeT) which includes MOC training	Via use of Procedures & MOC electronic Tool (P/MeT) which includes MOC training	MOC for work completed by Third Party Contractors on Esso Facilities is managed by Esso Personnel.	Via implementation of contractor MOC system. Vessel management environmental familiarisation

6 Monitoring of Environmental Performance

In accordance with OPGGS(E)R 14(6) the implementation strategy must include 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.

6.1 Audits, Assessments and Inspections

Environmental performance assurance for the activity will be 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.

6.2 Offshore Audit and Inspections

Esso undertakes audits against this EP periodically. Audits are conducted in accordance with the Esso Internal Audit Protocol. This protocol describes the EAPL risk-based approach to environmental plan (or monitoring plan, license conditions) audits and assessments. The risk-based approach considers the environmental impacts and risks associated with the activities, previous environmental performance of the activity (informed by NOPSEMA inspections, incident history and other environmental performance factors), trends in environmental recordable/reportable incident notifications and the nature and scale of the activity. As a minimum, an annual offshore audit will be completed against this EP.

Periodic environmental inspections will be completed. These inspections may focus on aspects of activities assessed to be of a higher consequence level or risk category, or key focus areas, or specific EPOs.

Opportunities for improvement or non-compliances observed are documented and communicated to the OIM at the time of the audit, who in turn is responsible for communicating this information to all relevant platform personnel. Findings and recommendations which cannot be resolved at the time of audit are provided in an audit report and documented in the IMPACT database to facilitate the tracking of all actions until closed out.

6.2.1 Vessel Inspections

In addition to the third party contractor OIMS evaluation (see Section 2.7), a pre-mobilisation inspection is undertaken for all vessels to communicate specific EP requirements and to ensure that procedures and equipment for managing routine discharges and emissions are in place to enable compliance with this EP.

Vessels will conduct their own HSE inspections, which will be provided to Esso for ongoing compliance monitoring. These will be discussed in the quarterly review and any findings/actions discussed.

Table 6-1 Summary of Audits, Inspections and Assessments

Audit/Inspection/Assessment	Frequency	Responsibility
EP Compliance Audit / Inspection	Once for contracts <1 year Annually for contracts >1 year	Environment & Regulatory Advisor
EP Compliance ongoing monitoring	Monthly report	Vessel Master /HSE
OIMS Assessment	Annually for contracts >1 year	Contract Manager

6.2.2 Marine Assurance

The ExxonMobil Marine Quality Assurance Best Practice (MQABP) is developed by the ExxonMobil Logistics Upstream Centre of Excellence and administered locally by each affiliate. The MQABP is based on a recognised marine quality process and standards framework developed and administered by the Oil Companies International Marine Forum.

The MQABP determines the level of assessment required, based on the term of hire, or repeated terms of hire. The Best Practice assesses both the vessel, and vessel operator, against a recognised industry standard:

- Offshore Vessel Safety Management System Assessment (OVMSA); and
- Offshore Vessel Inspection Questionnaire (OVIQ).

The OVIQ is customised by the selection of appropriate variants designed to examine the specific capabilities of the subject vessel in the specific tasks that will be undertaken by the vessel. An OCIMF accredited inspector completes the OVIQ and provides the observations in the form of the OVIQ report which is uploaded to the OCIMF database.The ExxonMobil Global Marine Quality Assurance group provides feedback on the OVIQ completed, or where less than 12 months old, provides a review of the existing OVIQ. OVIQ observations are ranked in priority by the Global Marine group, and the affiliate is responsible for ensuring the closeout of observations.

Esso's marine/logistics group is responsible for engaging with the vessel owner to develop a closeout target for high priority items, and the effective closeout of observations is reviewed quarterly by the Global Upstream Logistics Centre of Excellence. The assessment of OVMSA is determined by the length of engagement of each specific vessel operator, and is defined within the MQABP. Where OVMSA's are to be verified, they are verified at the site responsible for the day to day management of the vessel. ExxonMobil's Global Upstream Logistics Centre of Excellence assigns OCIMF accredited inspectors to complete on site OVMSA verifications.

Other inspections which are complimentary to the OVIQ, such as Condition and Suitability Surveys, and assessments against International Marine Contractor (IMCA) guidelines may also be conducted.

Where an OVIQ inspection and/or OVMSA Verification Review is not available and all reasonable efforts based on time and resource availability to complete an OVID inspection and/or OVMSA Verification Review are exhausted (i.e. short term vessel hire), the affiliate may approve the use of an alternate means of inspection.

6.2.3 Annual OIMS Assessment

OIMS Assessments (OIMS System 11-1) are carried out annually to determine if Esso is meeting the ExxonMobil OIMS Expectations and Guidelines.

OIMS System 11-1 describes the following OIMS assessments:

- External Assessment - An ExxonMobil team, composed of persons external to Esso operations, conduct an assessment of all of the Systems every 4 years. The External Assessment provides an independent evaluation of compliance with OIMS Expectations.
- OIMS Internal Assessment - This assessment is conducted in a similar manner to that of the external assessment. It is undertaken annually by a local team, except in the years in which an external assessment is conducted.

The findings and recommendations of assessments are documented in the IMPACT database to facilitate the tracking of all OIMS actions until closed out.

6.2.4 Ongoing Stewardship

6.2.4.1 Business Unit Leadership

Business Unit Leadership meetings (attendees include the Production Manager, the SSHE Manager, the Production Projects Manager, among others) cover issues relating to management of the upstream business, including environmental compliance issues and project endorsements.

6.2.4.2 Asset Leadership Team

The monthly Asset Leadership Team meeting, attended by Operations Superintendents, Field Superintendents and relevant SSHE and Technical Supervisors, include review of key performance indicators including those relating to environmental performance, incidents and compliance with OIMS system requirements.

6.2.4.3 Red Box

The Red Box Team (which includes OIMs and Offshore Field Superintendents) reviews platform performance fortnightly for each platform, including environmental incidents.

6.2.4.4 Toolbox

Toolbox meetings are conducted at the start of each shift to plan for activities being undertaken during the shift. This allows for relevant permits and Job Safety Analyses to be completed and to make sure that personnel undertaking the tasks understand all associated safety and environmental risks.

6.2.4.5 Vessel

Daily vessel reports are prepared by project vessels and issued to Esso. The report provides updates on project activities and HSE performance. Vessel HSE meetings are also used to transfer information, discuss environmental incidents and hazards and provide updates on environmental performance.

6.2.4.6 Third Party Contractor Performance

In accordance with the Third Party Services Management Manual, third parties' performance monitoring plans are established prior to a contractor mobilising to a work site location.

The Contract Administrator is engaged in the contract life cycle management and the SSHE Group assists in the assessment and monitoring of contractor performance, as required. Providers of OIMS-critical services such as aviation, vessels, construction, subsea activities and wellwork are subject to a 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/ EP breaches;
- Assessments of the adequacy of actions taken to address performance gaps / incidents;
- Deficiencies with SSHE requirements and recommended corrective actions; and
- Review of contractor HSE inspections and findings.

Report findings and recommendations are reviewed with contractor management and follow-up actions implemented to address deficiencies.

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 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. Measurement and recording of emissions and discharges are completed under OIMS System 6-5 Environmental Management. Table 7-1 summarises the monitoring requirements for routine operations in this EP.

Table 7-1 Summary of monitoring of emissions and discharges

Activity	Monitoring	Frequency	Responsibility
Greenhouse gas emissions	Flaring, fuel gas consumption and diesel fuel consumption	Daily Monthly	OIM PS&O
Produced formation water (PFW)	Oil-in-water concentration Volume of PFW discharged	Daily	OIM
	Oil-in-water monitoring verification results	Monthly	OIM
	Annual Produced Water Sampling and Toxicity Assessment	Annually	Environment & Regulatory Advisor

8 Reporting

8.1.1 Annual Environmental Performance Reporting

The OPGGS(E)R 14(2) states that the implementation strategy must:

a) state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity; and
b) provide that the interval between reports will not be more than 1 year.

Note: Regulation 26C requires a titleholder to report on environmental performance in accordance with the timetable set out in the environment plan.

Table 8-1 NOPSEMA annual environmental performance reporting timetable

Requirement	Timing	Contact
Submit an annual EP environmental performance report to NOPSEMA.	The annual report for the calendar year (January – December) will be submitted to NOPSEMA by the end of February of the following year.	NOPSEMA – submissions@nopsema.gov.au

8.1.2 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 reporting requirements under the OPGGS(E)R are managed under OIMS System 4-2 Compliance with Laws Regulations and Permits.

Incidents are managed internally in accordance with OIMS System 9-1 Incident Management to ensure valuable information and lessons learned are available to improve operations and prevent the recurrence of similar incidents.

The requirements for reporting environmental incidents to external agencies are listed in Table 8-2.

Table 8-2 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 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.	As soon as possible but before the 15th day of the following calendar month.	NOPSEMA – submissions@nopsema.gov.au
Reportable Incidents		
Reportable incidents are those that have caused, or have the potential to cause, moderate to significant environmental damage. Esso has interpreted this to mean: • Unplanned release of hydrocarbon liquid or chemicals exceeding 1bbl into the marine environment caused by, or suspected to have been caused by, petroleum activities (as defined as a Significant Spill in the ExxonMobil EPI Reporting Guidelines); and • Injury or death of a 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	• **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

Requirement	Timing	Contact
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 stop, control or remedy the reportable incident.		
Other Reporting Requirements		
Mandatory vessel MARPOL pollution notification reporting, Vessel Master to provide AMSA with the following information: • name of ship/s involved; • time, type and location of incident; • quantity and type of harmful substance; • assistance and salvage measures; and • any other relevant information. A POLREP form should be submitted by Vessel Master • Harmful substances report (POLREP) form 197 (Marine Order 91—Marine Pollution—Oil); • Harmful substances report (POLREP) form 196 (Marine Order 93—Marine Pollution Prevention—Noxious Liquid Substances); and • Marine Order 94 (Marine pollution prevention—packaged harmful substances) 2014 (Schedule 1—Marine pollutants report form).	Notification Immediately POLREP (pollution report). <24 hours	AMSA – Notification 1800 641 792 (Maritime) 1800 815 257 (Aviation) or +612 6230 6811 (Maritime) +612 6230 6899 (Aviation) AMSA POLREP Report 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

Requirement	Timing	Contact
		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

9 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.

The purpose of OIMS 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; and
- Required training, exercises, simulations, and/or drills are conducted to determine the adequacy of the emergency response and business continuity plans.

9.1 Emergency Response Documentation

The Emergency Response Manual (ERM) consists of concise information that may be required immediately in the event of an incident. Information contained in the ERM includes emergency response organisational structures, emergency response procedures relevant to specific emergency events, personnel role and responsibility checklists, emergency response call-out procedures and contact directories.

Copies of the ERM are held on each platform and other Esso onshore sites.

9.2 Oil Pollution Emergency Plan

In accordance with OPGGS(E)R 14(8) and 14(8A), the implementation strategy must contain an OPEP and provide for updating the plan, and include arrangements for testing the response arrangements in the OPEP.

Esso has in place the Bass Strait OPEP (see Appendix A of Volume 3) for all its offshore assets and operations in Bass Strait. The OPEP describes how Level 1, 2 and 3 spills will be managed and defines the lead organisations, responders, and notification requirements.

9.3 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:

- When they are introduced;
- Prior to the commencement of the activity;
- When they are significantly amended;
- Not later than 12 months after the most recent test;
- 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; and
- If a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.

Testing of response arrangements will be in accordance with the schedule outlined in Table 9-1.

Table 9-1 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 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
Regional Response Team (RRT)	To test the integration of the ExxonMobil RRT to support a Level II IMT	Esso ExxonMobil RRT	3 yearly

Test	Objective	Parties Involved	Schedule
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
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	Annual

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.

9.4 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.

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 9-2.

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 operations. In addition, the minimum requirement includes a relevant tertiary degree in engineering, environmental science, environmental management or similar.

9.4.1 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 IMT 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.

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.

9.4.2 Oil Spill Response Equipment Operation

Selected 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.

Table 9-2 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. • Familiarity with 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. • Familiarity with 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
	Source Control Branch – team member	• ICS 100/200
Logistics Section	Logistics Section Chief (LSC)	• Incident Management Training (PMAOMIR320). • Oil Spill Response training • Familiarity with 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.

9.4.3 Additional Specialist Training

Additional 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 9-3 and discussed further below.

Table 9-3 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 (or equivalent) 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; and

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; and
- 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; and
- How to present oil spill information back through the IMT in a clear and coherent manner.

9.4.4 Source Control Branch

ExxonMobil have a source control branch who specialise in source control in relation to a well blowout scenario. Personnel involved in Source Control Branch (SCB) management (i.e. Branch Director / Deputy Branch Director) will have the minimum competencies and training or meet requirements recognition of prior learning and experience.

10 Stakeholder Engagement and Community Consultation

OIMS System 10-1 Community Awareness and Public Affairs is in place 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 Operations Integrity of Esso operations and facilities;
- Anticipate community concerns and develop response plans, as appropriate; and
- 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 (Appendix A).

10.1 Activity-based Consultation with Relevant Stakeholders

To consult with relevant stakeholders and assist with preparing EPs, 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.

10.2 Discussions with Relevant Stakeholders in the Immediate Vicinity of Esso's Activities

Esso has regular meetings with SETFIA (approximately every quarter) to discuss proposed and current Bass Strait offshore activities in detail and to communicate associated impacts and risks that may affect relevant stakeholders. SETFIA then assists in identifying stakeholders who may be affected by an activity and consults with these stakeholders on Esso's behalf. All consultation between SETFIA and identified stakeholders is documented and provided to Esso, and any identified issues or concerns are followed up by Esso with a phone call and/or emails.

Esso also includes Offshore Fact Sheets and Campaign Information Sheets (including impacts and risks) in the SETFIA quarterly newsletter as necessary.

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.

10.3 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.

10.4 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.

10.4.1 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 4Q 2019 in recognition of the current level of major project activity.

10.4.2 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.

11 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

LRQA, 2019. LRQA Assurance Statement. 2019 ISO14001 and OHSAS 18001 Attestation Statement for ExxonMobil Corporation. Lloyd's Register LRQA.

12 Appendix A – Relevant Stakeholders

Stakeholder Consultation

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.

Commonwealth Department or Agency	Relevance
Department of the Environment and Energy - Director of National Parks	Responsible for managing Commonwealth reserves and conservation zones. Esso reports death / injury of EPBC listed species and notifies oil pollution if it impacts, or potentially 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 license 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.

State	State or Northern Territory Department or Agency	Relevance
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 1.

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

Stakeholder ID	Relevant stakeholders (planned activities)	Relevance
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

13 Appendix B – Stakeholder Consultation Reports

ID: 1 Organisation: Australian Marine Oil Spill Centre

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	141	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
10-Oct-17	142	From Stakeholder	Email	Stakeholder enquiry about details of field / asset sales	No objections, claims or issues raised	EAPL consulted with stakeholder regarding which activities may interface with them and will consult with them on drilling activities and provide them with an opportunity for input.
10-Oct-17	1151	To Stakeholder	Email	EAPL consulted with stakeholder regarding which activities may interface with them and will consult with them on drilling activities and provide them with an opportunity for input	No objections, claims or issues raised	N/A
26-Oct-17	143	To Stakeholder	Email	Invitation to December 2017 Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	144	To Stakeholder	Phone	Follow up phone call regarding invitation to community session. No answer - left a message.	No objections, claims or issues raised	N/A
21-Dec-17	1181	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2010	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2099	From Stakeholder	Email	Out of office reply received	No objections, claims or issues raised	N/A
30-Oct-18	2133	From Stakeholder	Email	Stakeholder interested participating in response exercise	No objections, claims or issues raised	N/A
20-Nov-18	2142	From Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 2 Organisation: Australian Maritime Safety Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	106	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
12-Oct-17	1154	To Stakeholder	Email	EAPL stakeholder consultation being underway and looking for formal input	No objections, claims or issues raised	Stakeholder confirmed they received revised coordinates
15-Nov-17	1157	From Stakeholder	Email	Stakeholder confirmed they received revised coordinates	No objections, claims or issues raised	N/A
21-Dec-17	1180	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder requesting shapefiles for the seabed survey and operational areas. EAPL emailed shapefiles to the stakeholder.
06-Aug-18	2011	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 3 Organisation: Asia Pacific Applied Science Associates (Oil Spill Modelling)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	145	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1182	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2012	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 4 Organisation: Australian Fisheries Management Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	136	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Data request is being processed.
13-Oct-17	137	From Stakeholder	Email	Request to update contact details	No objections, claims or issues raised	EAPL stakeholder database updated.
26-Oct-17	138	From Stakeholder	Email	Invitation to December 2017 Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	Stakeholder requested invitation be resent
09-Nov-17	140	To Stakeholder	Phone	Stakeholder requested invitation to Community Session be resent.	No objections, claims or issues raised	EAPL resent invitation.
21-Dec-17	1178	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
16-Jul-18	1995	To Stakeholder	Phone	Called to check if contact details are current	No objections, claims or issues raised	Stakeholder provided updated contact details
06-Aug-18	2013	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2143	To Stakeholder	Email	Invitation to December 2018 Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	Stakeholder requested invitation be resent

ID: 7 Organisation: BHP Billiton Petroleum

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	146	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	147	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	148	From Stakeholder	Email	Accepted community session invitation	No objections, claims or issues raised	N/A
17-Nov-17	312	From Stakeholder	Community Session	N/A	No objections, claims or issues raised	N/A
21-Dec-17	1186	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
06-Aug-18	2014	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2144	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 8 Organisation: Country Fire Authority (Region 10)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	149	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	150	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	151	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1167	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2015	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2145	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 9 Organisation: Commonwealth Department of Environment

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	152	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
16-Oct-17	153	From Stakeholder	Email	Request to update contact details	No objections, claims or issues raised	EAPL stakeholder database updated.
26-Oct-17	154	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	155	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1193	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Jun-18	1640	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	Email received to update contact details
07-Jun-18	1731	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	Email advising current contact is on leave
04-Jul-18	2277	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	Email received to update contact details
06-Aug-18	2016	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2146	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 10 Organisation: East Gippsland Catchment Management Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	156	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	157	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	158	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1168	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2017	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 11 Organisation: East Gipplsand Shire Council

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	159	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Nov-17	160				No objections, claims or issues raised	N/A
21-Dec-17	1209	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	automated interim response confirms that your enquiry has been received
07-Jun-18	1727	From Stakeholder		automated interim response confirms that your enquiry has been received	No objections, claims or issues raised	N/A
06-Aug-18	2018	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	automated interim response confirms that your enquiry has been received
06-Aug-18	2094	From Stakeholder		automated interim response confirms that your enquiry has been received	No objections, claims or issues raised	N/A
05-Dec-18	2281	To Stakeholder	Community Session	Titleholder held community session in Lakes Entrance discussing current and planned activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 13 Organisation: Environment Protection Authority Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	161	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	162	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
08-Nov-17	163	From Stakeholder	Email	Invitation declined	No objections, claims or issues raised	N/A
21-Dec-17	1211	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

06-Aug-18	2019	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2147	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
14-May-19	3016	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 14 Organisation: Geelong Ports

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Dec-17	1216	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2020	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 15 Organisation: Gippsland Ports

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	164	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	165	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
08-Nov-17	166	From Stakeholder		Responses to community session	No objections, claims or issues raised	N/A
16-Nov-17	167			N/A	No objections, claims or issues raised	N/A
17-Nov-17	313			N/A	No objections, claims or issues raised	N/A
21-Dec-17	1217	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2021	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2148	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
05-Dec-18	2283	To Stakeholder	Community Session	Titleholder held community session in Lakes Entrance discussing current and planned activities in Bass Strait.	No objections, claims or issues raised	N/A
14-Jan-19	2828	From Stakeholder		Email received from stakeholder requesting consultation on EAPL offshore activities that may impact on vessel activity within waterways managed by Gippsland Ports.	No objections, claims or issues raised	EAPL phoned stakeholder to discuss Esso's near term vessel related activities in Gippsland Ports.
14-May-19	3018	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 17 Organisation: Lakes Entrance Fishermans' Co-op

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	168	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
09-Nov-17	170	From Stakeholder	Email	Communit invitation response	No objections, claims or issues raised	N/A
17-Nov-17	317	From Stakeholder	Community Session	N/A	No objections, claims or issues raised	N/A
21-Dec-17	1221	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-Feb-18	1478	From Stakeholder	Email	Meeting acceptance	No objections, claims or issues raised	N/A
15-Feb-18	1571	To Stakeholder	In Person	Meeting to discuss degree of consultation and update on offshore activities	ISSUE: Amount and degree of consluation - too much MERIT: Yes and acknowledged however the regulatory regime requires it and Esso need to be able to demonstrate that they have consulted. Esso consultation will continue to be scheduled and managed to try and co-ordinate and minimise the amount. No further action required - closed.	During a meeting the stakeholder raised the item of the amount and degree of consultation between key fishing representatives and EAPL. EAPL will coordinate consultation to try and minimise the amount and degree, whilst still meeting community needs and regulatory requirements. Monthly phone call with key stakeholders to discuss EAPL offshore activities.
06-Aug-18	2022	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2149	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
05-Dec-18	2279	To Stakeholder	Community Session	Titleholder held community session in Lakes Entrance discussing current and planned activities in Bass Strait.	No objections, claims or issues raised	N/A
06-May-19	2999	To Stakeholder	Phone		No objections, claims or issues raised	N/A
14-May-19	3000	To Stakeholder	Email		No response received.	N/A
14-May-19	3001	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 18 Organisation: Lakes Entrance Scallop Fishing Industry Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	171	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
26-Oct-17	172	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Nov-17	173	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1222	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2023	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2150	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 20 Organisation: Wellington Shire Council

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	174	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	175	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	176	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1274	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2024	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2151	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 23 Organisation: Security Services

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	177	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1229	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2025	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 24 Organisation: Seven Group Holdings (formerly Nexus)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	495	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Oct-17	179	From Stakeholde r	Email	Thanks for the consultation, we have no concerns regarding your proposed activitieS	No objections, claims or issues raised	N/A
26-Oct-17	180	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

21-Dec-17	1249	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2026	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-Aug-18	2104	From Stakeholde	Email	Email from stakeholder requesting current EAPL contact details	No objections, claims or issues raised	EAPL provided contact details to stakeholder
27-Aug-18	2105	To Stakeholder	Email	EAPL provided contact details to stakeholder	No objections, claims or issues raised	N/A
20-Nov-18	2152	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 25 Organisation: Oil Response Company Australia

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	181	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	182	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	183	From Stakeholde		Response to community session	No objections, claims or issues raised	N/A
17-Nov-17	318				No objections, claims or issues raised	N/A
21-Dec-17	1233	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2027	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2153	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 26 Organisation: Beach Energy (formerly Lattice Energy - formerly Origin Energy)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	184	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
18-Oct-17	185	From Stakeholde	Email	Email from stakeholder received to update contact details. EAPL stakeholder database updated.	No objections, claims or issues raised	N/A
25-Oct-17	186	From Stakeholde	Email	Email from stakeholder received to update contact details. EAPL stakeholder database updated.	No objections, claims or issues raised	N/A
21-Dec-17	1220	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

10-Jan-18	1295	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2028	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2154	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
20-Dec-18	2731	From Stakeholde r	Email	Stakeholder advising of Enterprise Project	No objections, claims or issues raised	N/A
21-Jan-19	2835	From Stakeholde r	Email	Stakeholder following up email	No objections, claims or issues raised	N/A
14-May-19	3007	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 27 Organisation: Parks Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	187	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details.
26-Oct-17	188	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	189	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1172	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2029	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2155	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 28 Organisation: Port of Hastings

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	190	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
20-Oct-17	191	From Stakeholde r	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	N/A
21-Dec-17	1238	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	EAPL stakeholder database updated.
06-Aug-18	2030	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 29 Organisation: Phillip Island Nature Park

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	192	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	Update contact details	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
26-Oct-17	193		Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	No objections, claims or issues raised
09-Nov-17	194				No objections, claims or issues raised	No objections, claims or issues raised
17-Nov-17	319				No objections, claims or issues raised	No objections, claims or issues raised
21-Dec-17	1237	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	No objections, claims or issues raised
06-Aug-18	2031	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	No objections, claims or issues raised
20-Nov-18	2156		Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	No objections, claims or issues raised

ID: 30 Organisation: Port Franklin Fisherman's Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	195	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	196	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
08-Nov-17	197	From Stakeholde		Reponse to community session invitation	No objections, claims or issues raised	N/A
21-Dec-17	1236	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2032	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2157	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 32 Organisation: Victorian Ports Cooperation

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	198	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	Identify new contact and update details	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
18-Oct-17	199	From Stakeholde	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	EAPL stakeholder database updated.
26-Oct-17	200	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	201	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A

21-Dec-17	1264	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2033	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2098	From Stakeholder	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	EAPL stakeholder database updated.
20-Nov-18	2158	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 33 Organisation: Seafood Industry Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	202	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
10-Oct-17	203	From Stakeholder		Email received from stakeholder requesting a meeting to discuss offshore activities and consultation options	No objections, claims or issues raised	EAPL to arrange meeting with stakeholder
26-Oct-17	204	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
08-Nov-17	205	From Stakeholder		Invitation ACCEPTED	No objections, claims or issues raised	N/A
16-Nov-17	1046	To Stakeholder		Phonecall and face-to-face meeting to discuss the opportunity to do a fish abundance study and arrange additional meetings with EAPL. EAPL advised stakeholder that fish information from ABARES is sufficient at present and that we will arrange more meetings in the future.	No objections, claims or issues raised	N/A
17-Nov-17	315	From Stakeholder		Face-to-face discussion with stakeholder regarding: 1: Seismic campaigns 1: EAPL is currently not planning any seismic campaigns 2: Nature and amount of consultation that groups are asked to participate in 2: EAPL are trying to reduce the amount of consultation by combining projects into a single fact sheet 3: The inclusion of EAPL fact sheets in the Seafood Industry Victoria newsletter 3: EAPL will include fact sheets in the Seafood Industry Victoria newsletter	No objections, claims or issues raised	N/A
21-Dec-17	1251	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email received from stakeholder with a proposal to include EAPL fact sheets in Seafood Industry Victoria quarterly newsletter. EAPL will include fact sheets in Seafood Industry Victoria quarterly newsletter.

27-Dec-17	1289	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
08-Jan-18	1290	From Stakeholde		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
13-Feb-18	1477	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
16-Feb-18	1479	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
20-Feb-18	1575	From Stakeholde		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
07-Mar-18	1605	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
07-Mar-18	1606	From Stakeholde		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
07-Mar-18	1607	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
10-Apr-18	1608	To Stakeholder		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
10-Apr-18	1609	From Stakeholde		Discussion regarding EAPL fact sheet in PROFISH	No objections, claims or issues raised	N/A
16-May-18	1628	From Stakeholde		Invoice received from stakeholder for inclusion of EAPL fact sheet in Seafood Industry Victoria newsletter	No objections, claims or issues raised	N/A
07-Jun-18	1729	From Stakeholde		Out of office reply	No objections, claims or issues raised	N/A
04-Jul-18	2278	From Stakeholde		Out of office reply	No objections, claims or issues raised	N/A
01-Aug-18	2006	To Stakeholder		Email relating to SIV invoice	No objections, claims or issues raised	N/A
02-Aug-18	2088	To Stakeholder		Email relating to SIV invoice	No objections, claims or issues raised	N/A
06-Aug-18	2034	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2159	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
16-Jan-19	2839	To Stakeholder		Email regarding the inclusion of EAPL fact sheet in SIV quarterly newsletter	No objections, claims or issues raised	N/A
15-Apr-19	2953	From Stakeholde		Email received from stakeholder following up the inclusion of campaign information sheets in Seafood Industry Victoria newsletter. EAPL will include campaign sheets in Seafood Industry Victoria newsletter.	No objections, claims or issues raised	N/A

ID: 34 Organisation: Cooper Energy (Formerly Santos)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	206	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details. EAPL stakeholder database updated.

19-Oct-17	207	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	208	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	209	From Stakeholder	Email	Stakeholder accept invitation to community session	No objections, claims or issues raised	N/A
17-Nov-17	316	From Stakeholder	Community Session	Attended community session	No objections, claims or issues raised	N/A
21-Dec-17	1196	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2035	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2097	From Stakeholder	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	EAPL stakeholder database updated.
20-Nov-18	2160	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
20-Dec-18	2645	From Stakeholder	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	EAPL stakeholder database updated.
14-May-19	3008	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 37 Organisation: South East Trawl Fishing Industry Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	213	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	214	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	217	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1248	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
15-Feb-18	1572	To Stakeholder	In Person	Meeting to discuss offshore activities in Bass Strait and any impacts on the fishing community	1: MERIT: Yes Useful means of consultation and titleholder is now using the SMS services to advise stakeholders of EAPL offshore activities CLOSED 2. MERIT: Currently No there is no immediate need for a fishing survey - if this changes stakeholder will be considered to conduct it. CLOSED	1: Stakeholder can provide SMS service to advise fishermen of EAPL offshore activities 2: Stakeholder can provide fishing studies
08-May-18	1614	From Stakeholder	SMS	Stakeholder requesting quarterly meeting to be rescheduled	No objections, claims or issues raised	N/A
06-Aug-18	2036	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Stakeholder confirmed an SMS to fishermen was not required

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
20-Nov-18	2161	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
29-Apr-19	2998	To Stakeholder	Email	Invitation to set up a meeting with stakeholder to discuss consultation processes and provide an update on current Bass Strait activities	No objections, claims or issues raised	N/A
06-May-19	3039	From Stakeholder	Email	-Stakeholder suggesting a consultant be used for Bass Strait Oil and Gas consultation.	MERIT: YES EAPL will research viability of this arrangement.	EAPL will research viability of this arrangement.
08-May-19	3116	To Stakeholder	Email	Titleholder requested information from stakeholder on consultation model including how the model works, how much the titleholder pays and methodologies.	MERIT: YES EAPL will research viability of this arrangement.	Stakeholder provided a proposal for engaging a consultant for Bass Strait Oil and Gas consultation.
13-May-19	3040	To Stakeholder	Email	Meeting notice sent to Stakeholder to discuss Bass Strait activities and consultation options.	ISSUE: Stakeholder has limited resources	Stakeholder declined meeting due to limited resources.
11-Jul-19	2000	From Stakeholder	Email	Stakeholder provided information regarding 'Fishery Independent Survey' (FIS)	No objections, claims or issues raised	N/A

ID: 38 Organisation: South Gippsland Shire Council

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	210	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	211	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
08-Nov-17	212	From Stakeholder		Response to community session invitation	No objections, claims or issues raised	N/A
21-Dec-17	1250	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2037	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2162	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 39 Organisation: State Emergency Service

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	218	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	219	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	220	To Stakeholder	Phone	Follow up community session invitation	No objections, claims or issues raised	N/A
17-Nov-17	1044	To Stakeholder	Phone	Discussion regarding condensate	No objections, claims or issues raised	N/A
21-Dec-17	1247	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

06-Aug-18	2038	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2163	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 40 Organisation: Sustainable Shark Fishing Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	221	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	222	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	223	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1252	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2039	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2164	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 41 Organisation: Tasmanian Seafood Industry Council

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	224	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1256	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2040	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 42 Organisation: Maritime Safety Victoria (formerly Transport Safety Victoria)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	927	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Dec-17	928	To Stakeholder	Email	Email received from stakeholder requesting details for the new operator at Barry's Beach	No objections, claims or issues raised	EAPL provided Barry Beach operator details to the stakeholder.
21-Dec-17	1257	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-Mar-18	1581	To Stakeholder	Email	EAPL provided Barry Beach operator details to the stakeholder.	No objections, claims or issues raised	N/A
06-Aug-18	2041	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

06-Aug-18	2093	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	N/A
14-May-19	3020	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 43 Organisation: Department of Jobs, Precincts and Regions (formerly DEDJTR)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	225	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	226	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	227	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1200	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
04-Jul-18	2276	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	Email received to update contact details
25-Jul-18	2002	From Stakeholder	Email	Meeting invitation received	No objections, claims or issues raised	No objections, claims or issues raised
06-Aug-18	2042	To Stakeholder	EmailE	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2100	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	N/A
23-Aug-18	2117	To Stakeholder	Minutes	Discussion – focusing on Offshore Operations	No objections, claims or issues raised	N/A
20-Nov-18	2167	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
05-Dec-18	2282	To Stakeholder	Community Session	Titleholder held community session in Lakes Entrance discussing current and planned activities in Bass Strait.	No objections, claims or issues raised	N/A
29-Mar-19	2939	To Stakeholder	Phone	Discussing exercises and testing	Follow Up: Send contact details to stakeholder for invitations to Regional Reference Group and State exercise.	Phonecall with stakeholder discussing EAPL emergency reponse exercises and testing

ID: 44 Organisation: Department of Jobs, Precincts and Regions (formerly DEDJTR)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	228	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	229	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
21-Dec-17	1199	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email from stakeholder received to update contact details.
10-Jan-18	1294	From Stakeholder	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	EAPL stakeholder database updated.

06-Aug-18	2043	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2168	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
14-May-19	3010	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 45 Organisation: Department of Jobs, Precincts and Regions (formerly DEDJTR)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	231	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	232	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
21-Dec-17	1198	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2044	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2095	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	N/A
20-Nov-18	2166	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 46 Organisation: Department of Environment, Land, Water and Planning

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	234	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	235	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	236	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1201	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2045	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
29-Oct-18	2132	To Stakeholder	Phone	Discussion on Marine Pollution sub-plan	No objections, claims or issues raised	N/A
02-Nov-18	2141	From Stakeholder	Email	Discussion on "advice to oil exploration companies" document	No objections, claims or issues raised	N/A
02-Nov-18	2634	From Stakeholder	Email	Discussion on "advice to oil exploration companies" document	No objections, claims or issues raised	N/A
20-Nov-18	2169	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

14-May-19	3012	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Out of office reply

ID: 47 Organisation: VicPlan Operations Group

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	237	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	238	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	239	To Stakeholder	Phone	Response to community session invitation	No objections, claims or issues raised	N/A
21-Dec-17	1265	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2046	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2170	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 51 Organisation: Victorian Recreational Fishing (VRFish)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	240	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	241	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	242		Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
15-Nov-17	243	From Stakeholde r	Phone	Response to community session invitation	No objections, claims or issues raised	N/A
21-Dec-17	1268	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2047	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2172	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 52 Organisation: Victorian Scallop Industry Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	244	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	245	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

09-Nov-17	246	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised.	N/A
17-Nov-17	1048	From Stakeholder	Community Session	Email received from stakeholder regarding the impact of seismic activity on spawning scallops.	ISSUE: The representative from the Victorian Scallop Fishermen's Association was concerned that seismic activity could harm spawning scallops. MERIT: EAPL explained that the proposed work does not include any high-energy seismic and that there is no scientific evidence of seismic harming scallop populations. Gave him EAPL contact details to discuss any further concerns.	EAPL explained that the proposed work does not include any high-energy seismic and that there is no scientific evidence of seismic harming scallop populations. Gave them EAPL contact details to discuss any further concerns.
21-Dec-17	1270	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2048	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	Email received from stakeholder regarding the level of detail provided on maps in the EAPL Fact Sheet.	Emailed stakeholder high resolution copies of the maps used in the fact sheet
08-Aug-18	2103	To Stakeholder	Email	Higher resolution copies of the maps provided to stakeholder	No objections, claims or issues raised	N/A
20-Nov-18	2171	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 55 Organisation: Wildlife Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	247	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
25-Oct-17	248	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	Identify contact and update	Email from stakeholder received to update contact details. EAPL stakeholder database updated.
08-Nov-17	249	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
21-Dec-17	1277	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Jun-18	1728	From Stakeholder		Confirmation fact sheet was received	No objections, claims or issues raised	N/A
06-Aug-18	2049	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2092	From Stakeholder		Confirmation fact sheet was received	No objections, claims or issues raised	N/A
20-Nov-18	2174	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 58 Organisation: Oil Basins Ltd

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Oct-17	255	To Stakeholder	Phone	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

10-Oct-17	253	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	254	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
21-Dec-17	1232	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2051	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2176	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
14-May-19	3022	To Stakeholder	Email	Fact sheet outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 61 Organisation: Carnarvon Hibiscus

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	256	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	257	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	258	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1191	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2052	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2177	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 62 Organisation: Roads and Maritime Services

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	259	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
18-Oct-17	260	From Stakeholder	Email	Email from stakeholder received to update contact details.	No objections, claims or issues raised	N/A
21-Dec-17	1244	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Jun-18	1730	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	N/A
08-Jun-18	1733	From Stakeholder	Email	Fact Sheet received	No objections, claims or issues raised	N/A
06-Aug-18	2053	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia’s upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

13-Aug-18	2461	To Stakeholder	Email	Offer to discuss offshore operations via phone call	No objections, claims or issues raised	N/A

ID: 63 Organisation: Department of Primary Industries, Parks, Water and Environment (Tasmania)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Jan-17	261	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1207	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2054	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-May-19	3014	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 64 Organisation: Parks and Wildlife Service (Tasmania)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	262	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1243	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2055	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 66 Organisation: Apollo Bay Fishermen's Co-op

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1175	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2056	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 70 Organisation: Victorian Bays and Inlets Fisheries Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	263	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	264	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	265	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1259	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
06-Aug-18	2057	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2178	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 71 Organisation: Victorian Fishery Association Resource Management

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Oct-17	266	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	267	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	268	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1262	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2179	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 73 Organisation: Victorian Rock Lobster Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	269	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	270	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	271	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1269	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2058	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2180	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 74 Organisation: Warrnambool Professional Fishermen's Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	272	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1276	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2059	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 76 Organisation: Commonwealth Fisheries Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	273	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1194	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2060	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 77 Organisation: Southern Shark Industry Alliance

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	275	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	No objections, claims or issues raised
21-Dec-17	1253	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	ISSUE: stakeholder requesting more information on the EAPL stakeholder consultation process.	Email received from stakeholder requesting more information on the EAPL stakeholder consultation process.
05-Jul-18	1997	From Stakeholde r	Email	Email received from stakeholder requesting more information on the EAPL stakeholder consultation process.	ISSUE: EAPL to contact stakeholder to discuss EAPL stakeholder consultation process MERIT: Email sent from titleholder to stakeholder with contact details to discuss stakeholder consultation process.	Email sent to stakeholder with EAPL contact details to discuss the consultation process further.
06-Aug-18	2061	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	No objections, claims or issues raised
15-Jan-19	2734	To Stakeholder	Email	Email sent to stakeholder with EAPL contact details to discuss the consultation process further.	ISSUE: change of government to address fishing industry concerns. MERIT: Phone call made to Stakeholder to discuss concerns	Email received from stakeholder regarding a change of government to address fishing industry concerns.
16-Jan-19	2831	To Stakeholder	Phone	EAPL called Stakeholder to discuss concerns	CLOSED	Email received from stakeholder regarding a change of government to address fishing industry concerns.

ID: 79 Organisation: Eastern Victorian Sea Urchin Divers Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	274	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
19-Oct-17	276	To Stakeholder	Email		No objections, claims or issues raised	N/A
26-Oct-17	277	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	278	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1213	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
09-Apr-18	1594	From Stakeholder	Email	Email received from stakeholder enquiring whether EAPL has topography maps available	No objections, claims or issues raised	No mapping east of Marlow available
01-May-18	1602	To Stakeholder	Email	No mapping east of Marlow available	No objections, claims or issues raised	N/A
06-Aug-18	2062	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2181	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
14-May-19	3017	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 81 Organisation: Australian Oceanographic Services

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
19-Dec-17	1286	From Stakeholder	Email	Email received regarding provision of vessels for offshore work.	No objections, claims or issues raised	Email received regarding provision of vessels for offshore work.
19-Dec-17	1287	To Stakeholder	Email	Provided stakeholder with contact details for Underwater Operations coordinator	No objections, claims or issues raised	N/A
21-Dec-17	1170	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email received to update contact details
06-Aug-18	2063	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-May-19	3005	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 82 Organisation: East Gippsland Estuarine Fishermen's Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	279	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	280	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	281	To Stakeholder	Phone	left message on mobile regarding community session	No objections, claims or issues raised	N/A
21-Dec-17	1208	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2064	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2182	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 83 Organisation: Corner Inlet Fisheries Habitat Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	282	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	283	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	284	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
21-Dec-17	1195	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2065	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2183	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 84 Organisation: Port Phillip Sea Pilots

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1169	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2066	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 85 Organisation: National Offshore Petroleum Titles Administrator

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1231	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Email received to update contact details
06-Aug-18	2067	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-May-19	3021	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 87 Organisation: Bass Oil

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	285	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
26-Oct-17	286	From Stakeholde r	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	Email bounced
09-Nov-17	287	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1185	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2068	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2184	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
14-May-19	3006	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 90 Organisation: Water Police

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
22-Oct-17	290	From Stakeholde	Email	Contact details updated	No objections, claims or issues raised	N/A
26-Oct-17	291	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
09-Nov-17	292	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
10-Nov-17	293	To Stakeholder	Phone	Follow up phone call regarding invitation to community session	No objections, claims or issues raised	N/A
17-Nov-17	1047	From Stakeholde		Email requesting funding for an awareness campaign regarding EAPL facilities	No objections, claims or issues raised	N/A
11-Dec-17	1140	To Stakeholder		Follow up on funding with volunteer coastguard in 2018	No objections, claims or issues raised	N/A
21-Dec-17	1272	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2070	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2185	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A
05-Dec-18	2280	To Stakeholder	Community Session	Titleholder held community session in Lakes Entrance discussing current and planned activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 93 Organisation: Mornington Peninsula Shire

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
10-Oct-17	294	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1228	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2071	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 99 Organisation: Department of Agriculture and Water Resources

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
09-Nov-17	295	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1197	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
22-Aug-18	2113	To Stakeholder	Phone	Phone call to discuss international vessels	No objections, claims or issues raised	N/A

ID: 100 Organisation: CarbonNet

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
06-Oct-17	1142	To Stakeholder	In Person	EAPL provided an overview of activities at meeting	No objections, claims or issues raised	N/A
21-Dec-17	1189	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 101 Organisation: Victorian Fisheries Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	297	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1260	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2072	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 102 Organisation: Department of Environment & Energy

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	298	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1204	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2073	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 103 Organisation: Director of National Parks

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	299	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1206	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

06-Aug-18	2074	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
25-Oct-18	2131	From Stakeholder	Email	no authorisation requirements from the DNP	No objections, claims or issues raised	N/A

ID: 104 Organisation: Department of Defence

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
14-Dec-17	1143	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Acknowledgement that email has been received
21-Dec-17	1203	From Stakeholder	Email	Acknowledgement that email has been received	No objections, claims or issues raised	N/A
07-Jun-18	1724	To Stakeholder	Email	Acknowledgement that email has been received	No objections, claims or issues raised	N/A
06-Aug-18	2075	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2089	From Stakeholder	Email	Acknowledgement that email has been received	No objections, claims or issues raised	N/A

ID: 105 Organisation: Department of Foreign Affairs & Trade

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	301	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1205	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Jun-18	1639	From Stakeholder	Email	Email received to update contact details	No objections, claims or issues raised	Consultation database updated to reflect new contact
06-Aug-18	2076	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2096	From Stakeholder	Email	Out of office reply	No objections, claims or issues raised	N/A
14-May-19	3013	To Stakeholder	Email	Fact sheet outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 107 Organisation: Boating Industry Association of Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	303	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1187	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2077	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 109 Organisation: Life Saving Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	305	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1224	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2078	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 111 Organisation: Yachting Victoria

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	307	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1278	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2079	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 112 Organisation: Victorian Regional Channels Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	308	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1266	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2080	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 115 Organisation: Port of Portland

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
16-Nov-17	311	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1242	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
07-Jun-18	1732	From Stakeholder	Email	Email received to update contact details	No objections, claims or issues raised	N/A
06-Aug-18	2081	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 116 Organisation: Gippsland Times

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
26-Sep-17	320	To Stakeholder	-	Esso undertook a series of ads in the Gippsland Times focusing on our economic contribution, investment and community outreach in Gippsland and mentions our exploration program.	No objections, claims or issues raised	N/A
21-Dec-17	1218	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 117 Organisation: Lakes Post

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
14-Dec-17	1141			Advertisement appearing this week's Lakes Post	No objections, claims or issues raised	N/A
21-Dec-17	1219	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	NA

ID: 118 Organisation: Australian Communications And Media Authority

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
14-Dec-17	1144	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1176	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2082	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 119 Organisation: Border Protection Command

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
21-Dec-17	1188	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 120 Organisation: Tuna Australia Ltd

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
14-Dec-17	1145	To Stakeholder	Email	Requested contact details via the Enquiry Form on their website	Send fact sheet	N/A
19-Dec-17	1149	From Stakeholde r	Email	Contact details received and update email and fact sheet sent as requested.	No objections, claims or issues raised	N/A
21-Dec-17	1254	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2083	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 121 Organisation: Australian Southern Bluefin Tuna Industry Association

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
14-Dec-17	1146	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1183	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	Stakeholder received fact sheet and would like to remain on the mailing list.
14-Jun-18	1735	From Stakeholder	Email	Stakeholder received fact sheet and would like to remain on the mailing list.	No objections, claims or issues raised	N/A
06-Aug-18	2084	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 123 Organisation: Panama II Octopus fishing vessel

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
06-Aug-18	2086	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
20-Nov-18	2186	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	N/A

ID: 124 Organisation: Victoria Game Fishing Club

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
17-May-18	1629	From Stakeholder		Exclusion zone reminder flyer	No objections, claims or issues raised	N/A
06-Aug-18	2087	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A

ID: 125 Organisation: Australian Hydrographic Office

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
08-Nov-17	1825	To Stakeholder	Email	Fact sheet #1 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
14-Dec-17	1824	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1822	To Stakeholder	Email	Fact sheet #2 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
21-Dec-17	1823	From Stakeholder	Email	Stakeholder acknowledged receiving fact sheet #2	No objections, claims or issues raised	N/A
07-Jun-18	1810	From Stakeholder	Email	Stakeholder acknowledged receiving fact sheet #2	No objections, claims or issues raised	N/A
06-Aug-18	2090	To Stakeholder	Email	Fact sheet #4 outlining Esso Australia's upcoming activities in Bass Strait.	No objections, claims or issues raised	N/A
06-Aug-18	2091	From Stakeholder	Email	Stakeholder acknowledged receiving fact sheet #4	No objections, claims or issues raised	N/A

22-Aug-18	2112	From Stakeholder	Email	Stakeholder advised there were technical issues with the email gateway	No objections, claims or issues raised	N/A

ID: 126 Organisation: Department of Jobs, Precincts and Regions (formerly DEDJTR)

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
20-Nov-18	2165	To Stakeholder	Email	Invitation to Community Session in Lakes Entrance to discuss offshore activities in Bass Strait	No objections, claims or issues raised	No objections, claims or issues raised

ID: 128 Organisation: Correspondence that is applicable to all stakeholders

Date	ID	To / From	Method	Summary of Consultation	Assessment of Merit	Summary of Response
06-Feb-18	2458	From Stakeholder	Minutes	Minutes from Esso Fishermens Claims Tribunal	No objections, claims or issues raised	N/A
06-Aug-18	2459	From Stakeholder	Minutes	Minutes from Esso Fishermens Claims Tribunal	No objections, claims or issues raised	N/A
18-Feb-19	2951	From Stakeholder	Minutes	Minutes from Esso Fishermens Claims Tribunal	No objections, claims or issues raised	N/A

Fact sheet #1

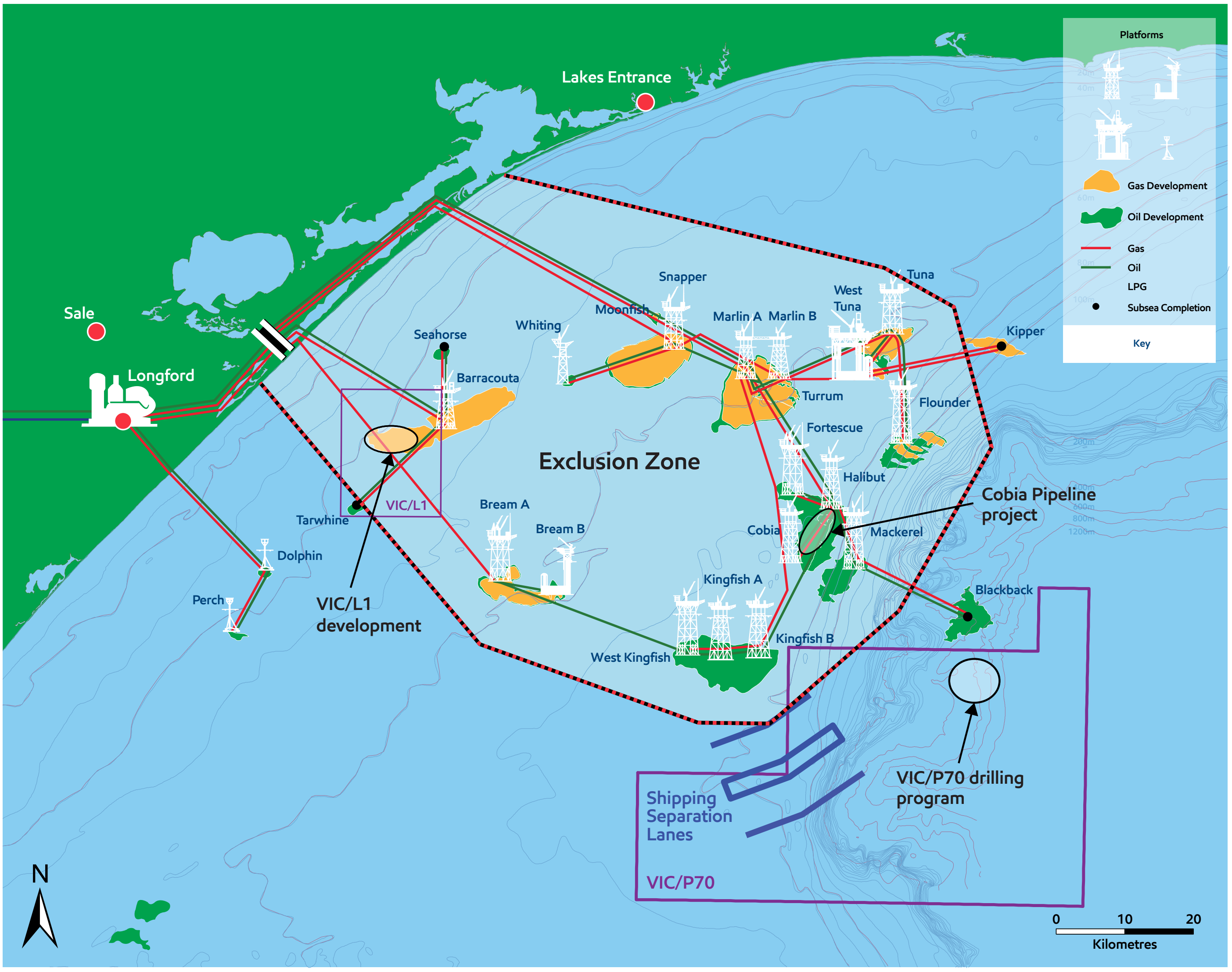
Esso offshore projects

Introduction

Esso Australia, a subsidiary of ExxonMobil Australia, is planning on undertaking a program of work across some of its offshore assets, including those owned jointly by the Gippsland Basin Joint Venture, in 2018 and 2019. This program forms part of Esso's ongoing investment in exploring domestic gas development opportunities to ensure that we can continue to meet Australia's energy needs.

This fact sheet provides high level details about the projects, regulatory requirements and consultation which will be occurring to facilitate information sharing and stakeholder engagement.

Project locations



Well coordinates

Baldfish Latitude 38° 36′ south, Longitude 148° 35′ east

Hairtail Latitude 38° 36′ south, Longitude 148° 31′ east

VIC/P70 drilling program

Esso Australia is planning to undertake an exploration drilling program in the VIC/P70 block, approximately 90km off the East Gippsland Victorian coast. The program will involve drilling two exploration wells, known as Baldfish and Hairtail, with the activity planned to commence in mid 2018. The drilling program is expected to last approximately 60 days.

The exploration wells will determine the extent of any gas reserves contained within the field and support any subsequent development. If successful, this development has the potential to bring online much needed new gas supplies from Bass Strait fields, which have been producing for more than 40 years.

Offshore Environment Regulations

Esso is preparing an Environment Plan and associated Oil Pollution Emergency Plan to identify, assess and manage environmental risks for the exploration drilling program. These plans will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the offshore environment regulator, for review and acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with the activities being planned, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP).

Key impacts and environmental risks

As part of development of the VIC/P70 Environment Plan, the key impacts and environmental risks of the project will be identified and controls implemented to reduce the risks to ALARP. These include:

Temporary displacement of shipping/fishing

The Baldfish and Hairtail wells are located outside the "*Bass Strait Area to be Avoided*" as defined on marine chart AUS357. Esso will seek to have a temporary petroleum safety zone created around the drill rig will for the duration of the drilling program, to ensure drilling activities can be completed safely and other marine users are protected. Esso will be working with stakeholders, including the Australian Marine Safety Authority, to manage the impact and communicate with marine users.

Drilling fluids and drill cuttings

As part of the drilling program, water-based mud (WBM) will be used to remove the cuttings from the wells to be drilled, cool the drill bits and maintain pressure control of the wells. WBM is mostly water and natural clays, with a small amount of low toxicity additives. The drill cuttings will be separated from the WBM and discharged overboard, while the WBM will be recycled and reused. Drill cuttings will settle in the local vicinity of the wells on the sea floor, which is predominantly sandy with limited bottom-dwelling marine fauna.

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Other discharges and waste

Controls such as hose inspections and creation of bunded areas will be in place to prevent and mitigate the uncontrolled release of fluids to the marine environment. Any waste generated will be managed in accordance with correct segregation, handling and be returned for onshore disposal. Small amounts of residual fluid from cleaning the mud and cement equipment will be discharged overboard.

Hydrocarbon release

The VIC/P70 drilling program will be undertaken in a well understood geological area where the target reservoir is gas. This, in conjunction with preventative measures, including the application of appropriate well control barriers, procedures and equipment, means that a well blowout or loss of well control are very unlikely. In the unlikely event of a release, the impact is expected to be localized with no significant shore line impact. Third party oil spill modelling is being conducted with a range of scenarios being investigated which will form the basis of Oil Pollution Emergency Plans. The plans will outline the roles, responsibilities and response strategies to mitigate the impact of a potential spill from drilling activities.

Other projects

VIC/L1 development

Esso Australia is examining options to develop a gas field in block VIC/L1 known as West Barracouta, approximately 6km south west of the existing Barracouta platform. The project is likely to involve the drilling of a number of subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. This project will be undertaken within Esso's current "Bass Strait Area to be Avoided".

To support the project's development, Esso will be conducting environmental and seabed surveys commencing in early 2018 (duration approximately 20 days) to assess the location of potential well sites and flow line routes. As the project develops, additional consultation with stakeholders will be conducted.

Cobia Pipeline project

The Cobia Pipeline project will undertake maintenance and repair works on the Cobia pipeline, which runs from the Cobia platform to the Halibut platform in Bass Strait. This project will be undertaken within the existing Bass Strait "Area to be Avoided" and a temporary petroleum safety zone will be implemented to provide protection during the project.

The offshore work for this project is planned to be carried out by a dynamically positioned vessel in late 2018 and will take approximately two weeks.

The key impacts and environmental risks of the VIC/L1 development and Cobia pipeline project will be developed and shared with stakeholders as regulatory documentation is progressed.

Consultation

We are committed to engaging with the communities where we operate and helping our stakeholders to understand our business. Esso will be consulting with stakeholders potentially affected by these projects through a number of different channels.

This fact sheet provides information to allow stakeholders to make an informed assessment of the possible consequences of the proposed activities to their functions, interests or activities. We will address questions and consider feedback from stakeholders relating to these projects throughout this consultation process.

If you have any specific questions or feedback about any of these projects please contact Esso at consultation@exxonmobil.com.

A face to face session is being planned for 17 November 2017. To register your interest in attending, please RSVP to consultation@exxonmobil.com

About Esso

Esso Australia is a subsidiary of ExxonMobil Australia, the country's largest integrated oil and gas company. Esso's Longford Plants has processed more than four billion barrels of oil and eight trillion cubic feet of gas since production began in 1969.

We place the highest priority on operating flawlessly in all aspects of our business. All these offshore projects will be managed in accordance with all regulatory requirements, as well as Esso's Operational Integrity Management System to reduce risks to ALARP. Environment Plans detailing each program of work and how the risks of the program will be managed by Esso will be submitted to NOPSEMA for acceptance.

Esso is continuously striving to improve all aspects of our safety performance including for our people, our processes, security, health, and environmental performance.

For more information about our operations please visit www.exxonmobil.com.au

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Fact sheet #2

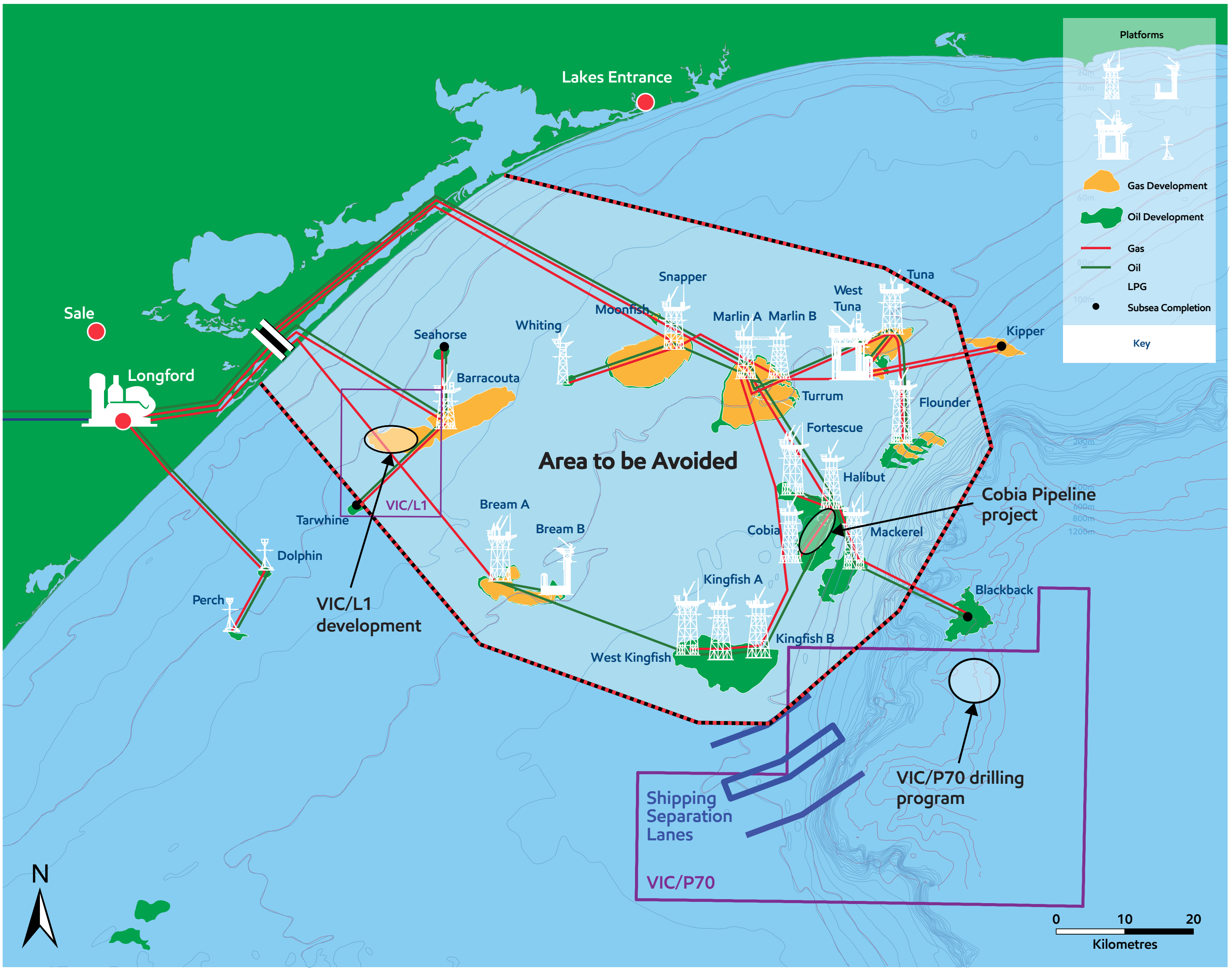
Esso offshore projects

Introduction

Esso Australia, a subsidiary of ExxonMobil Australia, is planning on undertaking a program of work across some of its offshore assets, including those owned jointly by the Gippsland Basin Joint Venture, in 2018 and 2019. This program forms part of Esso's ongoing investment in exploring domestic gas development opportunities to ensure that we can continue to meet Australia's energy needs.

This fact sheet provides high level details about the projects, regulatory requirements and consultation which will be occurring to facilitate information sharing and stakeholder engagement.

Project locations



Well coordinates

Baldfish Latitude 38° 36′ south, Longitude 148° 35′ east

Hairtail Latitude 38° 36′ south, Longitude 148° 31′ east

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VIC/P70 drilling program

Esso Australia is planning to undertake an exploration drilling program in the VIC/P70 block, approximately 90km off the East Gippsland Victorian coast. The program will involve drilling two exploration wells, known as Baldfish and Hairtail, with the activity planned to commence in mid 2018. The drilling program is expected to last approximately 60 days.

The exploration wells will determine the extent of any gas reserves contained within the field and support any subsequent development. If successful, this development has the potential to bring online much needed new gas supplies from Bass Strait fields, which have been producing for more than 40 years.

Offshore Environment Regulations

Esso is preparing an Environment Plan and associated Oil Pollution Emergency Plan to identify, assess and manage environmental risks for the exploration drilling program. These plans will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the offshore environment regulator, for review and acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with the activities being planned, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP).

Key impacts and environmental risks

As part of development of the VIC/P70 Environment Plan, the key impacts and environmental risks of the project will be identified and controls implemented to reduce the risks to ALARP. These include:

Temporary displacement of shipping/fishing

The Baldfish and Hairtail wells are located outside the "*Bass Strait Area to be Avoided*" as defined on marine chart AUS357. Esso will seek to have a temporary petroleum safety zone created around the drill rig will for the duration of the drilling program, to ensure drilling activities can be completed safely and other marine users are protected. Esso will be working with stakeholders, including the Australian Marine Safety Authority, to manage the impact and communicate with marine users.

Drilling fluids and drill cuttings

As part of the drilling program, water-based mud (WBM) will be used to remove the cuttings from the wells to be drilled, cool the drill bits and maintain pressure control of the wells. WBM is mostly water and natural clays, with a small amount of low toxicity additives. The drill cuttings will be separated from the WBM and discharged overboard, while the WBM will be recycled and reused. Drill cuttings will settle in the local vicinity of the wells on the sea floor, which is predominantly sandy with limited bottom-dwelling marine fauna.

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Other discharges and waste

Controls such as hose inspections and creation of bunded areas will be in place to prevent and mitigate the uncontrolled release of fluids to the marine environment. Any waste generated will be managed in accordance with correct segregation, handling and be returned for onshore disposal. Small amounts of residual fluid from cleaning the mud and cement equipment will be discharged overboard.

Hydrocarbon release

The VIC/P70 drilling program will be undertaken in a well understood geological area where the target reservoir is gas. This, in conjunction with preventative measures, including the application of appropriate well control barriers, procedures and equipment, means that a well blowout or loss of well control are very unlikely. In the unlikely event of a release, the impact is expected to be localized with no significant shore line impact. Third party oil spill modelling is being conducted with a range of scenarios being investigated which will form the basis of Oil Pollution Emergency Plans. The plans will outline the roles, responsibilities and response strategies to mitigate the impact of a potential spill from drilling activities.

Other projects

VIC/L1 development

Esso Australia is examining options to develop a gas field in block VIC/L1 known as West Barracouta, approximately 6km south west of the existing Barracouta platform. The project is likely to involve the drilling of a number of subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. This project will be undertaken within Esso's current "Bass Strait Area to be Avoided".

To support the project's development, Esso will be conducting environmental and seabed surveys commencing in early 2018 (duration approximately 20 days) to assess the location of potential well sites and flow line routes. As the project develops, additional consultation with stakeholders will be conducted.

Cobia Pipeline project

The Cobia Pipeline project will undertake maintenance and repair works on the Cobia pipeline, which runs from the Cobia platform to the Halibut platform in Bass Strait. This project will be undertaken within the existing Bass Strait "Area to be Avoided" and a temporary petroleum safety zone will be implemented to provide protection during the project.

The offshore work for this project is planned to be carried out by a dynamically positioned vessel in late 2018 and will take approximately two weeks.

The key impacts and environmental risks of the VIC/L1 development and Cobia pipeline project will be developed and shared with stakeholders as regulatory documentation is progressed.

Seabed surveys

In addition to the environmental and seabed surveys to be conducted for the VIC/L1 development, in order to support a number of future developments, Esso will be conducting seabed surveys commencing in early 2018 (duration approximately 60 days over a 6 month period) to help inform potential drilling activities at Kipper and VIC/L9, as well as potential plug and abandonment activities at a number of existing licence areas as shown in the figure below.

The proposed surveys will involve collection of geophysical data (i.e. measurements of seabed characteristics, imaging and profiling), collection of water and sediment samples, and collection of subsea floor materials.

A range of measures will be implemented to reduce potential environmental impacts to acceptable levels:

- Survey vessels will not anchor or refuel during the activity
- Measures will be taken to protect marine fauna from noise and to prevent vessel collisions
- All discharges (e.g. sewage, grey water) will meet legal requirements
- Appropriate spill response plans will be established
- Survey vessels will be assessed and managed to prevent the introduction of invasive marine species

Consultation

We are 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 these projects through a number of different channels.

This fact sheet provides information to allow stakeholders to make an informed assessment of the possible consequences of the proposed activities to their functions, interests or activities. We will address questions and consider feedback from stakeholders relating to these projects throughout this consultation process. If you have any specific questions or feedback about any of these projects please contact Esso at consultation@exxonmobil.com or call 03 9261 0260.

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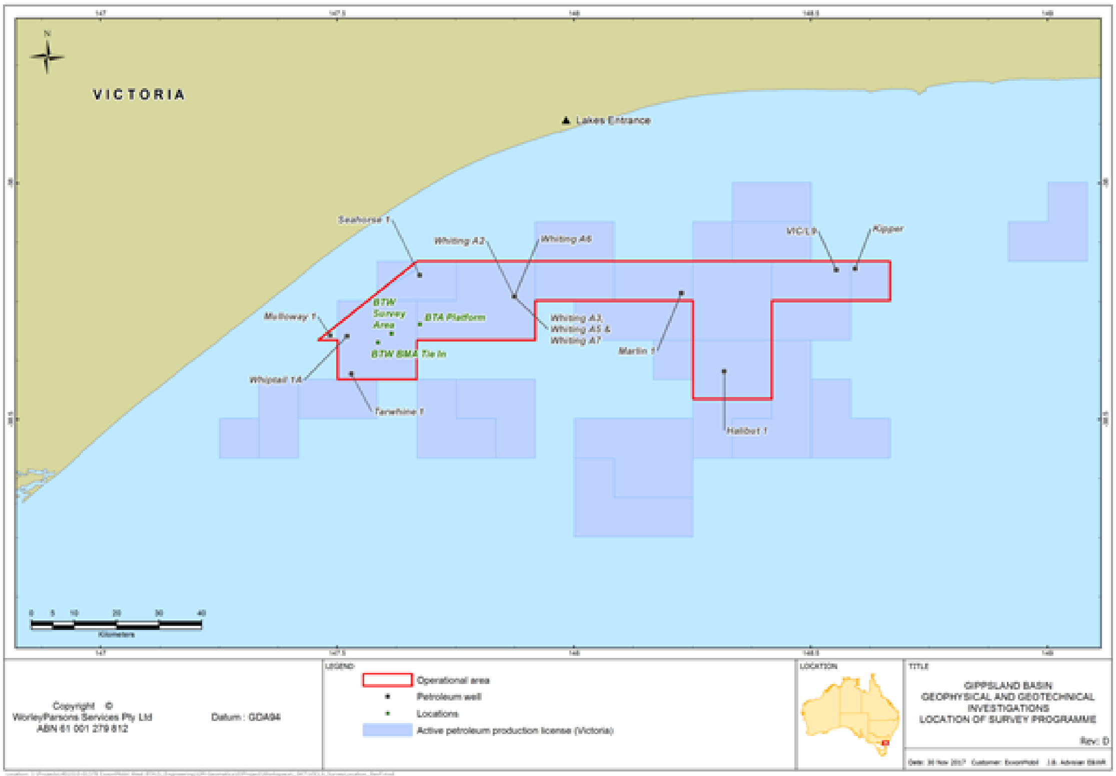

Map of proposed seabed surveys

About Esso

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We place the highest priority on operating flawlessly in all aspects of our business. All these offshore projects will be managed in accordance with all regulatory requirements, as well as Esso's Operational Integrity Management System to reduce risks to ALARP. Environment Plans detailing each program of work and how the risks of the program will be managed by Esso will be submitted to NOPSEMA for acceptance.

Esso is continuously striving to improve all aspects of our safety performance including for our people, our processes, security, health, and environmental performance. For more information about our operations please visit www.exxonmobil.com.au

Fact sheet #3 included in PROFISH

Esso offshore projects

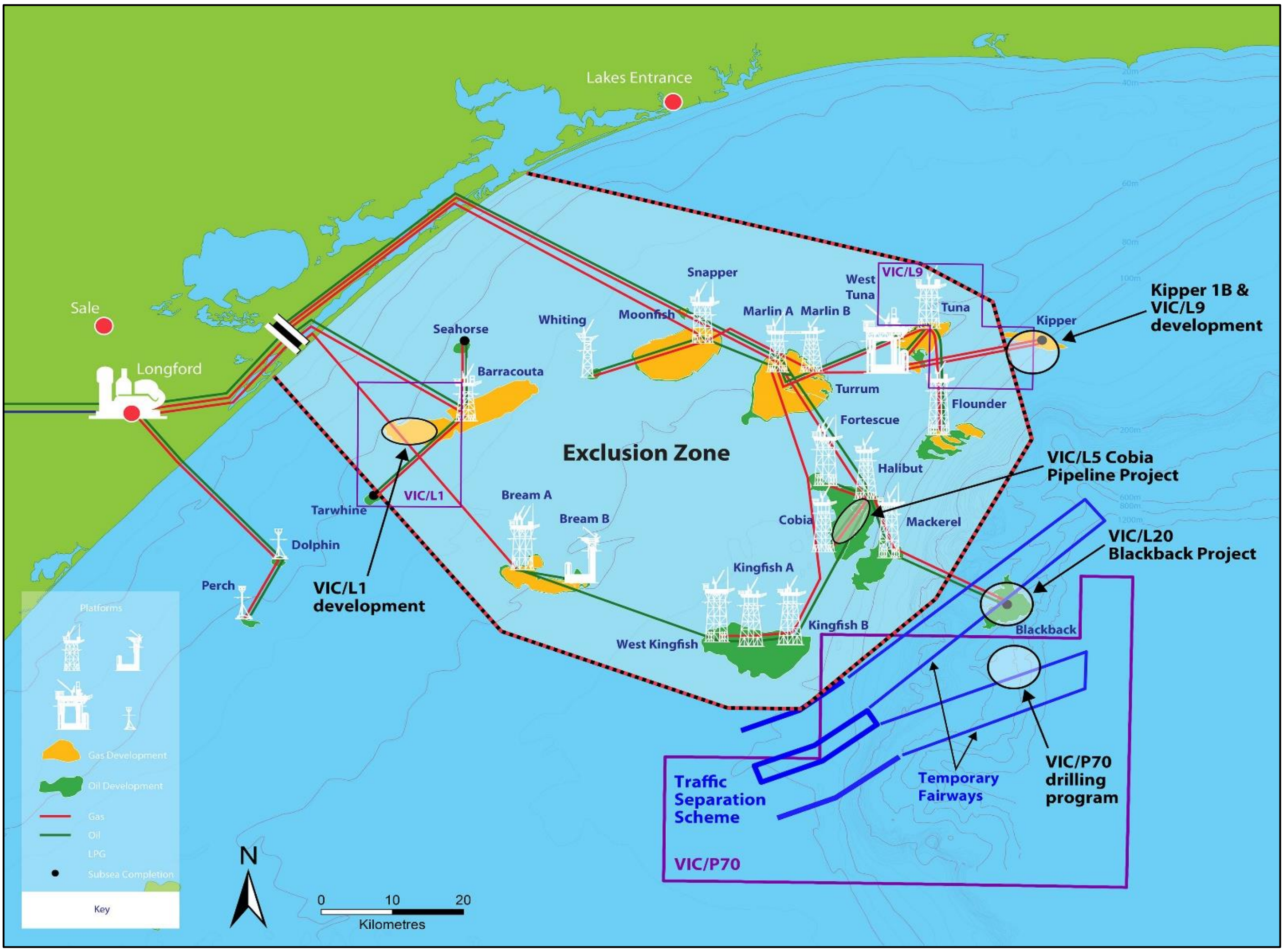
INTRODUCTION

Esso Australia, a subsidiary of ExxonMobil Australia, is planning on undertaking a program of work across some of its offshore assets, including those owned jointly by the Gippsland Basin and Kipper Unit Joint Ventures, in 2018 and 2019.

This program forms part of Esso's ongoing investment in exploring domestic gas development opportunities to ensure that we can continue to meet Australia's energy needs.

This fact sheet provides high level details about the projects, regulatory requirements and consultation which will be occurring to facilitate information sharing and stakeholder engagement.

Project Locations



PROJECTS

VIC/P70 drilling program

Esso Australia is planning to undertake an exploration drilling program in the VIC/P70 block, approximately 90km off the East Gippsland Victorian coast. The program will involve drilling two exploration wells, known as Baldfish and Hairtail. The drilling program is expected to last approximately 60 days starting mid-2018.

The exploration wells will determine the extent of any gas reserves contained within the field and has the potential to lead to development of much needed new gas supplies from The Gippsland Basin, which has been producing for more than 40 years.

The Baldfish and Hairtail wells are located outside the "Bass Strait Area to be Avoided" as defined on marine chart AUS357.

Esso will seek to have a temporary petroleum safety zone created around the drill rig for the duration of the drilling program, to ensure drilling activities can be completed safely and other marine users are protected. (VIC/P70 well coordinates: Baldfish Latitude 38° 36′ south, Longitude 148° 35′ east / Hairtail Latitude 38° 36′ south, Longitude 148° 31′ east)

Esso will be working with stakeholders, including the Australian Marine Safety Authority, to manage the impact and communicate with marine users.

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Seabed surveys

Esso Australia is examining options to develop a gas field in block VIC/L1 known as West Barracouta, approximately 6km south west of the existing Barracouta platform. The project is likely to involve the drilling of a number of subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. This project will be undertaken within Esso's current "Bass Strait Area to be Avoided".

To support the project's development, Esso will be conducting environmental and seabed surveys commencing in early 2018 (duration approximately 20 days) to assess the location of potential well sites and flow line routes.

In addition to the environmental and seabed surveys to be conducted for the VIC/L1 development, in order to support a number of future developments, Esso will be conducting seabed surveys commencing in early 2018 (duration approximately 60 days over a 6 month period) to help inform potential drilling activities at Kipper and VIC/L9, as well other activities at a number of existing licence areas.

The proposed surveys will involve collection of geophysical data (i.e. measurements of seabed characteristics, imaging and profiling), collection of water and sediment samples, and collection of subsea floor materials. The Environment Plan for the seabed survey work was accepted in February 2018.

VIC/L5 Cobia Pipeline project

The Cobia Pipeline project will undertake maintenance and repair works on the Cobia pipeline, which runs from the Cobia platform to the Halibut platform in Bass Strait. This project will be undertaken within the existing Bass Strait "Area to be Avoided" and a temporary petroleum safety zone will be implemented to provide protection during the project.

The offshore work for this project is planned to be carried out by a dynamically positioned vessel in late 2018 and will take approximately two weeks.

VIC/L20 Blackback

Esso Australia is examining options to secure wells no longer in operation. (Well coordinates: Latitude 38° 32′ south, Longitude 148° 33′ east)

VIC/L25 and VIC/L9 Kipper 1B and Pilchard

Esso Australia and its Joint Venture partners are planning to drill a number of additional wells at Kipper. These will be tied into the existing infrastructure within the existing Kipper petroleum safety zone. The current schedule is for these to be drilled in 2019.

In addition to the Kipper infield drilling a similar gas field, Pilchard, is being assessed and may be drilled and developed in the same drilling campaign.
Pilchard may be drilled from Kipper or may require a new subsea location nearby. (Well coordinates: Latitude 38° 11′ south, Longitude 148° 36′ east)

OFFSHORE ENVIRONMENT REGULATIONS

Esso is preparing Environment Plans and associated Oil Pollution Emergency Plans to identify, assess and manage environmental risks for these projects. These plans will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the offshore environment regulator, for review and acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with the activities being planned, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP).

CONSULTATION

We are 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 these projects through a number of different channels.

As these projects develop, additional consultation with stakeholders will be conducted, including key impacts and environmental risks.

This fact sheet provides information to allow stakeholders to make an informed assessment of the possible consequences of the proposed activities to their functions, interests or activities. We will address questions and consider feedback from stakeholders relating to these projects throughout this consultation process. If you have any specific questions or feedback about any of these projects please contact Esso at consultation@exxonmobil.com or call 03 92610260

ABOUT ESSO

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Esso is continuously striving to improve all aspects of our safety performance including for our people, our processes, security, health, and environmental performance.
For more information about our operations please visit www.exxonmobil.com.au

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Fact sheet #4

Esso offshore projects

Introduction

Esso Australia, a subsidiary of ExxonMobil Australia, is undertaking a program of work across some of its offshore assets, including those owned jointly by the Gippsland Basin Joint Venture and the Kipper Unit Joint Venture, in 2018 and 2019.

This program forms part of Esso's ongoing investment in exploring for domestic gas development opportunities to ensure that we can continue to meet Australia's energy needs.

This fact sheet provides high level details about the projects, regulatory requirements and consultation that is occurring to facilitate information sharing and stakeholder engagement.

Projects

VIC/P70 drilling program

Esso is undertaking an exploration drilling program in the VIC/P70 block, approximately 90km off the East Gippsland Victorian coast. The program will involve drilling two exploration wells, known as Baldfish and Hairtail.

All regulatory requirements are in place with the Environmental Plan accepted by NOPSEMA on 4 July 2018 (a summary is available on the NOPSEMA website and on the ExxonMobil Australia website www.exxonmobil.com.au).

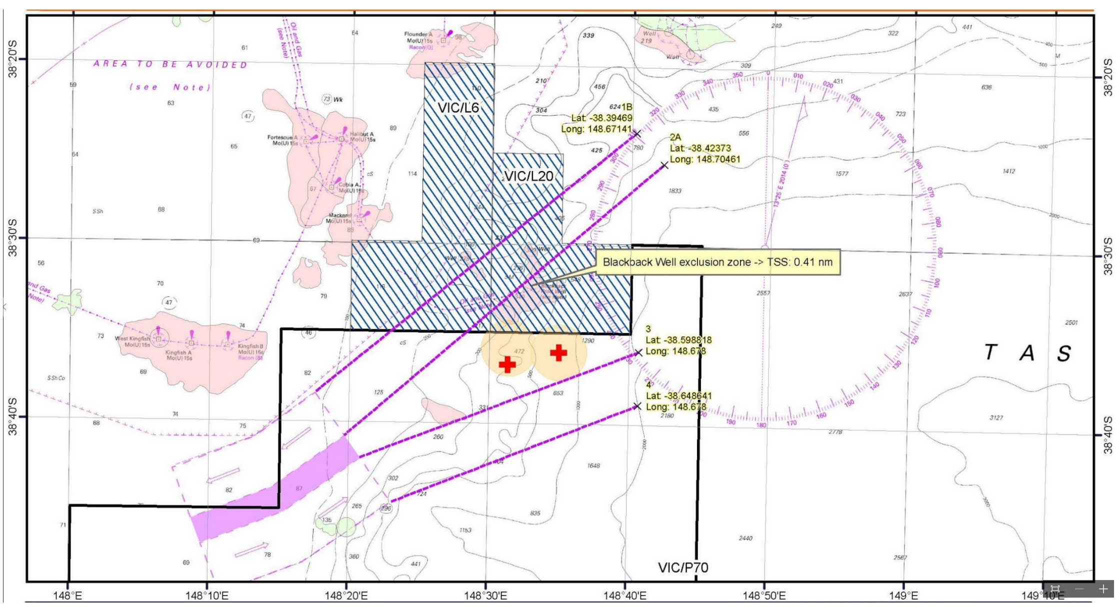
The drilling program is expected to start in the second half of 2018 and continue for approximately 60 days, using the Ocean Monarch mobile offshore drilling unit (MODU).

The exploration wells will determine the extent of any gas reserves contained within the field and the potential for development of much needed new gas supplies from the Gippsland Basin, which has been producing for more than 45 years.

The Baldfish and Hairtail wells are located outside the Bass Strait "Area to be Avoided" as defined on marine chart AUS357 and temporary fairways have been established to protect the rig and other marine users (see figure below).

Temporary petroleum safety zones will also be in place for the duration of the drilling program, to further provide protection. (VIC/P70 well coordinates: Baldfish Latitude 38° 36′ south, Longitude 148° 35′ east / Hairtail Latitude 38° 36′ south, Longitude 148° 31′ east).

Esso is working with stakeholders, including the Australian Marine Safety Authority, to manage the impact and communicate with marine users.



Temporary fairways

VIC/L20 Blackback

Esso is undertaking a project to work on the Blackback wells also using the Ocean Monarch MODU. The program is expected to start in the second half of 2018 and continue for approximately 60 days. (Well coordinates: Latitude 38° 32′ south, Longitude 148° 33′ east).

Ocean Monarch MODU

VIC/L1 development

Esso is examining options to develop a gas field in block VIC/L1 known as West Barracouta, approximately 6km south west of the existing Barracouta platform. The project is likely to involve the drilling of two subsea wells within one petroleum safety zone, which will be tied back to our existing Barracouta infrastructure in Bass Strait.

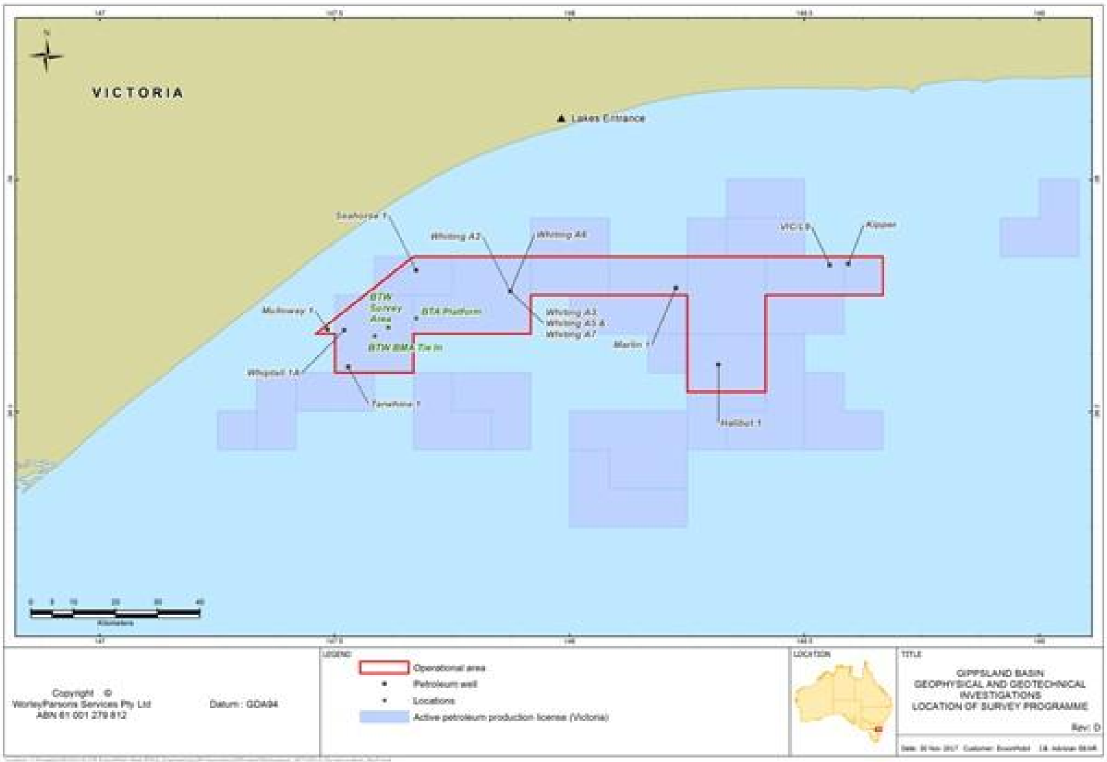
A subsea flowline approximately 6km in length connected via a subsea hot tap into the existing gas export pipeline and controls umbilical approximately 6.5 km in length to the Barracouta platform is planned to be installed. This project will be undertaken within Esso's current Bass Strait "Area to be Avoided".

To support the project's development, Esso has conducted environmental and seabed surveys and geotechnical surveys are planned to be completed the first half of 2019 (previously planned for 2018), subject to regulatory approval. The results of these surveys will be used to assess the location of the well sites and flowline and umbilical routes.

Seabed surveys

In addition to the seabed surveys to be conducted for the VIC/L1 development, Esso will be conducting seabed surveys to help inform potential drilling activities in VIC/L9, as well as potential plug and abandonment activities at a number of existing licence areas as shown in the figure below.

The proposed surveys will involve collection of geophysical data (i.e. measurements of seabed characteristics, imaging and profiling), collection of water and sediment samples, and collection of subsea floor materials. Geotechnical data will also be collected.



Map of proposed seabed surveys

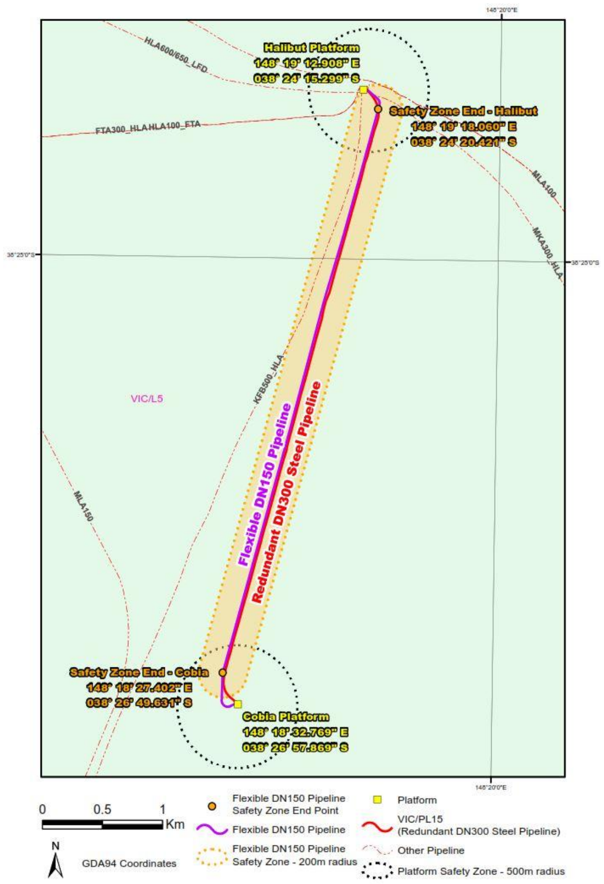
A range of measures will be implemented to reduce potential environmental impacts to acceptable levels:

- Survey vessels will not anchor or refuel during the activity
- Measures will be taken to protect marine fauna from noise and to prevent vessel collisions
- All discharges (e.g. sewage, grey water) will meet legal and environmental requirements
- Appropriate spill response plans will be established
- Survey vessels will be assessed and managed to prevent the introduction of invasive marine species

VIC/L05 Cobia Pipeline project

The Cobia Pipeline project will undertake maintenance and repair works on the Cobia pipeline, which runs from the Cobia platform to the Halibut platform in Bass Strait.

This project will be undertaken within the existing Bass Strait "Area to be Avoided" and a temporary petroleum safety zone will be implemented to provide protection during the project.



Temporary petroleum safety zone for Cobia Project

The offshore work for this project is planned to be carried out by the Seven Eagle, a dive support vessel, in December 2018 and will take approximately two weeks.

Dive support vessel 'Seven Eagle'

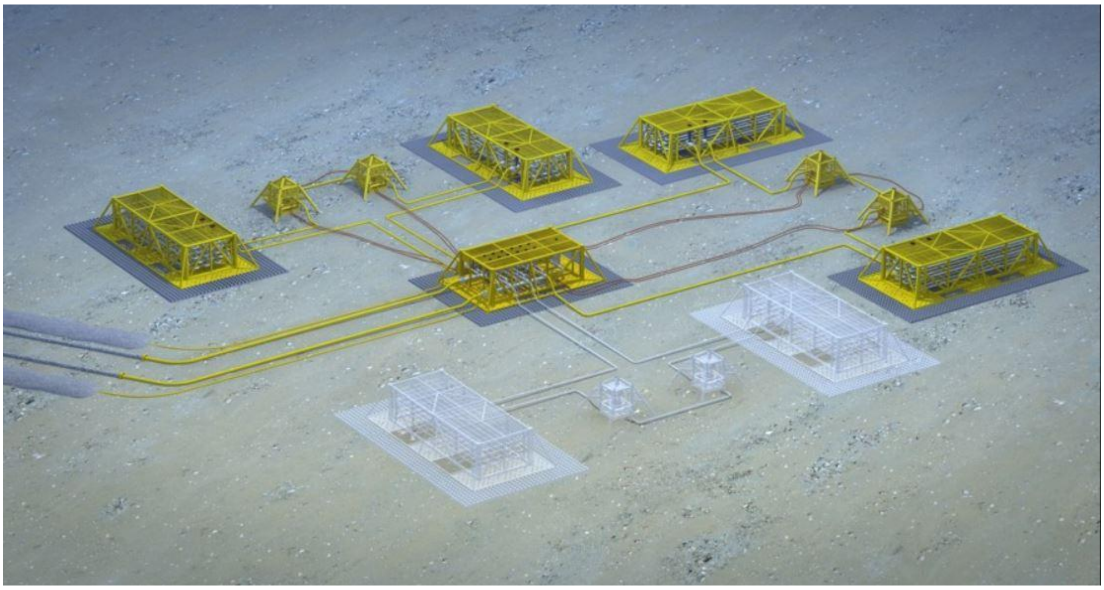
VIC/L05 Mackerel and other platform based activities

Esso is also considering work on the Mackerel wells with the program expected to begin in November 2018 and continue for approximately 10 months (Platform coordinates: Latitude 38° 27′ south, 148° 18′ east), with various platform based activities scheduled throughout 2019 to 2022.

VIC/L25 and VIC/L9 Kipper 1B and Pilchard

Esso and its Kipper Unit Joint Venture partners are planning to drill a number of additional wells at Kipper (Well coordinates: Latitude 38° 11′ south, Longitude 148° 36′ east). These wells were part of the original Kipper plan and are referred to as Stage 1B.

The wells will be tied into the existing subsea infrastructure within the current Kipper petroleum safety zone as shown in the following artist's impression. The current schedule is for the Kipper 1B wells to be drilled in 2020.



Artist's impression of Kipper Subsea Facilities

In addition to the Kipper infield drilling, a similar gas field, Pilchard, is being assessed by Esso and its Gippsland Basin Joint Venturers and may be drilled and developed in a future drilling campaign.

Offshore environment regulations

Esso is preparing Environment Plans and associated Oil Pollution Emergency Plans to identify, assess and manage environmental risks for these projects.

These plans will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the offshore environment regulator, for review and acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act 2006 and Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

In addition, Esso will be conducting a five-yearly review of existing Environment Plans for platforms operating in Bass Strait commencing mid-2019, in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act 2006 and Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with the activities being planned, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP).

Produced Formation Water (PFW)

As part of the accepted offshore Environment Plans, Esso committed to undertaking in-situ monitoring of the discharge of Produced Formation Water (PFW) to assess its potential impact on the Bass Strait environment, including impacts to seawater and marine sediments.

This in-situ sampling was conducted during the period 28 to 29 June 2018 in the vicinity of the Tuna platform (Latitude 38° 10′ south, Longitude 148° 25′ east).

The sampling involved adding fluorescent (FWT) red dye solution to the PFW stream as a tracer (prior to discharge) for two hours on 28 June and three hours on 29 June.

The dye allowed visual detection of the plume for accurate sampling. Dilution was also determined by towing a fluorometer in transects, a short distance behind the sampling vessel at both near field and far field locations.

This type of monitoring is commonly undertaken to provide dispersion and dilution parameters from discharge points such as sewage outfalls.

Produced Formation Water tracer dye study

Consultation

We are 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 these projects through a number of different channels.

As these projects develop, additional consultation with stakeholders will be conducted, including key impacts and environmental risks.

This fact sheet provides information to allow stakeholders to make an informed assessment of the possible consequences of the proposed activities to their functions, interests or activities. We will address questions and consider feedback from stakeholders relating to these projects throughout this consultation process.

If you have any specific questions or feedback about any of these projects please contact Esso at consultation@exxonmobil.com or call 03 9261 0260.

About Esso

Esso Australia is a subsidiary of ExxonMobil Australia, the country's largest integrated oil and gas company. Esso's Longford Plants has processed more than four billion barrels of oil and eight trillion cubic feet of gas since production began in 1969.

We place the highest priority on operating flawlessly in all aspects of our business. All of these offshore projects will be managed in accordance with all regulatory requirements, as well as Esso's Operational Integrity Management System to reduce risks to ALARP.

Environment Plans detailing each program of work and how the risks of the program will be managed by Esso will be submitted to NOPSEMA for acceptance.

Esso is continuously striving to improve all aspects of our safety performance including for our people, our processes, security, health, and environmental performance.
For more information about our operations please visit www.exxonmobil.com.au.

From: Hall, Katrina L on behalf of EP Consultation /SM
Sent: Monday, 9 October 2017 2:50 PM
To: [redacted]
Subject: Esso Stakeholder Update October 2017
Attachments: FINAL EM_fact_Offshore Fact Sheet - October 2017.pdf

Dear [redacted]

I have recently taken over from Melanie Bok as the Offshore Environment Advisor so I'd like to take the opportunity to formally introduce / re-introduce myself and also to update you on our Bass Strait petroleum activities.

Gas exploration and future projects in Bass Strait

You may be aware that we are pursuing new development opportunities for gas in Gippsland. We have a taskforce looking at various discovered undeveloped resources and we are also planning to drill a deep-water exploration well next year in newly acquired acreage, VIC/P70, south west of our existing fields. Our objective is to leverage our extensive infrastructure, the wealth of knowledge and the data we have collected over 50 years of exploration and production in the Gippsland Basin by identifying new development opportunities. Advances in technology have significantly extended the reach of our platforms opening up opportunities for ~~satellite~~ these developments. We have attached a flyer with more information on upcoming activities, including how to get in touch with us if you think you may be affected by our proposed activities. We're happy to address questions and consider feedback from our stakeholders relating to these projects.

Changes to Barry Beach Marine Terminal operation

Esso Australia has awarded a contract to Qube Energy Pty Ltd to operate the Barry Beach Marine Terminal (BBMT), located near Port Welshpool in South Gippsland, on our behalf. Qube is a diversified logistics and infrastructure company, with expertise in logistics management. Qube will operate Barry Beach Marine Terminal allowing it to continue providing supply depot services to our offshore platforms as well having the ability to offer port facilities to third-party businesses. Subject to approvals, the transition to the new operator is expected to occur before the end of 2017. Please see our website for more information Community News: Barry Beach Marine Terminal.

Biennial Offshore Consultation Session

We are planning to hold our biennial Offshore Consultation Session in Lakes Entrance on Friday 17 November. Look out for your invitation or email us at consultation@exxonmobil.com if you're interested in attending.

Reminder about offshore exclusion zones

A reminder that the Petroleum Safety Zone extends out to a 500m radius around offshore facilities, and vessels are excluded from entry into this zone or face penalties under the Marine Safety National Law Act. Vessel operators are responsible for reporting incidents to AMSA.

Offshore operations

We continue to manage our offshore operations and maintenance activities in relation to our accepted offshore Environment Plans (i.e. platform and subsea activities which are all beyond the State Waters boundary). If you would like more information on the environmental management in place for Esso's operations in Bass Strait, please consult the Environment Plan summaries published on NOPSEMA's website.

Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.

Kind regards,

Katrina Hall
Senior Environment Advisor
Regulatory, Environment and Risk Group
Production SSH&E

Esso Australia Pty Ltd
12 Riverside Quay
Southbank VIC 3006
+61 3 92610272

Work days: Mon, Tue, Wed

From: De Lotto, Joanna
Sent: Thursday, 26 October 2017 4:16 PM
To: Lemmens, Sjaak /C; Waterhouse, Kate /C
Cc: Thomas, Carolyn Y; Hall, Katrina L
Subject: FW: Invitation: Esso Australia Offshore community session - Friday 17 November
Attachments: Response Form to invitation.pdf; Invitation - 2017 - Offshore community session.pdf

All done!

From: Walker, Rebecca /C
Sent: Thursday, October 26, 2017 4:08 PM
Subject: Invitation: Esso Australia Offshore community session - Friday 17 November

Dear valued stakeholder,

Please find attached your invitation to the Esso Australia Offshore community session being held on Friday 17 November.

Your RSVP as per the attached response form would be appreciated by Monday 13 November.

Kind regards

Rebecca Walker
Administrative Assistant - Offshore Production Operations

Esso Australia Pty Ltd
88 Cunninghame Street, Sale, VIC 3850
Phone: +61 3 51 43 4428
rebecca.walker9@exxonmobil.com

From: Waterhouse, Kate /C on behalf of EP Consultation /SM
Sent: Thursday, 21 December 2017 1:31 PM
Cc: Thomas, Carolyn Y
Subject: Esso Stakeholder Update December 2017
Attachments: FINAL EM_fact_Offshore Projects Fact Sheet - December 2017.pdf

Dear Stakeholder,

Please find attached a revised fact sheet outlining Esso's upcoming activities in Bass Strait.

You will have seen much of this information before, in the fact sheet we sent you in October. We are sending you this revised fact sheet because the seabed survey area has been expanded and we wanted to make sure we are keeping you informed.

If you have any questions or concerns, please do not hesitate to contact Carolyn Thomas on 03 9261 0260 or Carolyn.y.thomas@exxonmobil.com

Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.

Kind regards,

Katrina Hall
Senior Environment Advisor
Regulatory, Environment and Risk Group
Production SSH&E

Esso Australia Pty Ltd
12 Riverside Quay
Southbank VIC 3006
+61 3 92610272

Work days: Mon, Tue, Wed

Esso Australia Pty Ltd
ABN 49 000 018 566
12 Riverside Quay
Southbank VIC 3006
GPO Box 400
Melbourne VIC 3001
Telephone: 61 3 9270 3333

27 October 2017

Dear valued stakeholder,

It gives me great pleasure to invite you to meet with representatives from Esso over morning tea to hear about our offshore activities in Bass Strait, including upcoming projects we have planned over 2018 and 2019.

Since the mid 1960's, Esso Australia Resources Pty Ltd (Esso) has operated the Bass Strait offshore oil and gas fields and associated production and processing facilities on behalf of the Gippsland Basin Joint Venture with BHP Billiton.

As the operator, Esso has responsibility for the day-to-day management and operation of 23 offshore platforms and subsea installations in Bass Strait.

As part of our commitment to engage with the communities in which we operate and helping our stakeholders to understand our business, we are holding an informal gathering in Lakes Entrance.

As an organisation that may have an interest in our company or may be affected by our operations, we invite you to join us for morning tea at the **Lakes Entrance Coast Guard Base, 420 Esplanade, Lakes Entrance on Friday 17 November at 10.00am**. (until approximately 11.30 am).

If you would like to attend, please **RSVP** as per the attached response form to Rebecca Walker by **Monday 13 November 2017.**

I hope you can attend, as I look forward to talking with you about our operations.

Yours sincerely

Geoff Humphreys
Offshore Operations Manager

Att

Note: free public parking is available next to the venue

From: Walker, Rebecca /C
Sent: Tuesday, 20 November 2018 2:38 PM
Subject: Invitation: Esso Australia Offshore community session - Wednesday 5 December 2018
Attachments: Offshore Community Session Invitation - 2018.pdf

Dear valued stakeholder,

Please find attached your invitation to the Esso Australia Offshore community session being held on Wednesday 5 December 2018.

Your RSVP by responding to this email or accepting the calendar invitation you will receive following this email would be appreciated by Wednesday 28 November 2018.

Kind regards

Rebecca Walker
Administrative Assistant - Offshore Production Operations

Esso Australia Pty Ltd
Level 1, 64 – 66 Foster Street (PO BOX 372)
Sale VIC 3850
Phone: +61 3 51 43 4428
rebecca.walker9@exxonmobil.com

Please note – I work Monday, Tuesday, Wednesday and Thursday

Esso Australia Pty Ltd
ABN 49 000 018 566
Level 9, 664 Collins Street
Docklands Victoria 3008
GPO Box 400
Melbourne Victoria 3001
61 3 9261 0000 Telephone

20 November 2018

Dear Valued Stakeholder,

It gives me great pleasure to invite you to meet with representatives from Esso over morning tea to hear about our offshore activities in Bass Strait, including upcoming projects we have planned for the end of 2018 and in 2019.

Since the mid 1960s, Esso Australia Resources Pty Ltd (Esso) has operated the Bass Strait offshore oil and gas fields and associated production and processing facilities on behalf of the Gippsland Basin Joint Venture with BHP.

As the operator, Esso has responsibility for the day-to-day management and operation of 23 offshore platforms and subsea installations in Bass Strait.

As part of our commitment to engage with the communities in which we operate and helping our stakeholders to understand our business, we are holding an information session in Lakes Entrance.

As an organisation that may have an interest in our operations, we invite you to join us for morning tea at the **Bellevue on the Lakes, 201 Esplanade, Lakes Entrance** on **Wednesday 5 December 2018** at **10.00am** (until approximately 11.30 am).

If you would like to attend, you can either respond directly to this email or by accepting the Calendar Invitation you will have received following this email. Please **RSVP by Wednesday 28 November 2018.**

I hope you can attend, as I look forward to talking with you about our operations.

Yours sincerely

Geoff Humphreys
Offshore Operations Manager

Att

Esso community information session

Since the mid 1960s, Esso Australia has operated the Bass Strait offshore oil and gas fields and associated production and processing facilities on behalf of the Gippsland Basin Joint Venture with BHP. As the operator, Esso has responsibility for the day-to-day management and operation of 23 offshore platforms and subsea installations in Bass Strait.

As part of our commitment to engage with the communities in which we operate and helping our stakeholders to understand our business, we are holding an information session on Wednesday, 5 December 2018 at 10am (until approximately 11.30 am) at Bellevue on the Lakes, 201 Esplanade, Lakes Entrance.

You can meet with representatives from Esso over morning tea to hear about our offshore activities in Bass Strait, including upcoming projects we have planned for the end of 2018 and in 2019.

If you would like to attend the information session or to find out more about our operations, please email consultation@exxonmobil.com

If you would like to be involved in Esso's ongoing consultation program or you believe that your interests, activities or functions are potentially affected by Esso's operations, please contact us:

Telephone: 03 9261 0260
Email: consultation@exxonmobil.com
Address: Esso Australia Pty Ltd
GPO Box 400
Melbourne VIC 3001

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