Esso Deepwater Gippsland Pty Ltd (“Esso”)

VIC/P70 EXPLORATION DRILLING ENVIRONMENT PLAN SUMMARY

REVISION HISTORY

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Definitions

In this document "Esso Deepwater" means Esso Deepwater Gippsland Pty Ltd.

Esso Deepwater is the designated operator for Block VIC/P70. Esso Deepwater receives services, including personnel, from ExxonMobil Corporation subsidiary, Esso Australia Pty Ltd (EAPL).

"Esso" may be used to refer to the ExxonMobil subsidiaries.

"Diamond Offshore" refers to Diamond Offshore Services Company and/or Diamond Offshore General Company.

This document, the VIC/P70 Exploration Drilling Environment Plan, is generally referred to as the "VIC/P70 Drilling EP".

The VIC/P70 Exploration Drilling Operational area refers to the 2 NM buffer zone around each of the wells.

The Zone of Potential Impact (Operational ZPI) refers to the area that is potentially impacted as a result from a major LOWC scenario, as outlined in Section 4.2.

Abbreviations

ABWMIS	Australian Ballast Water Management Information System
AFFF	Aqueous Film-Forming Foam Concentrates
AFMA	Australian Fisheries Management Authority
AHT	Anchor Handling Tug
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
APASA	RPS Asia Pacific Applied Science Association
APPEA	Australian Petroleum Production and Exploration Association
AQIS	Australian Quarantine Inspection Service (now Department of Agriculture and Water Resources; DAWR)
ATBA	Area To Be Avoided
BBMT	Barry Beach Marine Terminal
BCR	Ballast Control Room
BHPB	BHP Billiton Petroleum (Bass Strait) Pty Ltd
BIA	Biologically Important Area
BKA	Blackback subsea facility
BOM	Bureau of Meteorology
BOP	Blow Out Preventer
BSCZSF	Bass Strait Central Zone Scallop Fishery
CHARM	Chemical Hazard and Risk Management Model
CMMS	Computerised Maintenance Management System (Ocean Monarch)
CMP	Commonwealth Marine Park (previously Commonwealth Marine Reserve, CMR)
CSS	Check-shot Survey
CVIT	Commonwealth Victoria Inshore Trawl
DAWR	Department of Agriculture and Water Resources (previously AQIS; also Ag. Dept.)
DEDJTR	Department of Economic Development, Jobs, Transport and Resources Victoria
DELWP	Department of Environment, Land, Water and Planning Victoria
DKD	Dynamic Kill Drilling Fluid
DO	Diesel Oil
DoEE	Department of the Environment and Energy
DoIIS	Department of Industry, Innovation and Science

DSV	Dive Support Vessel
DWH	Deepwater Horizon
EAPL	Esso Australia Pty Ltd
EARPL	Esso Australia Resources Pty Ltd
ECD	Ecological Character Description
EEZ	Exclusive Economic Zone
EMBA	Environment that May Be Affected (also see Operational ZPI)
ENVID	Environmental Hazard Identification workshops
EP	Environment Plan
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
ERA	Environmental Risk Assessment
ERM	Emergency Response Manual
ESD	Ecologically Sustainable Development
ESG	Emergency Support Group
EWMM	Esso Work Management Manual
FIMS	Facility Integrity Management System
FVO	First Valve On
GBJVOA	Gippsland Basin Joint Venture Operational Agreement
GEMS	Diamond Offshore GEMS Procedures (Global Excellence Management System)
GHG	Greenhouse Gases
GOR	Gas to Oil Ratio
HAZID	Hazard Identification workshops
HMCS	OSPAR Harmonised Mandatory Control Scheme (HMCS)
HOCNF	OSPAR Harmonised Offshore Chemical Notification Format (OCNS)
HP	High Pressure
ICS	Incident Control System
IMP	Invasive Marine Pests
IMS	Invasive Marine Species
IMO	International Maritime Organisation
IOPP	International Oil Pollution Prevention certificate
IMT	Incident Management Team
JV	Joint Venture
KEF	Key Ecological Feature
KPI	Key Performance Indicators
LEFCOL	Lakes Entrance Fishing Co-operative Limited
LEL	Lower Exposure Limit
LMRP	Lower Marine Riser Package
LO	Lubricating Oil
LPG	Liquid Petroleum Gas
LMRP	Lower Marine Riser Package
LOWC	Loss of Well Control
LWD	Logging While Drilling
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MDO	Marine Diesel Oil
MDRT	Measured Depth from Rotary Table
MEPC	(IMO) Marine Environment Protection Committee
MES	Monitoring, Evaluation and Surveillance
MLWL	Mean Low Water Level
MODU	Mobile Offshore Drilling Unit (rig)
MOL	Main Oil Line
MMSCFD	Million Standard Cubic Feet per Day
MT	Metric Ton
MSL	Mean Sea Level

NEBA	Net Environmental Benefit Analysis (see OPEP)
NEPM	National Environment Pollution Measures
NM	Nautical Mile
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
OCNS	Offshore Chemical Notification Scheme (CEFAS 2017)
OI	Operations Integrity
OGUK	Oil and Gas UK (previously UKOOA)
OICSS	Offset Installation Capping Stack System
OIE	Offset Installation Equipment
OIMS	Operations Integrity Management System
OIW	Oil-In-Water
OVID	Offshore Vessel Inspection Database
OWS	Oil-water separators
OSMP	Operational and Scientific Monitoring Program
OSPAR	OSPAR Commission - manages Harmonised Mandatory Control Scheme (HMCS)
OSRA	Oil Spill Resource Atlas
OSRL	Oil Spill Response Limited
OSV	Offshore Support Vessel
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E) Regs	Offshore Petroleum and Greenhouse Gas Storage Environment Regulations 2009
ORCA	Oil spill Resources Company of Australia
OSR	Oil Spill Response
OSTM	Oil Spill Trajectory Modelling
PEC	Predicted Environmental Concentration
PFAS	Per- and poly-Fluoroalkyl Substances
PFOA	Perfluoro-octanoic acid
PFOS	Perfluoro-octanoic sulfonate
PMS	Diamond Planned Maintenance System
PNEC	Predicted No Effect Concentrations
PIC	Person In Charge
PSZ	Petroleum Safety Zone
RA	Risk Assessment
RAMSAR	Convention on Wetlands of International Importance
RC	Required Competencies
RFFWI	NOPSEMA Request for Further Written Information
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle
RRT	Regional Response Team
SCB	Source Control Branch
SDS	Safety Data Sheet (previously Material Safety Data Sheet, MSDS)
SEMS	Safety and Environmental Management System (Ocean Monarch)
SESSF	Southern and Eastern Scale-fish and Shark Fishery
SETF	South Eastern Trawl Fishery
SFRT	Subsea First Relief Toolkit
SIV	Seafood Industry Victoria
SMART	Special Monitoring of Applied Response Technologies
SMC	Subject Matter Contact
SOOB	Summary of operational boundaries
SSHE	Safety, Security, Health, Environment
TD	Total Depth
TSS	Traffic Separation Scheme
VICSS	Vertical Installation Capping Stack System

VSP	Vertical Seismic Profiling
WBM	Water Based Mud
WCDS	Worst Credible Discharge Scenario
WMP	Waste Management Plan
WOMP	Well Operations Management Plan
WWC	Wild Well Control
Operational ZPI	Zone of Potential Impact

1 Introduction

1.1 Overview

This Environment Plan (EP) 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) (OPGGSE) Regulations 2009, per the amended Act and Regulations as at 01 January 2015. The EP development has been guided by N04750-GN1344 Environment Plan Content Requirements (NOPSEMA 2016).

This EP demonstrates that Esso Deepwater Gippsland Pty Ltd ("Esso Deepwater") has a sound understanding of how its operations interact with the environment and demonstrates the implementation of controls to reduce environmental risks to as low as reasonably practicable (ALARP) and acceptable levels. It also sets appropriate environmental performance outcomes, standards, and measurement criteria for these controls.

The scope of the EP is to manage the environmental impacts and risks associated with all activities relating to the VIC/P70 exploration drilling activities, to be completed by a Mobile Offshore Drilling Unit (MODU). The Diamond Offshore Ocean Monarch has been engaged as the MODU for this work scope.

Activities included in the scope of this EP are discussed in detail in Section 3 and include pre-mooring activities, drilling, well abandonment, well suspension, anchor handling, guard and support vessels, ROV activities and use of helicopters.

The operational area within Exploration Block VIC/P70 consists of the 2 NM buffer zone around the wells, and the AHT and guard vessels when supporting the MODU (Section 3.1).

Activities excluded from the scope of this EP are vessels / MODUs 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.

1.2 Background

The VIC/P70 exploration drilling operational area is located approximately 90 - 100 km from shore in Exploration Permit Area VIC/P70. Water depth within VIC/P70 ranges from 200 m to over 3 km, with the drill locations, Hairtail-1, Baldfish-1 and Sculpin-1, at ~359m, ~665m and ~2,300m respectively.

Block VIC/P70, in the deepwater Gippsland basin, was acquired by Esso Deepwater, a wholly owned subsidiary of Exxon Mobil Corporation, in 2Q, 2017. It is the first new exploration acreage acquired by ExxonMobil in Australia since 2010, and the first in the Gippsland Basin since 1996.

VIC/P70 contains the Dory, Angel and Archer-Anemone fields, as well as the Fangtooth prospect, and incorporates the area previously the subject of blocks VIC/P45 and VIC/P59, previously explored by Apache Energy (Apache, 2008). Since acquiring the field, Esso Deepwater has accelerated exploration drilling plans in response to concerns about domestic gas shortages.

The prospects include the Latrobe and Golden Beach levels. A large part of VIC/P70 was covered by a high quality 3D survey acquired and processed by BHP Billiton in early 2003. Additionally, the area encompasses the Apache Elver 3D and CSEM seismic surveys.

The VIC/P70 operational area is adjacent to the Blackback (BKA) subsea facility, about 7 km to the north of Baldfish-1, in 402 m of water depth and in Production License Area VIC/L20. The BKA subsea facility is tied back to Mackerel (MKA) Platform through a 23 km long oil export line running from the BKA subsea facility to the MKA platform, and has been suspended.

Exploration drilling activities in the VIC/P70 Operational area are scheduled over an estimated 60 day period, commencing in Q3, 2018 (Baldfish-1 and Hairtail-1), and an estimated 75 days for Sculpin-1 in late Q3 / early Q4, 2019.

This EP was accepted by NOPSEMA on 17 June 2019 (Ref: ID: 4779 A677157), after three rounds of Requests for Further Written Information (RFFWI) (ID: 4779 A663499 of 22 March 2019; ID: 4779 A669086 of 23 April 2019 and ID: 4779 A673805 of 24 May 2019). Esso commitments made in the response to these RFFWI are part of project commitments.

1.3 Scope of Revision

In accordance with OPGGSE Regulations 2009, there are a number of triggers for a revision to an EP. The changes to the VIC/P70 Drilling EP to what was contemplated in Revision 3 of the EP (Baldfish Drilling EP) are:

- Inclusion of an additional drilling location, Sculpin, within license area VIC/P70. It is important to note that VIC/P70 includes the Baldfish-1 and Hairtail-1 wells, and that the description of the environment was covered in Revision 3 of the EP
- Change in survey timing.

The scope of the revision as it relates to the triggers in the OPGGSE Regulations 2009 are described below.

Subregulation 17(1) – New activity

The changes to the parameters of the drilling activity do not constitute a change to the type of activity and do not result in a change in regulatory levy category. The activity (exploration drilling) remains the same.

Subregulation 17(5) – Significant modification or new stage of the activity

The change to the drilling activity (additional location and change in timeframe) triggers the requirement for an EP revision.

Subregulation 17(6) and Regulation 8 - New or increased impact or risk

The changes to the drilling activity do not introduce a new or increase an existing environmental risk already contemplated in the EP, as outlined in this EP Revision.

Subregulation 17(7) – Change in titleholder

The inclusion of an additional drilling location within Exploration Licence VIC/P70 does not introduce a new titleholder, and therefore does not trigger the requirement for an EP revision. The drilling operator also remains the same.

1.4 Titleholder

Block VIC/P70 was acquired by Esso Deepwater from Liberty Petroleum Corporation (Liberty) in June 2017. Esso Deepwater is the current titleholder of VIC/P70, which it wholly owns, as defined in the OPGGS (Environment) Regulations 2009, details as below:

Esso Deepwater Gippsland Pty Ltd (ACN 602 257 821)
Level 9, 664 Collins Street
Docklands, VIC 3008
Telephone: +61 3 9261 0000

The environmental contact for this activity is:

Carolyn Thomas
Esso Australia Pty Ltd for and on behalf of Esso Deepwater Gippsland Pty Ltd
Risk, Environment and Regulatory Supervisor
Telephone: (03) 9261 0260
Email: carolyn.y.thomas@exxonmobil.com

Esso Deepwater is the designated operator for Block VIC/P70. Esso Deepwater receives services, including personnel, from ExxonMobil Corporation subsidiary, Esso Australia Pty Ltd (EAPL).

NOPSEMA (Submissions) will be notified via phone or email 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 (Reg. 15 (3) of the OPGGS(E) Regulations 2009).

1.5 Corporate Environment Policy

It is ExxonMobil 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, ExxonMobil'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 operational 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, co-operational 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.

Esso Deepwater conducts all operations under the ExxonMobil Environment Policy. It carefully measures performance and strives to continually enhance it by improving systems and investing in technology.

2 Environmental Legislation

2.1 Legislative Framework

The principal offshore legislation for production activities beyond three nautical miles to the outer extent of the Australian Exclusive Economic Zone (EEZ) at 200 nautical miles is the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Act 2006. The Commonwealth OPGGS Act is administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

This EP has been prepared for submission to NOPSEMA, in accordance with the provisions of the OPGGS (Environment) Regulations 2009. Key regulatory obligations of the titleholder under an approved EP are provided below in Table 2-1.

Table 2-1 Key obligations of the titleholder under an approved EP

Obligation	OPGGS (Environment) Regulations	EP Reference
A titleholder commits an offence if: (a) the titleholder undertakes an activity; and (b) there is no environment plan in force for the activity.	6 (1)	-
A titleholder must not undertake an activity in a way that is contrary to: (a) the environment plan in force for the activity; or (b) any limitation or condition applying to operations for the activity under these Regulations.	7 (1)	-
(1) A titleholder commits an offence if: (a) the titleholder undertakes an activity after the occurrence of: (i) any significant new environmental impact or risk arising from the activity; or (ii) any significant increase in risk arising from the activity; and (b) the new impact or risk, or increase in the impact or risk, is not provided for in the environment plan in force for the activity. (2) Subregulation (1) does not apply in relation to an activity if the titleholder submits a proposed revision of the environment plan in force for the activity in accordance with subregulation 17(6) and the Regulator has not refused to accept the revision.	8 (1) and 8 (2)	-
(1) A titleholder commits an offence if: (a) the titleholder undertakes an activity; and (b) there is a reportable incident; and (c) the titleholder does not notify the reportable incident in accordance with subregulation (4).	26A (1)	Section 8.6.6.1
(2) A titleholder commits an offence if: (a) the titleholder undertakes an activity; and (b) there is a recordable incident; and (c) the titleholder does not notify the reportable incident in accordance with subregulation (4).	26B (1)	Section 8.6.6.2
A titleholder undertaking an activity must submit a report to the Regulator in relation to the titleholder's environmental performance for the activity, at the intervals provided for in the environment plan.	26C (1)	Section 8.6.3
Revision of an Environment Plan: - See Regulation 17 – Revision because of a change, or proposed change, of circumstances or operations. - See Regulation 18 – Revision on request by the Regulator. - See Regulation 19 – Revision at the end of each 5 years.	Division 2.4 17, 18, 19	-

2.2 Relevant Legislation

Relevant Commonwealth, Victorian, New South Wales and Tasmanian Legislation as it applies to the operation of facilities and petroleum pipelines is provided in Table 2-2, Table 2-3, Table 2-4 and Table 2-5 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 2-2 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.		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 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.	• 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). • 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.	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
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.	Convention on the Prevention of Marine Pollution by dumping of waste & other materials 1972 (London Convention) MARPOL	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 emergencies. Requirements are given effect through AMSA.	International Convention on Oil Pollution (Preparedness, Response and Cooperation) 1990 (OPRC)	Australian Maritime Safety Authority (AMSA)
Historic Shipwrecks Act 1976	Protects the **heritage values of shipwrecks and relics.**	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.	DoEE
National Environment Protection Council Act 1994	Council develops (in conjunction with other state authorities) through the Intergovernmental Agreement on the Environment (IGAE) 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.**		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.**	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.**	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 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)).	Australian Maritime Safety Authority (AMSA)

Legislation	Coverage and Applicability to Activity	International Convention Enacted	Administering Authority
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.	International Convention for the Control and Management of Ships Ballast Water & Sediments 2017	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**.	International Convention for the Prevention of Pollution from Ships [MARPOL 73/78] (certain sections)	Department of Infrastructure and Regional Development (DoIRD) (formerly Department of Infrastructure & Transport) /AMSA
Coastal Waters (State Powers) Act 1980	This Act transferred **constitutional power over coastal waters**, and title to seabed minerals within territorial limits, from the Commonwealth to the States.		Geoscience Australia (Maritime Boundaries Advice Unit)
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.	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.		Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA)
Clean Energy Act 2011	The Act sets up a mechanism to deal with climate change by encouraging the **use of clean energy** and puts a price on greenhouse gas emissions.	United Nations Framework Convention on Climate Change,1992, and the Kyoto Protocol	Clean Energy Regulator
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.	Chicago Convention 1944.	Civil Aviation Safety Authority (CASA)

Legislation	Coverage and Applicability to Activity	International Convention Enacted	Administering Authority
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.		Australian Communications and Media Authority (ACMA)

Table 2-3 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.

Legislation	Coverage
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 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 2-4 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 2-5 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 (MAST) 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.

3 Description of the Activity

3.1 VIC/P70 Exploration Drilling Operational Area

The VIC/P70 Drilling operational area applicable to the scope of this Environment Plan (EP) consists of the 2 NM radius buffer zone around the Baldfish-1, Hairtail-1 and Sculpin-1 wells in Block VIC/P70, as established by AMSA (Section 6.25), and the AHT and guard vessels when supporting the MODU. Note that the buffer zone encompasses the petroleum safety zone (PSZ) and most of the mooring spread of the anchors.

3.2 Location

The proposed VIC/P70 drilling locations are located approximately 90 - 100 km off the Gippsland coast, between approximately 359 m and 665 m of water depth at Baldfish-1 and Hairtail-1, and ~2,300m at Sculpin-1 (Figure 3-1). The distance between Hairtail-1 and Baldfish-1 is approximately 3.5 km, with Sculpin-1 approximately 17 km Southeast of Baldfish-1.

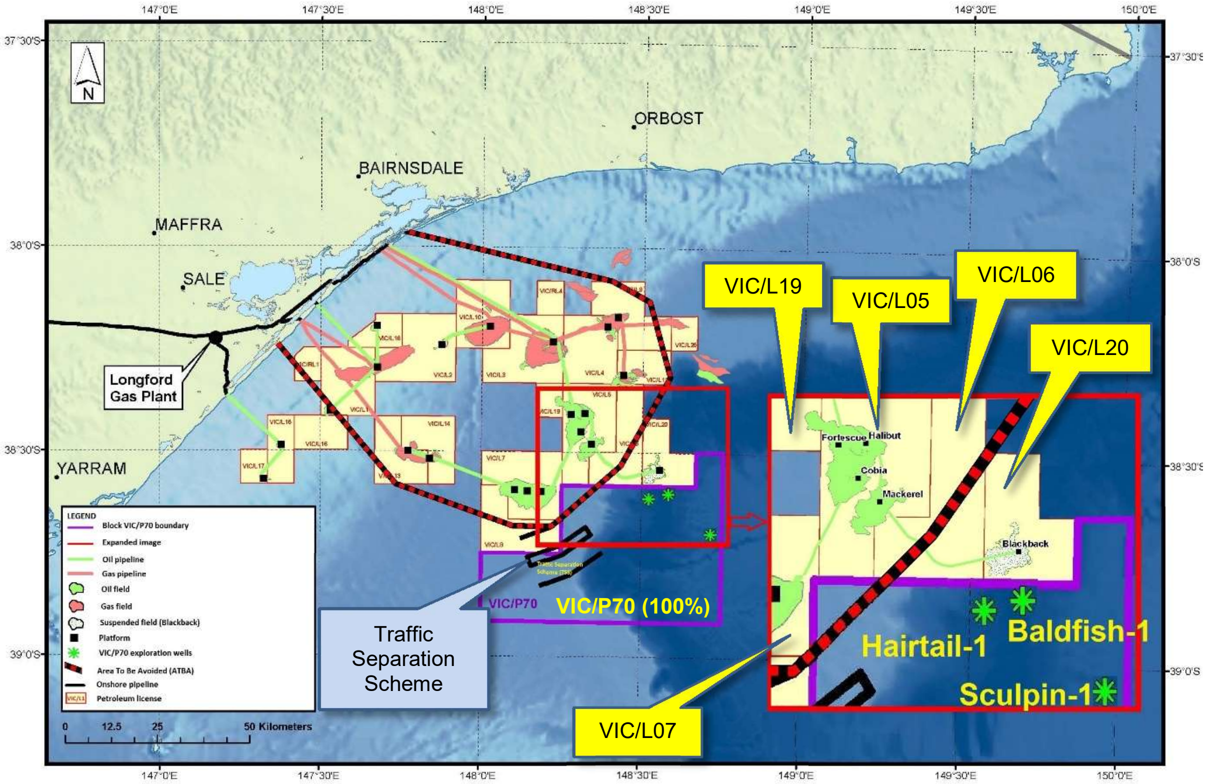


Figure 3-1 The exploration drilling locations in Block VIC/P70, Deepwater Gippsland Basin

There are no producing assets in VIC/P70, although a number of wells have previously been drilled in this block. The nearest production facility is the Blackback subsea facility (BKA), about 7 km to the north in VIC/L20. The three BKA subsea oil wells are connected to the Mackerel operational area (MKA) via the 23 km BKA-MKA200 production pipeline and gas lift secondary line (MKA-BKA65). Note that plugging and abandonment (P&A) of the three Blackback wells is planned for Q1, 2019, after the Blackback P&A EP was accepted by NOPSEMA on 20 November 2018.

3.3 Programme Overview

The Deepwater Gippsland Basin Exploration permit VIC/P70 was acquired through a Sales & Purchase Agreement (SPA) executed in May 2017, with a commitment to drill two exploration wells by 2Q, 2019.

The VIC/P70 exploration drilling program will meet this commitment and is targeting gas reserves in Block VIC/P70. Although substantial exploration has taken place nearby, the three wells, Baldfish-1, Hartail-1 and Sculpin-1, represent new prospects. Drilling is scheduled for Q3, 2018, during an approximate 60 day drilling campaign for Baldfish and Hairtail-1, and an estimated 75 days for Sculpin-1 in late Q3 / early Q4, 2019, subject to weather and operational performance, and will be undertaken using the moored submersible Mobile Offshore Drilling Unit (MODU), the Ocean Monarch, owned and operated by Diamond Offshore General Company (Diamond).

Table 3-1 VIC/P70 Exploration drilling programme and reservoir conditions

Location Specific Details	
Designated Authority for Drilling Area (Environment)	National Offshore Petroleum Safety and Environment Authority (NOPSEMA)
Shore Base	Likely to be Melbourne Port; Barry Beach
Permit Area	Exploration Licence VIC/P70, located in Commonwealth waters
Name of Wells	Baldfish-1, Hairtail-1 & Sculpin-1
Location	Deepwater Gippsland Basin, Bass Strait
Type of Well	Exploration
Water Depth	359 m (Hairtail-1), 666 m (Baldfish-1), 2,300 m (Sculpin-1)
Drilling	
Well locations	Three single well centres; two vertical well, one directional (build/hold/drop). Option for geological side-track from one or two well centres, time permitting.
MODU	Ocean Monarch (Moored Semi-submersible) (Diamond Offshore General Company)
Casing Programme	Refer Section 3.7
Directional Profile	Hairtail-1 and Sculpin-1 are planned to be vertical wells. Baldfish-1 will be built to 20° and drop to vertical with approx. 230m horizontal displacement (Section 3.7)
Drilling Fluids (provisional)	**Hairtail-1/Baldfish-**1: Seawater + viscous sweeps to 45m BML Seawater + viscous sweeps for 17 ½" (445 mm) to 1,000m BML Water-based Mud (WBM) for 12 ¼" (311 mm) to Total Depth (TD) **Sculpin-1**: SW + viscous sweeps to 50mBML SW + Viscous Sweep for 17-1/2" hole to 250m BML Option to use Dynamic Kill Drilling Fluid (DKD) refer Table 3-8) Water based Mud for 12-1/4" hole to 900m BML Water based Mud for 8-1/2" hole to well TD ~3,800MTVD
Gas discharge rate (modelled)	Hairtail-1: Condensate: 11.0 kbd; Gas 500 MMSCFD (@ GOR 45,327 scf/bbl) Baldfish-1: Condensate: 10.7 kbd; Gas 485 MMSCFD (@ GOR 45,327 scf/bbl) Sculpin-1: Condensate: 22.7 kbd; Gas 360 MMSCFD (@ GOR 15,873 scf/bbl)
Reservoir pressure (at water contact; psia)	Hairtail-1: 4,086 - 4,110 psia @ 80°C (282 – 283 Bar) Baldfish-1: 4,086 psia @ 80°C (282 Bar) Sculpin-1: 5,450 psia @ 31°C (376 Bar)
Completion	P&A at reservoir, at surface casing shoe and below mudline in accordance with Well Operations Management Plan
Formation Evaluation	Wireline logging only (no well testing)
Estimated Drill Period	60 days for Baldfish-1 and Hairtail-1; approximately 75 days for Sculpin-1
Scheduled Commencement Date	MODU towed to location 3Q, 2018 for Hairtail-1 and Baldfish-1. Recommence drilling at Sculpin-1 in late 3Q / early Q4, 2019. Works are expected to continue into Q1 2020.

Water depths in Block VIC/P70 range from 315m to 2,430 m, spanning the shelf-slope break. The thickness of overburden (sea bed to target: Top Latrobe Group) ranges from over 2,000m in the west to <600m in the east of the prospect.

Dry gas is defined as natural gas that occurs in the absence of condensate or liquid hydrocarbons. Dry gas typically has a gas-to-oil ratio exceeding 100,000 scf/STB. Wet gas, on the other hand, is defined as natural gas that contains less methane (typically less than 85% methane) and more ethane and other more complex hydrocarbons. A wet gas is predicted from the VIC/P70 reservoirs, resulting in liquid drop-out in the form of light condensate.

3.4 The Ocean Monarch MODU

Ocean Monarch (Figure 3-2) is a Keppel FELS Enhanced Victory Class conventionally moored semi-submersible mobile offshore drilling unit (MODU), which has been classified by the American Bureau of Shipping (ABS) as A1, "Column Stabilised Drilling Unit".

The facility is equipped with eight electric anchor winches. The winches hold a combination of wire rope and chain specifically designed for deepwater anchoring purposes. Each of the eight main anchor legs consists of a 15.0 MT Stevpris anchor, 975 m of 82.6 mm R5 stud link anchor chain with a breaking strength of 712 T and 700 m of 95.3 mm diameter independent wire rope core (IWRC) wire with a breaking strength of 785 MT. These specifications are subject to change in line with Safety Case provisions.

The range of the anchor pattern depends on water depth. For Baldfish-1 (666 m water depth), each of the anchors will reach 1,800 – 2,100 m from the MODU. For Sculpin-1, anchor reach is expected to be around 3.8 km from the drill centre, due to depth at that location (2.3 km).

Figure 3-2 Ocean Monarch MODU

Ocean Monarch is owned by Diamond Offshore Services Company and operated by Diamond Offshore General Company (Diamond). The design and build particulars of the Ocean Monarch are shown in Table 3-2.

Table 3-2 Ocean Monarch Key Facility Dimensions

Dimension	Value	Dimension	Value
Lightship Weight	21,500 MT	Transit draft	12.6 m
Net tonnage (NT)	6,357 MT	Transit displacement	31,744 MT
Overall length of unit	107 m	Moonpool dimensions	27.7 by 7.62 m
Overall breadth of unit	109 m	Helideck diameter	22.3 by 22.3 m
Overall depth of unit	112 m	Designed for helicopter	Sikorsky S-92
Draft at loadline	22.7 m	Maximum operating depth	3,048 m water depth
Displacement at loadline	43,252 MT	Maximum drilling depth	10,668 m

3.4.1 MODU Communication and Navigation Systems

Ocean Monarch is fitted out with extensive communication and navigation aids in accordance with Safety Case requirements, including normal and emergency communications facilities to allow communications between the facility and aircraft, vessels, shore base and emergency response entities as required.

The emergency communication systems are designed to fulfil the current capabilities of a Global Maritime Distress and Safety System (GMDSS) and the system is designed to work in all areas between approximately 70°N and 70°S. The facility is equipped with the following GMDSS and other external communication equipment:

- Two Global Maritime Distress and Safety System (GMDSS) stations, each consisting of:
  - Marine medium frequency / high frequency single side band transceiver
  - Marine very high frequency (VHF) digital selective calling (DSC) radio telephone
  - Mini-C Inmarsat C transceiver
  - Marine VHF DSC radio telephone
- Six Standard VHF DSC radios with AIS and GPS receiver
- 20 Standard portable marine VHF transceivers
- Four portable marine VHF GMDSS radios
- Single IP66 EC aeronautical radio beacon transmitter
- Three aeronautical VHF transceiver
- Iridium satellite communication system
- Satellite broadband data system
- Distress alarm panel
- Six search and rescue transponders (SART)
- GMDSS emergency position indicating radio beacons (EPIRB)
- Marine asset tracking system.

In addition to the above external communications equipment, the lifeboats are also equipped with a variety of communications equipment.

Additionally, the MODU is equipped with an automatic tracking system for identifying and locating vessels by electronically exchanging data with other nearby ships, Automatic Identification System (AIS) base stations and satellites. AIS information supplements marine radar on PSV/AHV, which is the primary method of collision avoidance for water transport. Information provided by AIS equipment, such as unique identification, position, course and speed, can be displayed on a screen or an electronic chart display and information system.

AIS is intended to assist MODU officers and allow maritime authorities to track and monitor vessel movements. Vessels fitted with AIS transceivers and transponders can be tracked by AIS base stations located along coast lines or, when out of range of terrestrial networks and through a growing number of satellites that are fitted with special AIS receivers which are capable of deconflicting a large number of signatures. The AIS is fitted to the Ocean Monarch in accordance with IMO International Convention for the Safety of Life at Sea (SOLAS) (IMO 1974) requirements.

In addition to the abovementioned navigation tools, Diamond agreed with the installation of additional Navaids as a result from the Safety Case Revision workshop (February 2018) and in discussion with AMSA (see Chapter 9). These include:

- **A Kongsberg BS 610 AIS base station**: The base station provides slot management and integrity monitoring of the AIS AtoN. All AIS AtoN and AIS base stations are to be identified in accordance with the most recent edition of Recommendation ITU-R M.585.

  If the AIS AtoN is not within VHF radio range of an existing AIS base station, then a new AIS base station should be established within the VHF radio range of the AIS AtoN to ensure the integrity of the FATDMA reservations and monitoring of the AIS AtoN.

  Since the MODU will be operating at distances greater than 100NM from any existing AIS infrastructure, it has selected the Kongsberg BS 610 base station to satisfy the regulatory requirement.

  There is a brief process required for relocating the MODU and ensuring the AIS is configured correctly. The required AMSA forms will be completed by Diamond Offshore, with assistance from AMS Maritime. This process establishes communication with NOPSEMA, AMSA and other support and Search and Rescue authorities. Requisite notice to mariners through the Australian Hydrography service will also be triggered through this process.

- **AMEC Mando 303 AIS AtoN**: The AIS AtoN will transmit Random Access Time Division Multiple Access (RATDMA). The AtoN will be configured so all vessels receiving the transmission are provided correct and accurate platform information including dimensions, position, etc. The system will be completely configured prior to delivery and will in essence be “plug and play” assuming the platform will have infrastructure as detailed post site survey.

  AIS can be used on offshore structures and facilities to assist with positive identification by transiting and service vessels. AIS may also be used to assist those operating offshore facilities to monitor vessel traffic in their vicinity including potential and real incursions into exclusion or restricted areas.

  Given many AIS transmitters may be used in any one area, a level of control, integrity and protection of the AIS VDL is required in accordance with IMO Resolution MSC.347 (91). AMSA monitors the use of the AIS VDL and issues all Australian MMSI numbers, AIS licences and FATDMA time slots to owners of non-shipborne AIS transmitters to ensure there is no interference from co-located services and provide a level of control to ensure integrity and protection of the AIS VDL.

  Offshore facilities marked with AIS AtoN will use the appropriate Message 21 coding as contained in the most recent version of Recommendation ITU-R M.1371.

  FPSOs and MODUs are considered fixed offshore facilities, however, as they are SOLAS vessels, they should change their AIS navigational status when they are connecting to a riser or the seabed, to indicate “moored” or “at anchor”. This status will also apply when using dynamic positioning to conducting undersea operations.

  AIS AtoN has full functionality of the Type 3 AMS Mando unit to satisfy the requirement under IEC 62320-2.

- **CNS Horizon Software and Charting**: Horizon provides a complete AIS interface that includes the ability to view and track all vessels, display specific vessel information, and send and receive safety related text messages. Horizon’s interface and display of AIS related information offers a substantial leap forward in the ability to communicate and interact with vessels. Indicative incursion/exclusion zones are displayed as rings with the MODU in the centre. These rings are configurable.

3.4.2 Certification, Classification and Registration

Details of Ocean Monarch registration and classification are shown in Table 3-3. Overall the facility is designed and constructed to meet IMO and class requirements.

Table 3-3 Facility Registration Details

Item	Description
Facility name	Ocean Monarch
Type of rig	Column stabilised semi-submersible drilling unit
Owner	Diamond Offshore Services Company
Class	ABS, A1, Column Stabilised Drilling Unit
IMO number	8751368
International call sign	V7IY3
Registration	Majuro, Republic of Marshall Islands
Maximum Accommodation	150 Persons on board (POB)
Builder, prime build	Nylands Verksted A.S
Location of build	Oslo, Norway (1973-74)
Builder, facility conversion	Keppel Fels, Ltd
Location of Refit	Singapore (2008)

The Ocean Monarch was originally designed and constructed in the Nylands Verksted shipyard in Oslo, Norway, and delivered in 1974. The most recent and relevant major modification to convert the facility into its current configuration began in 2006. The purpose of this modification was to upgrade the facility to a moored column stabilised drilling unit compliant with the International Maritime Organization (IMO) Code for the Construction and Equipment of Mobile Offshore Drilling Units 1989 (MODU Code 1989).

All engineering modifications and upgrades were undertaken by accredited contractors with completed modifications subject to ABS supervision and approval.

Table 3-4 General Information on Storage Capacities

Material	Capacity	
Water ballast	19,686 m^3	123,820 bbl
Diesel oil (*See Table 3-5 for details*)	1,097 m^3 (two main tanks)	6,901 bbl
Helifuel	5.68 m^3	35.7 bbl
Lubrication oil	3.59 m^3	22.6 bbl
Hydraulic / gear oil	6.76 m^3	42.5 bbl
Potable water	462 m^3	2,904 bbl
Liquid mud	1,582 m^3	9,949 bbl
Cement	311 m^3	1,959 bbl
Barite / bentonite	265 m^3	1,667 bbl
Sewage	24.5 m^3	154 bbl
Sack storage	6,000 sacks	
Drill pipe, outfitted	14,066 m	46,148 ft
Riser, outfitted	2,400 m	7,874 ft

3.4.3 MODU Layout

The Ocean Monarch is a semi-submersible column stabilised drilling unit. The facility consists of four pontoons (two major and two outriggers). From each main pontoon two main columns and two minor columns rise to support the main deck. From each outrigger pontoon two major columns rise to support the main deck. Horizontal and diagonal braces support the major and minor columns.

The four main columns on the outriggers house chain lockers for the mooring system which extend to the column top at an elevation of 36.6 m (120 ft). The upper hull contains all marine and drilling systems for operation. The upper hull consists of the main deck, drill floor, accommodation module, helideck, mud house, shaker house and cranes.

The deck is arranged with the substructure and drill floor centred marginally aft of midships and on the centreline. Drill pipe is stored on the starboard of the facility at an elevation of 43.8 m (144 ft) and casing and riser at the aft of the facility at main deck elevation. Both areas are served by two deck cranes with an overhead gantry crane servicing the riser deck and a pipe handling knuckle boom crane servicing the pipe deck.

The main deck of the facility is located at 39.0 m (128 ft) above base line. Key compartments are located on the main deck level (Figure 3-3). The moonpool area is located at midships beneath the drill floor.

The substructure supports the drill floor at 48.8 m elevation. The engine room is located on the port side of the Ocean Monarch on the main deck level. The engine room houses the main diesel engines and generators and the auxiliary machinery pit. The mechanical office, workshop and store are also located within the structural envelope of the engine room.

There are two designated control stations on board the facility where critical emergency functions are available, the Ballast Control Room (BCR) and the Driller's cabin. The BCR is the primary or central control station for all marine related activities and emergency systems.

A total crew compliment of up to 150 persons is provided for by 51 two-man berths and 12 four-man berths. The accommodation module is located at the port of the facility and is comprised of three levels.

Diesel fuel tank capacities are summarised in Table 3-5, with the location of the two major diesel fuel tanks shown in Figure 3-4.

3.4.4 Diesel Oil

The facility has two diesel oil (DO) tanks, totalling 1,059 m^3, one located in each of the inboard pontoons (Table 3-5; Figure 3-4). These tanks can be filled through 102 mm deck connections, located at both the port and starboard loading stations. The tanks are equipped with sounding tubes and pressure transducers for fluid level monitoring and vent lines. The DO storage tanks are fitted with high and low suction tail pipes.

Table 3-5 Ocean Monarch Diesel Fuel Tank Capacities

Lower Hull (Inboard only)		Main Deck Tanks	
CPT-3	530 m^3 (90%: 475 m^3)	Box Girder-	34.15 m^3
CST-3	530 m^3 (90%: 475 m^3)	Box Girder Overflow	3.64 m^3
		Day Tank	12.4 m^3
Lifeboats			
#1 Lifeboat	0.215 m^3	#3 Lifeboat	0.215 m^3
#2 Lifeboat	0.215 m^3	#4 Lifeboat	0.215 m^3

The DO transfer system is operated from the BCR via the pump and valve control panel. There are two rotary gear type positive displacement DO transfer pumps, located one in each pontoon pump room. These pumps are used primarily to transfer fuel to the main engine room DO settling tanks.

The DO service tank is located in the box girder between the two aft engines and five forward engines and feeds the DO purifiers and are discharged into the DO day tank located on the aft bulkhead of the engine room. The DO day tank supplies fuel to the seven diesel engines that power the facility. The DO service and day tanks are equipped with inspection man-ways, vents and spill containment coamings. The DO day tank is also equipped with a level gauge. The DO settling tank and DO day tank overflow back into the pontoon storage tanks via the DO overflow tank.

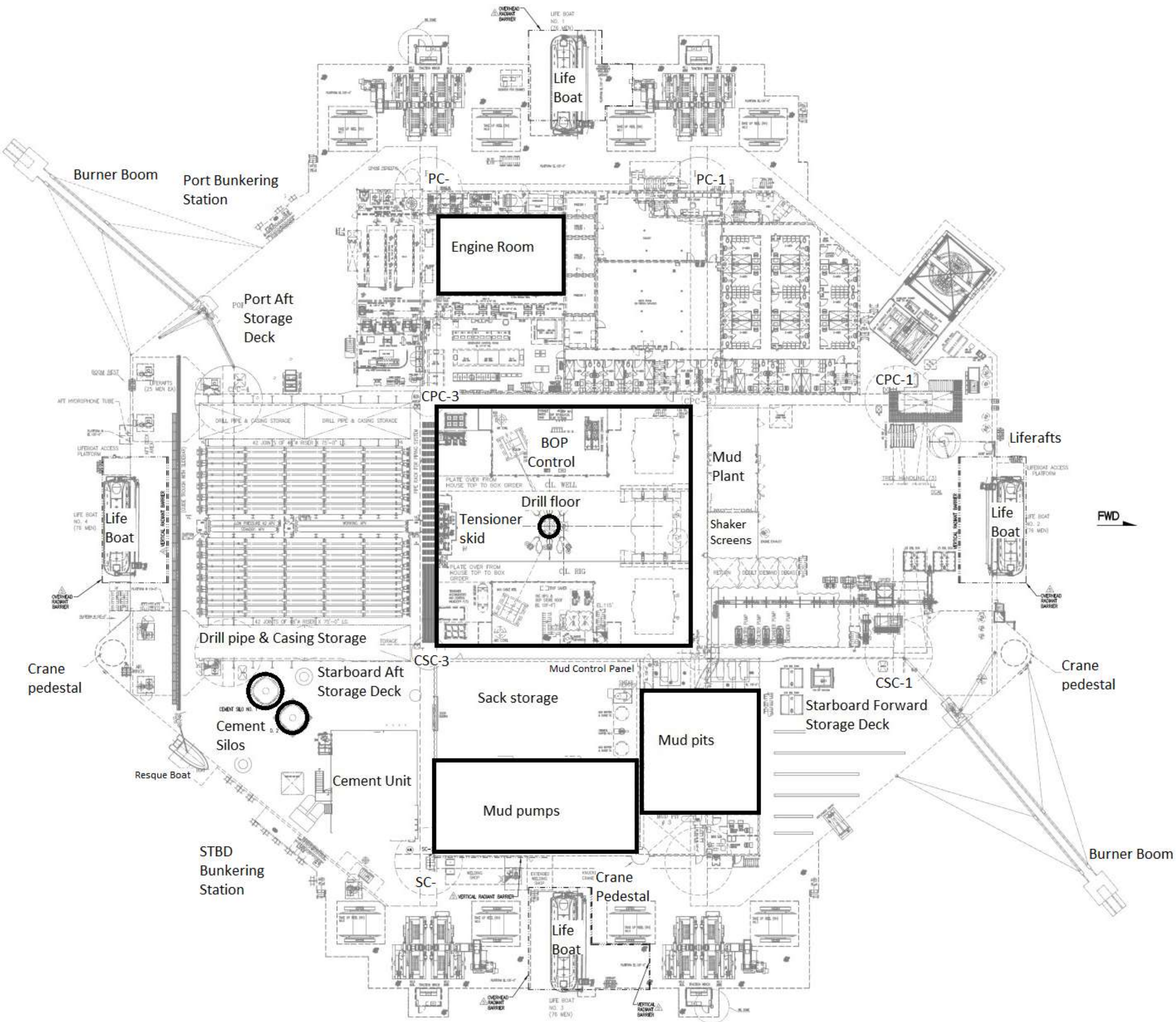


Figure 3-3 General Arrangement – Main Deck

3.4.5 Bunkering

The Barge Supervisor, or his nominee, is responsible for all bunkering operations on the facility. Diesel bulk hoses are suspended, when not in use, on purpose built saddles at the bunkering stations for ease of connection to the crane and transfer to attendant support vessels. Bunkering is carried out in accordance with the Diamond Offshore GEMS procedures that stipulate all the necessary safety and environmental pre-bunker checks. Bunkering hoses are fitted with dry break coupling and a valved weak link.

The Barge Supervisor is responsible for ensuring that there is adequate spare capacity available in the facility's storage tanks and prepares a detailed loading plan. The bunkering is controlled and monitored from the BCR with CCTV cameras mounted at both bunkering stations and the tank contents master panel. The bunkering station and the BCR are always manned when receiving fuel and communication is established and maintained with the supplying vessel. The bunkering can be stopped either from the bunkering station or from the BCR.

Metering of fuel taken on board is carried out using the facility's tank gauging system and verified by hand sounding as necessary.

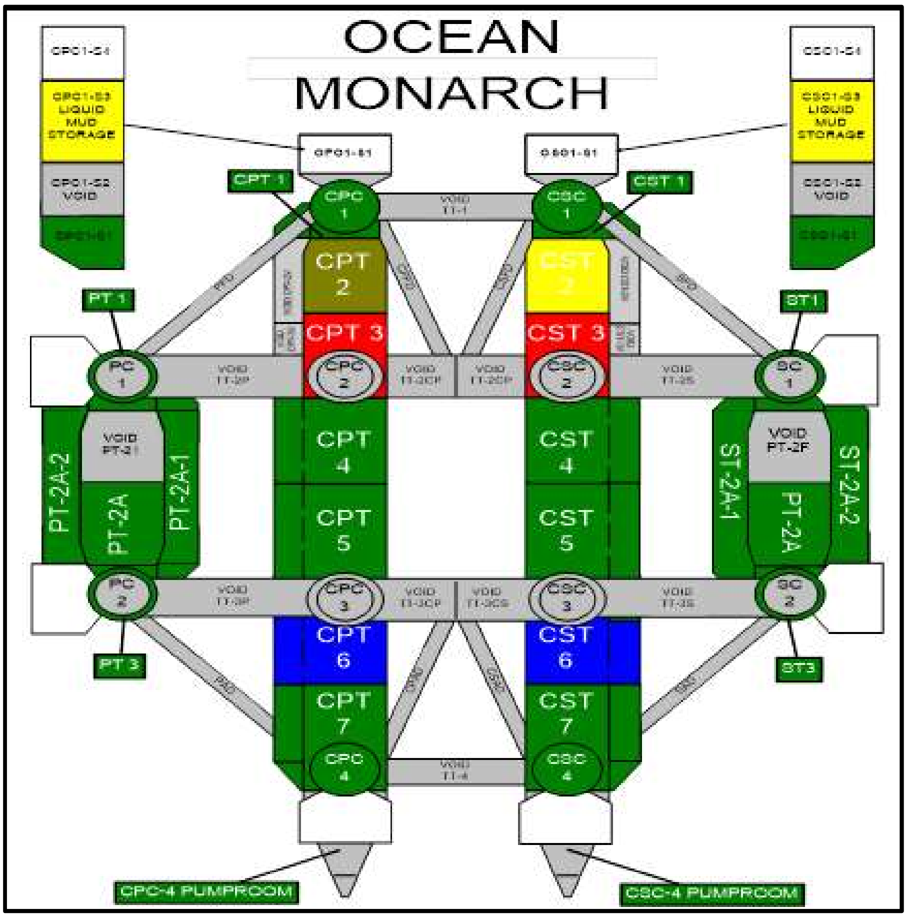


Figure 3-4 **Pontoon and Column Layout and location of diesel fuel tanks (CPT3 and CST3)**

3.4.6 Lubricating Oil

There is one 2.13 m^3 main engine lubricating oil (LO) storage tank. One tank provides satisfactory capacity to change out the oil on all seven engines at one time. The main engine LO tank is located between the bank of five engines and the auxiliary machine pit. The main engine LO tank is equipped with vents, tank level indication, inspection man ways and coamings for the purpose of oil spill containment. The tank suction valves are equipped with a means of remote closure from the pneumatic DO and LO shut off system for the main engines that is located outside the aft door to the engine room.

Fresh oil is gravity fed to the main engines from a reservoir on each engine. Oil in the engines can be gravity drained to a dirty oil tank next to the LO tank. Waste oil can be pumped out using the waste oil pump to a deck connection on main deck for offloading into approved containers.

Lube oil to the emergency generator is gravity fed from a reservoir on the emergency generator. Oil in the engine sump is gravity drained into buckets and emptied into the dirty oil tank.

There is a 1.46 m^3 capacity oil storage tank in the mud pump room to provide make up and change oil for the four high-pressure triplex mud pumps. The mud pump sumps are pumped out into drums which are either drained to the dirty oil tank on deck level 7 from a drain connection on the upper deck or pumped into tote tanks to be shipped ashore.

3.4.7 Drain, Effluent and Waste Systems

The drainage and effluent systems and associated environmental pollution control systems on the MODU include:

- Bilge water collection tanks, headers and bilge oil / water separator
- Domestic waste segregation and disposal

- Drill floor drilling mud spill drains and rain water collection system
- Domestic grey water drainage
- Black water drainage and sewage treatment plant
- Galley waste disposal including macerator
- Helideck drainage and containment system
- Equipment bunding
- Rain and wash down drainage
- Scuppers for fuel at oil loading stations.

The effluent and waste disposal systems on the MODU include:

- Different types of waste are segregated onboard in containers for transport by supply vessels for onshore disposal by contracted waste disposal or recycling companies.
- Grey water is disposed of to sea, as is sewage water following treatment by an Omnipure marine sewage treatment plant.
- Garbage is compacted by a pneumatic Enviro-Pak unit and shipped ashore for disposal and compliant with MARPOL requirements.
- Biodegradable food scraps are macerated and disposed of to sea by a "Tuff-Gutt" grinder compliant with MARPOL requirements.
- Hazardous area drains, including rig floor drains, bilges and equipment coaming drains, are processed by the oil / water separator and the water is discharged overboard.
- Nonhazardous drains including the deck scupper system are discharged directly overboard.

3.4.7.1 Deck Drainage and waste oil

Drainage of non-hazardous water from the decks passes through a scupper system directly to the sea by way of piping chutes or dumps.

Drainage from separate higher risk collection areas, where the fluids may contain mud, are passed through the barite separator from where the fluid phase is led directly to the inlet of the three section skimmer tank on the forward cellar deck. From the third stage of this unit, the fluid is directed to an adjacent automatic oily water separator (OWS). The OWS processes the fluid, passing the clean phase with less than 15 ppm oil directly to the sea and any oil is forced to the dirty oil tank for eventual disposal to shore facilities. Any discharge detected with higher than 15 ppm oil is redirected back to the skimmer tank. Equipment with the potential to leak hazardous materials have coamings fitted to contain any potentially polluting fluids and these are either drained to drain tanks or emptied manually into storage containers for disposal.

The drainage from engine room and auxiliary machine pit bilges is collected in the 5.31 m^3 dirty oil tank for eventual onshore transfer for disposal. Spent grease and lubricants for other equipment is collected in storage drums and stored in a designated hazardous storage area away from potential sources of heat or flames. All fuel and bulk lubricant disposal is fully documented using an oil record book.

3.4.7.2 Sewage Treatment

The Ocean Monarch is equipped with an Omnipure 12MX marine sewage treatment plant (Certified to MARPOL IMO Resolution MEPC.2 (VI)) which treats both black and grey water. The black and grey water is collected from toilets, sinks, showers, urinals and associated sanitary waste systems and is gravity fed into the sewage collection tank. It is then pumped by a macerator pump through an electrolytic cell which utilises electrolysed seawater to generate hypochlorite and then into a residence tank. In the residence tank the treated water is aerated and retained for an appropriate amount of time to ensure any remaining bacteria are destroyed. It is then discharged overboard. Regular sample testing of the discharge water is carried out to confirm correct operation.

3.4.7.3 Segregation and Storage of Waste

The different types of waste onboard are, where possible, segregated and placed in containers for onshore disposal by contracted waste disposal / recycling companies.

Garbage that remains onboard is packaged for disposal and a full record is kept using a garbage management log. Every package or item that leaves the facility must be fully documented. Garbage is compacted by an Enviro-Pak pneumatic garbage compactor and then shipped onshore for disposal. Biodegradable food scraps are macerated and discharged directly into the sea from the "Tuff-Gutt" food macerator.

3.4.8 Mud System

Drilling mud performs several functions; cooling and lubrication of the drill bit, transportation of drill cuttings to the surface and most importantly serving as the primary well control barrier, preventing the influx of hydrocarbons from the formation into the wellbore. The mud system consists of two subsystems, high pressure and low pressure.

Mud is either mixed on board via the bulk mud system or brought onboard via the bunkering stations from supply vessels. Mud is transferred from the storage location to the active mud pits, and supply mud to the high pressure mud pumps. These pumps pump the mud downhole at high pressure. The mud returns to the surface with cuttings and potentially hydrocarbons from the formation, via the riser to the flowline.

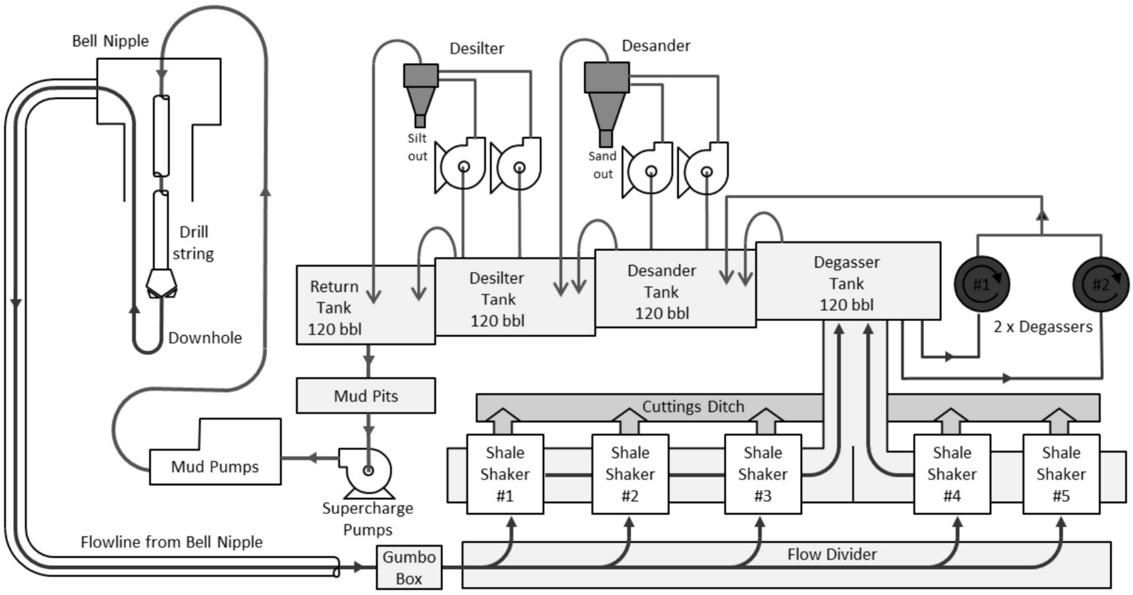


Figure 3-5 Ocean Monarch Mud System Overview

At the shakers, drill cuttings are screened out, mud flows into and over the sand traps and into the first of the mud cleaning pits. The mud is transferred via the degassers, if appropriate, and mud cleaning tanks and equipment back to the pits. The schematic in Figure 3-5 illustrates the main components of the mud system and the basic mud flow and return. Estimated cutting volumes for the VIC/P70 exploration drilling campaign are given in Table 3-6. Mud volumes are provided in Section 6.18 and 6.19. Additionally, at the end of the campaign, excess mud is normally disposed overboard, unless mud can be recycled and used for subsequent drilling activities.

The Ocean Monarch is equipped with five Brandt LCM-3D/CM-2 cascading shale shakers, each driven by two 1.86 kW linear vibration motors and one 0.746 kW circular vibration motor and are each rated to handle up to 114 m^3/h. The shale shakers use vibrating screens to remove the larger cuttings from the returned drilling mud. The shakers are housed in the shaker house and each shaker is equipped with a dedicated extraction hood.

The shakers combine the efficiency of a circular-motion shaker with the high throughput of a linear-motion shaker and are highly effective in rapidly separating and discharging solids, thus providing high throughput. The screens are repairable, and are furbished with individual seals to eliminate screen leakage.

Table 3-6 Cutting volume estimates

Parameter	Baldfish-1	Hairtail-1	Sculpin-1*
Cuttings Volume (m^3)			
• Top hole (SW + Sweeps)	155	155	107
42" hole	50	50	50
17 $^1/_4$" hole	105	105	44
• Bottom section (WBM)	106	106	65
12 $^1/_4$" hole	106	106	44
8 $^1/_2$" hole	-	-	21
Totals (m^3)	256	256	145 -157
Discharge duration			
• Top hole (SW + Sweeps)	3-5 days	3-5 days	3-5 days
• Bottom section (WBM)	10-15 days	10-15 days	10-15 days

** Estimates include allowances for use of Dynamic Kill Drilling (DKD) fluid (Table 3-8)*

3.4.9 Cement System

The cement unit and associated equipment are supplied by a third party on campaign-specific basis to meet the specific needs of the clients well construction program. The cement unit is primarily used to pump cement into the well bore to cement casing into position or to set cement plugs. The cement unit interfaces with the high pressure mud system through the cementing manifold and interconnecting hoses or through the test connectors at the choke manifold.

Cements are transported as dry bulk to the MODU by support vessels. The dry bulk storage tanks on the MODU vent excess compressed air to atmosphere. This venting process carries small amounts of cement which is discharged below the MODU (maximum volume approximately 10 MT per well).

After a string of casing or a liner has been installed into the well it is cemented. During riserless drilling, a cement spacer is displaced by the cement slurry and discharged directly to the seabed at the mudline (approximately 100 bbl, or 15.9 m^3 per well). Cement slurry is pumped down the inside of the casing. The cement is then displaced by drilling fluid, and forced up into the annular space between the casing and the borehole wall.

Upon completion of each cementing activity, the cementing head and blending tanks are cleaned which results in a release of approximately 160 bbl (26m^3) of cement contaminated water to the ocean per well..

3.4.10 Well control

The VIC/P70 exploration wells each target a single zone interval that are normally pressured. The Dory-1 well provides good offset well control for reservoir pressure prediction.

The well's system of physical barrier when drilling the target interval is comprised of:

- weighted drilling fluids whose hydrostatic pressure exceeds pore pressure;
- casings strings that are run in the well that seal off / isolate the formations and formation fluids; and
- the BOP stack that connects to the wellhead and is tied back to the MODU with the marine riser

Well control criteria barrier requirements include:

- A minimum of two physical barriers in each potential flow path;
  - At least one barrier must be active at all times
  - A controlled column of fluid is monitored with sufficient density to overbalance formation pressures can be one barrier

- Each physical barrier (e.g., cement, plugs, packers, valves, BOPs) is pressure tested, preferably in the direction of flow. The pressure test amount shall be greater than the expected maximum well pressure at the barrier
  - If testing in the direction of flow is not possible, a pressure test in the opposite direction shall still be conducted
  - If pressure testing is not possible, the integrity of the barrier is verified through diagnostics and/ or analysis of the operation by which the barrier was installed
- If reducing hydrostatic overbalance below pore pressure is planned and failure of a single physical barrier could cause the well to flow, that barrier will be negatively tested in the direction of flow
- MODU has blind shear rams, capable of sealing
- If practicable, Remotely Operated Vehicle (ROV) hot stabs to be surface tested with the ROV pump or equivalent
- Both the Auto-shear and Deadman systems to be surface tested prior to deployment of the BOPs
- Well shut-in procedures

Ocean Monarch is equipped with a National Oilwell PS2-1000 electric top drive assembly. It is equipped with two inside blowout preventers (IBOP) which are rated to 1,034 bar (15,000 psi) and there are four identical spares.

3.4.10.1 Blowout Preventer (BOP)

The BOP system serves as a secondary means of well control. When a formation influx occurs during drilling, one or more BOP preventers are activated to seal the annulus, or wellbore, to “shut in” the well. Denser or heavier mud is then circulated into the wellbore to re-establish primary well control. Mud is pumped down the drill string, up the annulus, out the choke line at the BOP stack, and then up the high-pressure lines on the riser and through the choke manifold until the downhole pressure is controlled and the influx is circulated out of the well. Once this “kill weight” mud extends from the bottom of the well to the top, the well is back in balance and has been “killed”. The primary functions of the BOP stack include:

- Confining well fluid to the wellbore
- Providing a means to add fluid to the wellbore
- Allowing controlled volumes of fluid to be withdrawn from the wellbore.

While performing these primary functions, the BOP stack also:

- Regulates and monitors wellbore pressure
- Centralises and hangs off the drill string in the wellbore
- Seals the annulus between the drill pipe and the casing to shut in the well
- Prevents additional influx from the reservoir into the wellbore
- Seals the well by completely closing off the wellbore if no pipe is in the hole
- Allows stripping drill-pipe
- Severs the drill pipe to seal the well in emergencies.

The BOP systems on Ocean Monarch have redundancy integrated inherently within the design of the system.

The BOP stack consists of two units that are stacked on top of one another, the upper unit is the Lower Marine Riser Package (LMRP) and the lower unit is the Blowout Preventer (BOP). The BOP stack sits atop the wellhead and is connected to the riser through the connection at the top of the LMRP. When the riser needs to be disconnected due to a situation arising such as impending rough weather, and the BOP is required to remain in place to secure the well, the drill string is typically pulled back into cased hole and hung off on the closed BOP rams. The LMRP is then disconnected from the BOP and either retrieved to surface or left suspended on the riser until the situation has passed and it can be reconnected so that drilling operations can continue.

As well as the LMRP and BOP, the BOP stack also houses all the subsea control equipment necessary to control the LMRP and BOP functions. This control equipment takes signals from the surface from the two MUX cables and the hot line which are connected to pods attached to the BOP stack. The LMRP and the BOP also house ROV intervention panels to allow ROVs to control some of the critical functions of the BOP stack if communication with the surface is lost.

The choke and kill manifold is used to control the pressures encountered during a well kick. The Ocean Monarch has a maximum working pressure of 1,034 bar (15,000 psi). The choke manifold is rated for H_2S service.

The facility is equipped with a hydrostatic test unit. The unit is rated for generating pressures up to 2,068 bar (30,000 psi) and flow rates up to 21.6 L/min (5.70 gpm).

There are two ROV intervention panels located on the BOP stack, one on the LMRP and one on the BOP. The panels allow ROVs to manually open and close specific valves on the stack in the event that communication with the surface is lost.

3.4.10.2 Suspension of Drilling Operations

Generally, if adverse metocean conditions are forecast or are suddenly experienced, drilling operations would be suspended. Similar procedures can be applied in case of emergencies, such as vessel collisions. In these situations, the drill string would be pulled from the hole enough so that it could be hung off with the BOP closed and the LMRP would be ready for disconnection from the BOP.

If any of the following criteria are reached, drilling operations will be suspended and the drill string hung off in the well head:

- Vessel motions or prevailing weather conditions make it difficult and hazardous for personnel to operate the drilling equipment
- The significant heave of the rotary table reaches 1.8 m and maximum heave reaches between 3.1 and 3.7 m.
- When the relative angle at the lower flex joint reaches 0.5°
- The mean line tension of the highest loaded mooring line reaches 75% of the test tension.

3.4.10.3 Disconnection of Marine Riser

If any of the following criteria are reached, the marine riser will be disconnected from the well head:

- The significant heave of the rotary table reaches approximately 3.7 m and the maximum heave reaches and 4.6 m with expected further weather deterioration
- The maximum angle of the ball joint approaches 8°
- The mean chain tension of the highest loaded anchor line approaches proof tension.

The BOP system is configured with autoshear / deadman functionality which is a safety feature that automatically closes the blind shear rams if all electrical and hydraulic pressure communication between the pod and the receiver manifolds is interrupted. The rig uses Houghton Safe NL-1 Hydraulic fluid (OCNS Reg. #25580, non-CHARMable Cat. D rating) in the Riser Tensioner System and the Crown Motion Compensator, These systems are closed, with no planned discharge to the marine environment.

The approved Ocean Monarch Safety case provides detailed disconnect, suspend and retrieval procedures, as well as a detailed plan and checklists for actions to be taken in the event of approaching adverse weather systems.

3.5 Support Vessels

Drilling operations will be supported by at least two Anchor Handling Tugs (AHTs). Although details remain to be finalised, AHTs supporting Ocean Monarch in Bass Strait will be specified and operated in accordance with international and Australian regulatory requirements. The vessel's will be certified as being in compliance with international maritime legislative requirements by a Classification Society registered with International Association of Classification Societies (IACS) They are likely to have comparable specifications to the *Far Statesman* and *Far Saracen (*Table 3-7*)*. Additionally, a guard and/or supply vessel (OSV) may be engaged to patrol the temporary fairways (Section 6.25.2.1), to deliver supplies and to return wastes to shore, depending on the requirements agreed under the Facility Safety Case Revision, and in accordance with the NOPSEMA requirements under a Safety Case (NOPSEMA 2013, 2016, 2017). The vessels are used for:

- Supply operations
- Assist with shipping monitoring and maintaining the 500 m exclusion zone around the MODU
- Emergency response and rescue
- Anchor handling
- Guard vessel

Table 3-7 Support Vessel Specifications (typical)

Specifications	Far Saracen (2010)/ Far Statesman (2013)	Specifications	Far Saracen (2010)/ Far Statesman (2013)
Yard	VARD Langsten	Fuel Oil	998 m³
Main Class	+1A1, SF, E0, DK(+), HL(2,8), COMF-V(3), FiFi I, NAUT OSV(A), TMON, BIS (Far Statesman: Fire Fighting Ship 1)	Potable Water	898 m³
LOA	87.4m	Main Engines	2 x 4,500 KW + 4 x 2,230 KW (F. Statesman) / 4 x 2,100 KW (F. Saracen)
Breadth Moulded	21m	Bow Thrusters	1 x 2,040 BHP
Draft (max)	7.8m + 0.9m Skeg/Nozzle	Stern Thrusters	2 x 1,632 BHP
Deadweight	3,934mt (d=7.765m)	Azimuth Thrusters (Bow)	1 x 2,448 BHP
Gross Register Tonnage	6,170 (F. Statesman)/ 6,107 (F. Saracen)	Consumption at Service Speed	22,8m³ / 24hrs @ 12Knots
Total Capacity (POB)	40 Persons	Consumption at Economy Speed	13,3m³ / 24hrs @ 10Knots

3.6 Helicopter Support

Helicopter support will be from a suitable helicopter base. While it is likely that helicopter activities will be from the Esso helicopter base in Longford, another heliport may be chosen for operational and commercial reasons.

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 will be limited to daylight hours.

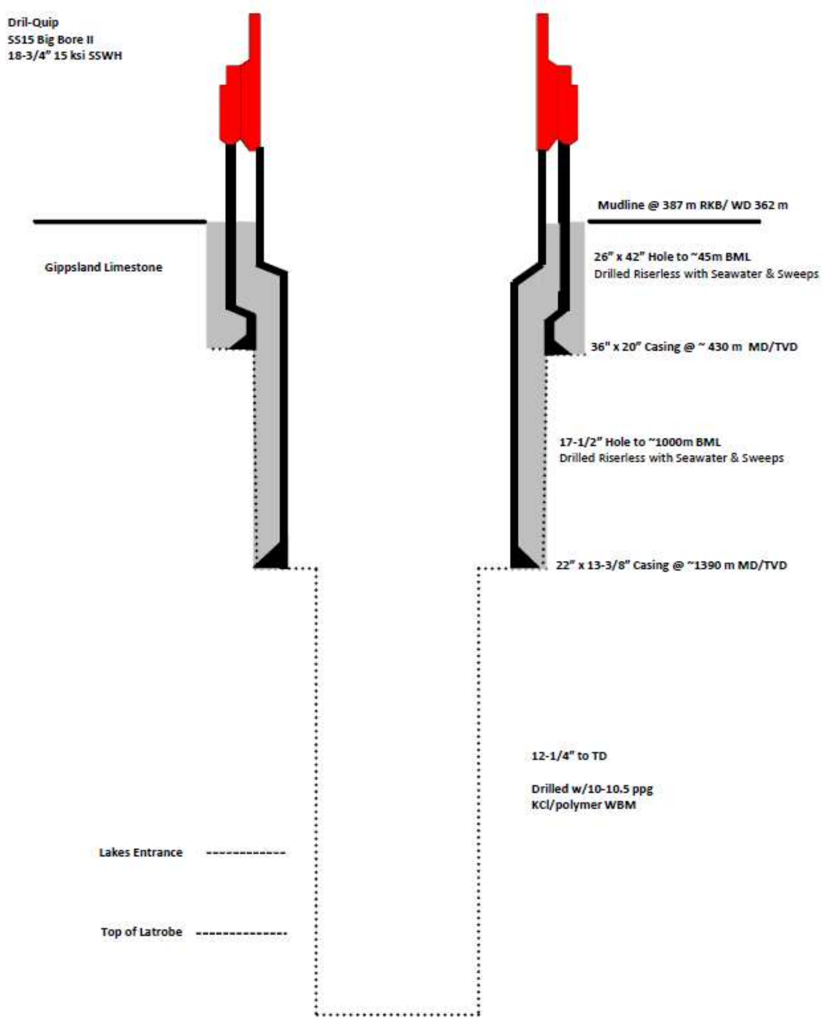
3.7 Subsea Well design

Esso will drill at each of the three well locations, from mudline locations to bottom-hole targets. The locations of the wellheads are provided in Figure 3-1. Esso has designed the wells for the VIC/P70 drilling work scope to allow for P&A on completion of wireline logging (Section 6.26).

The Dory-1 well (Apache 2008) discovered gas but did not prove up the greater VIC/P70 structure. Existing data on the location include 3D-seismic, Australian Government owned Multi Beam Echo Sounder (MBES) bathymetry data and offset well information (Dory-1, Madfish-1, Billfish-1, Elver-1 and the Blackback Field Development and exploration wells), complemented by the 2012 reprocessed Blackback_ext 3D seismic data and Multi Beam Echo Sounder Bathymetry. An additional short offset seismic cube has also been generated as part of an ongoing seismic reprocessing effort over the prospect.

Figure 3-6 shows the generalised well designs. Table 3-8 provides a description of the typical VIC/P70 well operations sequence (subject to optimization as part of operational considerations).

a)



b)

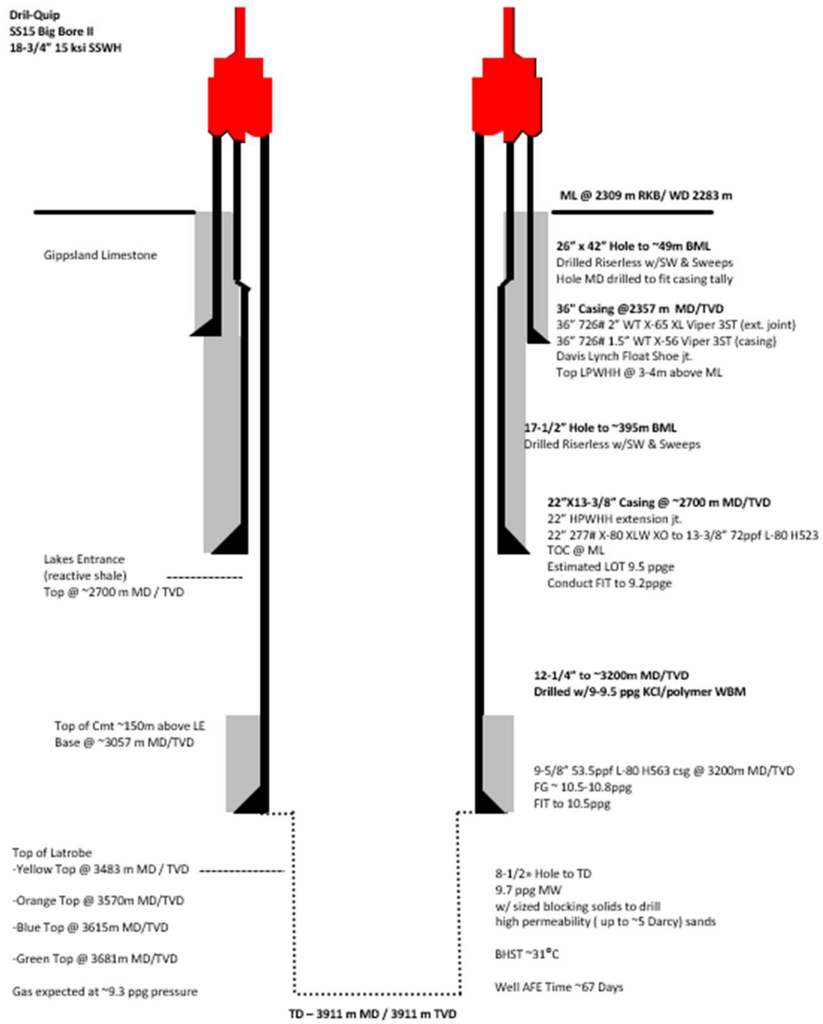


Figure 3-6 VIC/P70 Exploration Drilling - Generalised Well Design a) Baldfish-1 & Hairtail-1, b) Sculpin-1

3.8 Reservoir Evaluation

Each well will undergo an evaluation program once the target formations have been reached. Well evaluation will consist of well logging including check-shot surveys (CSS), and wireline logging. CSS is carried out using geophones inside the wellbore and a seismic source that is hung over the side of the MODU. CSS is used for correlation with surface seismic data to produce images of higher resolution than surface seismic images.

Table 3-8 VIC/P70 Exploration Drilling - Typical well operations sequence (provisional)

VIC/P70 typical well operations sequence		
	Baldfish-1 & Hairtail-1	**Sculpin-1**
1	Perform mooring operations and position MODU over the well location.	
2	Pre-spud ROV seabed survey	
3	Drill 26” x 42” hole riser-less with seawater.	
4	Run and cement 36” x 20” casing/low pressure wellhead with cement returns to seafloor.	
5	-	The base case is to drill the 17-1/2” hole section with seawater and sweeps at Sculpin. However, in order to set the 13-3/8” casing deep enough through the Lakes Entrance shale to provide sufficient hydrostatic integrity for the following section, a Dynamic Kill Drilling (DKD) fluid may be used for the last 100-200m of hole.
6	Run and cement 22” x 13-3/8” casing/high pressure wellhead with cement returns to seafloor.	
7	Run BOPs and riser.	
8	Drill 12$^{1}/_{4}$” hole with water based mud to well TD.	Drill 12$^{1}/_{4}$” hole with water based mud to ~3200m TVD RFE
9	-	Run and cement 9 $^{5}/_{8}$” casing/Top minimum of 150m above casing shoe
10	-	Drill 8-$^{1}/_{2}$” hole with water based mud to well TD (~3,801 m).
11	Perform wireline logging operations.	
12	Permanently plug and abandon the well.	
13	Post-drilling ROV seabed survey	
14	Perform de-mooring operations.	

3.8.1 Check-shot Survey (CSS)/ Vertical Seismic Profiling (VSP)

The evaluation program for each well will use a small array (typically consisting of three airguns, with a volume of between 150 - 250 cui each). The source is fixed and generally positioned at 5-10 m below water surface. CSS/VSP operations, proposed for this drilling program, are typically of short duration, normally taking not more than a day to complete. At least one successful survey is required for each well, and each will also have a source test 48 hours before survey operations commence.

Reservoir profiling generates higher intensity noise than routine drilling operations. The CSS/VSP source generates a noise level around 190 dB re 1 µPa in the 5 –100 Hz range, with this level decreasing rapidly with the distance from the source. Modelling indicated that in the vertical plane, the maximum sound pressures would occur directly below the source, with 184 dB re 1 µPa/Hz measured at five metres below the source and 168 dB re 1 µPa/Hz measured at 25 m below the source. In the horizontal plane, maximum sound pressures were modelled to decrease to 160 dB re 1 µPa/Hz within 20 m of the source. These results indicate that the distance required to achieve 120 dB re 1 µPa is 3 km (e.g. URS 2009).

The major difference between VSP and CSS is that VSP data are recorded at much smaller spatial sampling intervals than check-shots (Balch & Lee, 1984; Hardage 1985). While a receiver may be moved large distances between vertical CSS levels, VSP recording normally covers the entire well profile.

Note that the nature and scale of reservoir profiling by means of CSS/VSP is significantly smaller in scale than seismic survey programs:

- **The CSS/VSP source** (normally a cluster of 3-5 air guns) emits substantially less energy than a marine seismic array, which has streamers of 6 or even 8 km long, containing hundreds of channels and the seismic source is typically fired every 15 or 20 seconds;

- **The duration** is considerably shorter (typically 12 hours per well compared to continuous 24 hour operations over a period of weeks for a typical marine seismic survey);
- **The CSS/VSP source is stationary** and is only activated when receiver is in downhole location, compared to a marine seismic survey where the survey vessel tows the seismic array and streamer-mounted hydrophones behind the vessel while sailing transect lines.

Whilst reservoir profiling is quieter and shorter in duration than exploration seismic surveys, measures outlined in the EPBC Act Policy Statement 2.1 'Interaction between offshore seismic exploration and whales' (DEWHA, 2008) will be implemented during CSS/VSP (refer Section 6.23).

3.8.2 Wireline Operations

Once drilling has reached TD, the properties of the rocks are analysed, using open-hole logging tools (wireline logging). The objective of logging in an exploration area is to locate hydrocarbons in a well and determine if enough commercial quantities of resource is present.

Logging indicates the basic parameters of porosity (fluid-filled portion of the rock); the water, oil and gas saturations and the vertical extent of a productive hydrocarbon zone, or net pay (above). Most logging tools designed for formation evaluation are based on electric, nuclear or acoustic measurements.

Well logging may use radioactive sources that emit rays and receivers that measure the amount of received reflection from the rock in the borehole or behind casing. Quartz and carbonates, which compose the most common hydrocarbon reservoirs, have little or no intrinsic radioactivity. Shales, which often act as seals above reservoirs, include several naturally occurring radioactive components. Most logging strings include a gamma ray sonde to detect this radiation and discriminate geologic layers.

A laterolog measures formation resistivity by creating an electric circuit. The other design uses induction coils to measure conductivity, the inverse of resistivity. An extensive zone filled with hydrocarbon is apparent on an electric log typically as more resistive than an adjacent water-filled zone.

An acoustic or sonic logging tool transmits a sound pulse into the formation and a receiver on another part of the tool detects the transmitted pulse. The travel distance of the pulse is known, so its travel time provides a sound velocity that is proportional to a porosity measurement.

As part of wireline operations, formation samples will be collected. Reservoir fluid sampling is the only method to definitively determine the presence of oil or gas. At the same time, reservoir pressure is measured, using a down-hole pressure gauge to determine aquifer and hydrocarbon pressures.

A down-hole coring tool will be used to acquire small rock samples over intervals of interest. These samples are then analysed for reservoir properties such as porosity, permeability, saturation, mineralogy and age.

3.9 Remotely Operated Vehicle (ROV) support

Subsea activities will be supported by a remotely operated vehicle (ROV). The ROV will be used to undertake subsea surveys and observations, will undertake remote activities during drilling operations and may also be used to operate the BOP in emergencies, such as malfunction or when BOP control from the MODU is not possible. The ROV and its support modules are leased independent of the rig spread, and depending on project-specific operational needs.

4 Description of the Environment

4.1 Regulatory Context

The OPGGS(E) Regulations 2009 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 OPGGSE Regulations, this EP Summary 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 OPGGSE Regulations 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.

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

With regards to 13(3)(f) more detail has been provided for:

- Key Ecological Features (KEFs) as they are considered a conservation value under a Commonwealth Marine Area (CMA), and
- Commonwealth Marine Parks (CMPs; previously Commonwealth Marine Reserves, CMRs) as they are enacted under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

4.2 Definition of Zone of Potential Impact (Operational ZPI)

The Zone of Potential Impact (Operational ZPI), also referred to as the Environment that May be Affected (EMBA), is based on the maximum credible hydrocarbon spill event that might occur during petroleum activities. For the activities that fall under this EP, the Operational ZPI is based on hydrocarbon exposures above impact thresholds (6.28.2.4), resulting from a major LOWC (See Section 6.32), based on stochastic modelling results (APASA 2018, 2019).

Figure 4-1 and Figure 4-2 display a contour line that encompasses the low sea surface threshold (0.5 g/m^2), low dissolved aromatic threshold (576 ppb.hrs) and low entrained threshold (67,200 ppb.hrs) prediction for all scenarios modelled within the study. Both for the Baldfish-1 and Sculpin-1 well locations, the Operational ZPI is largely determined by the probability (>1%) of oil exposure at the sea surface, resulting from a major LOWC event, at a threshold of 0.5 g/m^2. No actionable shoreline impact (see Section 6.34 & 7.2) or impact to Victorian coastal waters is predicted at the lowest thresholds as applied in this study for a major LOWC event at either the Baldfish-1 or Sculpin-1 well location.

The Operational ZPI extends along waters off the Gippsland Basin and eastern Victoria coast (Figure 4-1 and Figure 4-2). No shore line impact was predicted above the impact thresholds, except at the reference value for entrained hydrocarbons, based on ANZECC Guidelines (Sections 4.3 and 6.32).

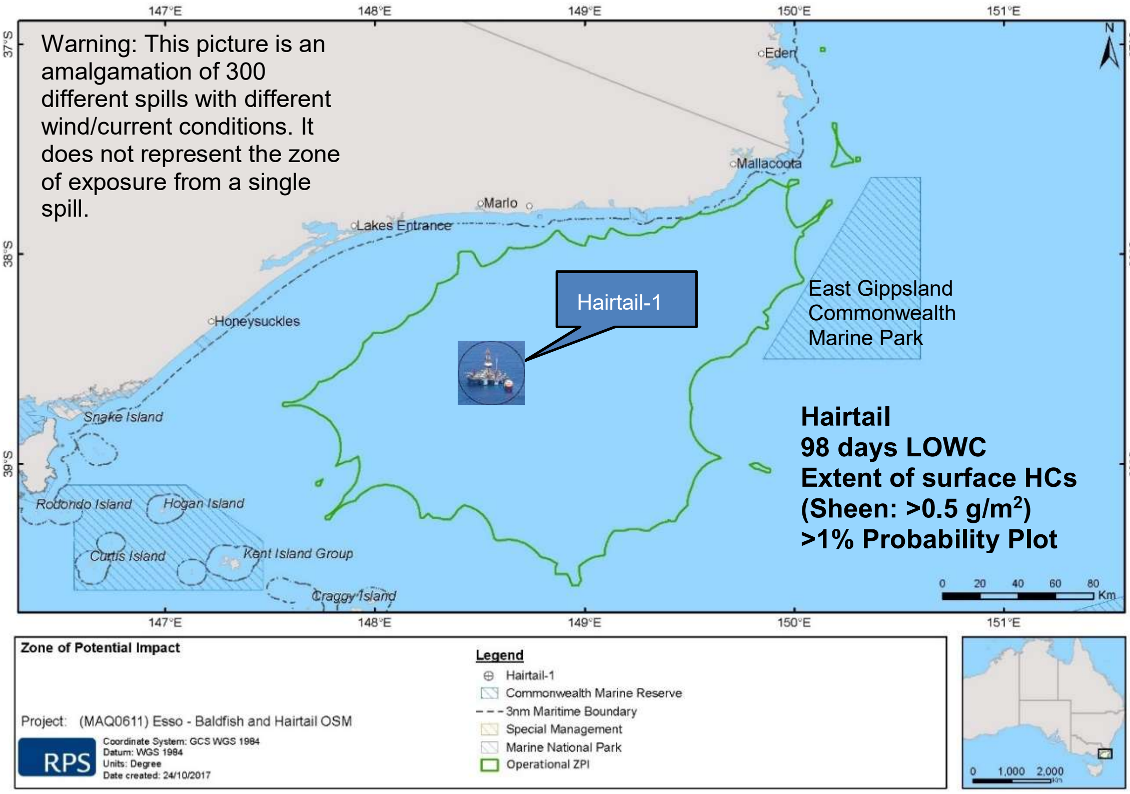


Figure 4-1 **Exploration Drilling Zone of Potential Impact (Operational ZPI), based on hydrocarbon exposures above impact thresholds resulting from a LOWC scenario at Baldfish-1 (APASA 2018)**

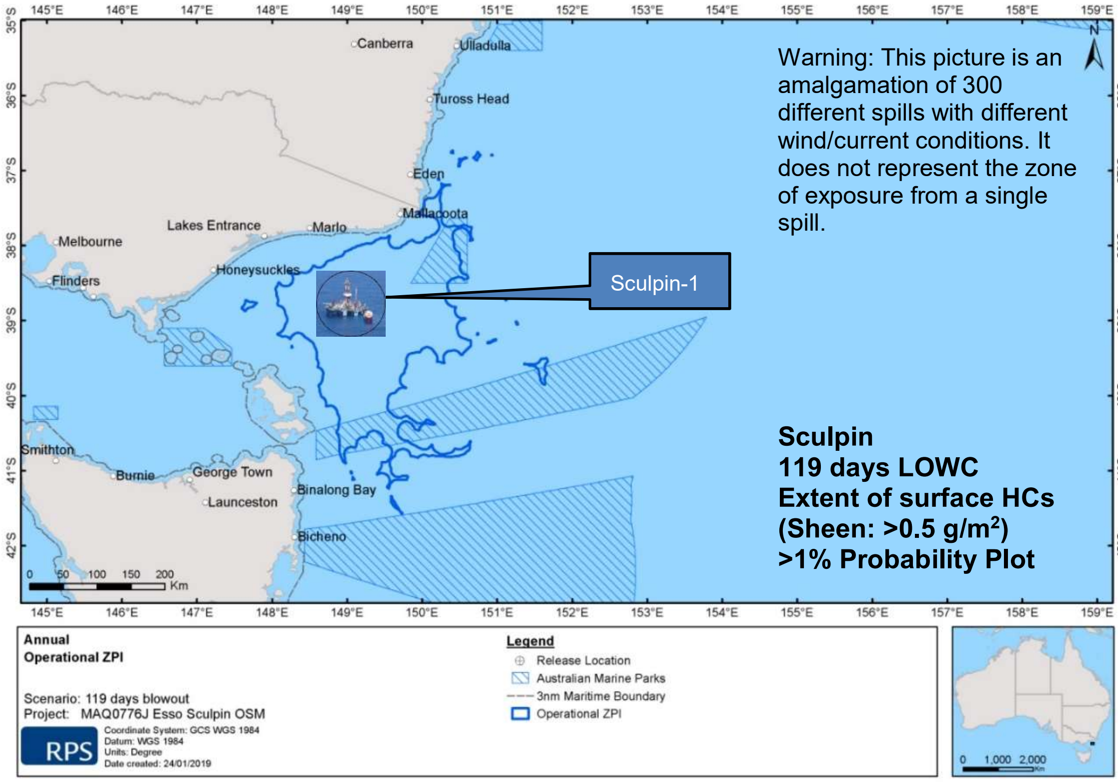


Figure 4-2 **Exploration Drilling Zone of Potential Impact (Operational ZPI), based on hydrocarbon exposures above impact thresholds resulting from a LOWC scenario at Sculpin-1 (APASA 2019)**

The Operational ZPI is based on 100 simulations for the surface and subsea scenarios, for each of three release scenarios (including a scenario where a capping stack is successfully installed, 45 days after the LOWC; APASA 2018, 2019). These were then combined into a single output map for sea-surface and in-water exposure to hydrocarbons. The green line shows the low exposure thresholds for surface, entrained and dissolved hydrocarbons (e.g., where light sheens may be visible and in-water hydrocarbons may be present). The Operational ZPI at moderate exposures is much smaller. While installation of a capping stack would significantly shorten the duration of the LOWC and approximately halve the released hydrocarbon volume, this appears to have limited influence on the extent of the Operational ZPI (see Section 6.32).

4.3 Environmental Monitoring ZPI

As outlined in Section 6.28.2.4 (Thresholds), there are practical limitations to oil spill trajectory modelling (OSTM) as a tool to assess spill risk, and thresholds, no matter how carefully chosen, are a simplification of the actual situation. In order to take this into account, model assumptions and selection of thresholds are conservative. Nonetheless, low level impacts may extend beyond the lowest thresholds.

In response to the Macondo spill, particular concerns were raised regarding entrained hydrocarbons, as these were trapped by a thermocline and spread far more extensively than indicated by surface hydrocarbon trajectory observations alone (Section 6.28.2.4).

Although OSTM demonstrates that entrapment of entrained hydrocarbons in the watercolumn is not evident for either Baldfish-1 or Sculpin-1, as shown by the modelling of hydrocarbon stratification (Section 6.32.2.9), the project has adopted the ANZECC criteria for entrained hydrocarbons as a basis to define the geographical extent of a potential ecological impact (Figure 4-3) (refer Section 6.28.2.4: Thresholds, for further details). This zone is named the "Environmental Monitoring ZPI". Both for the Baldfish-1 and sculpin-1 well locations, the Environmental Monitoring ZPI is largely determined by the probable extent (>1%) of entrained hydrocarbon exposure, resulting from a major LOWC event, at the ANZECC threshold of 7 ppb over a period >96 hrs.

At this highly conservative threshold, it is unlikely that entrained hydrocarbons are measurable in the water column with standard laboratory methodology, while impacts on even the most sensitive biota and ecosystems would most likely not be detectible with conventional scientific methods, even when ecological or water quality impacts may occur. Oil spill response outside the Operational ZPI would be restricted to monitoring, evaluation and surveillance (MES), as the Operational ZPI excludes shoreline impact, and other tools for oil spill response are not feasible at these low concentrations (Sections 7.2 & 7.3.1).

The key environmental sensitivities within and immediately outside the Operational ZPI (i.e. the Environmental Monitoring ZPI) are described in Sections 4.7 to 4.15 below. Table 4-1 lists the EPBC Act listed species occurring outside the Operational ZPI (for which species are described in Sections 4.8.8.1 to 4.8.16), but which fall within the Environmental Monitoring ZPI.

An additional 57 threatened species occur within the Baldfish/Hairtail Environmental Monitoring ZPI, most of which are birds (53 species). Of the 53 threatened bird species, 22 are "Migratory wetland" species (42%). The majority of the threatened bird species (30, or 57%) are listed as brooding or roosting in the area (either as "Breeding/roosting known to occur" or "Breeding/roosting likely to occur"). Two bird species, the White-throated needletail and the Kermadec petrel (western), are known to feed in the Baldfish/Hairtail Environmental Monitoring ZPI, but are not identified as occurring within the Operational ZPI.

Fifteen threatened species are "Known to occur" or "Likely to occur" in the Baldfish/Hairtail Environmental Monitoring ZPI, including the Flatback turtle and 14 bird species.

Ten threatened species are listed as "Migratory marine species" in the Baldfish/Hairtail Environmental Monitoring ZPI, including the Flatback turtle and 9 bird species (4 shearwaters, two tern species, two frigatebird species and the Common noddy). Nine threatened species are listed as "May occur" in this ZPI, including 7 bird species.

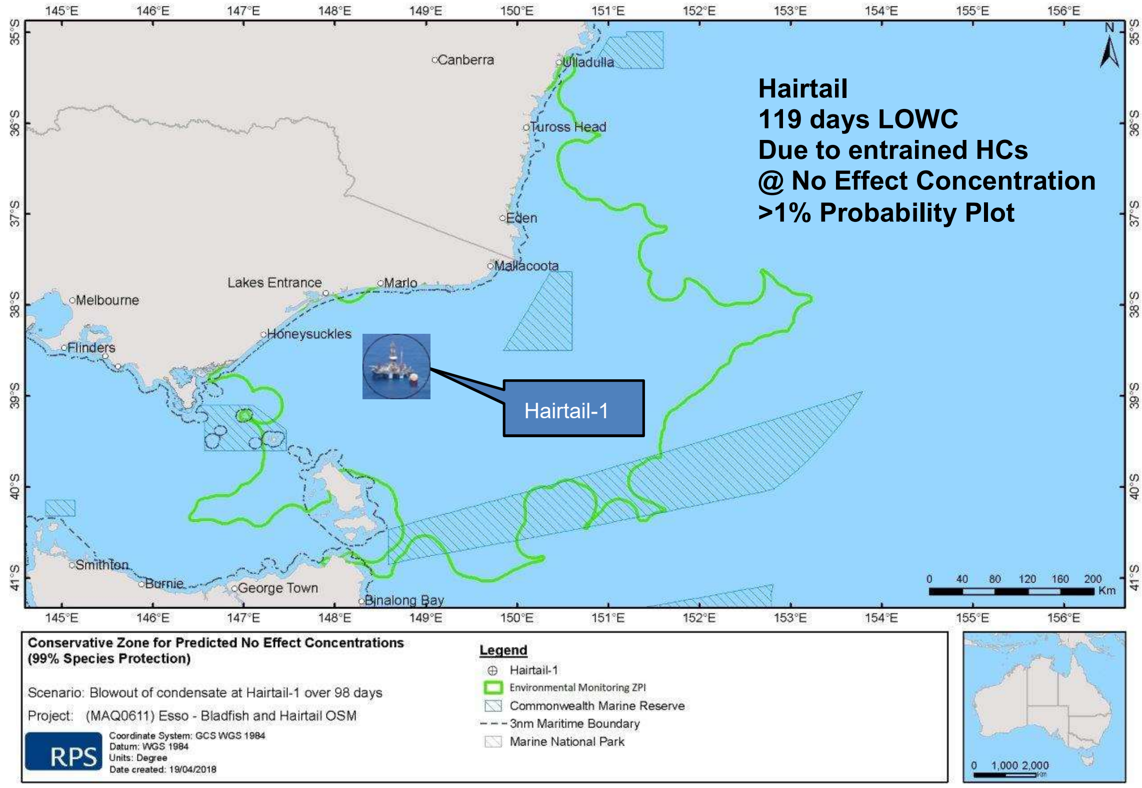


Figure 4-3 **Environmental Monitoring ZPI: Geographic extend of potential impacts from entrained hydrocarbons at ANZECC reference level (7 ppb, 96 hrs) resulting from a LOWC scenario at Baldfish-1 (APASA 2018)**

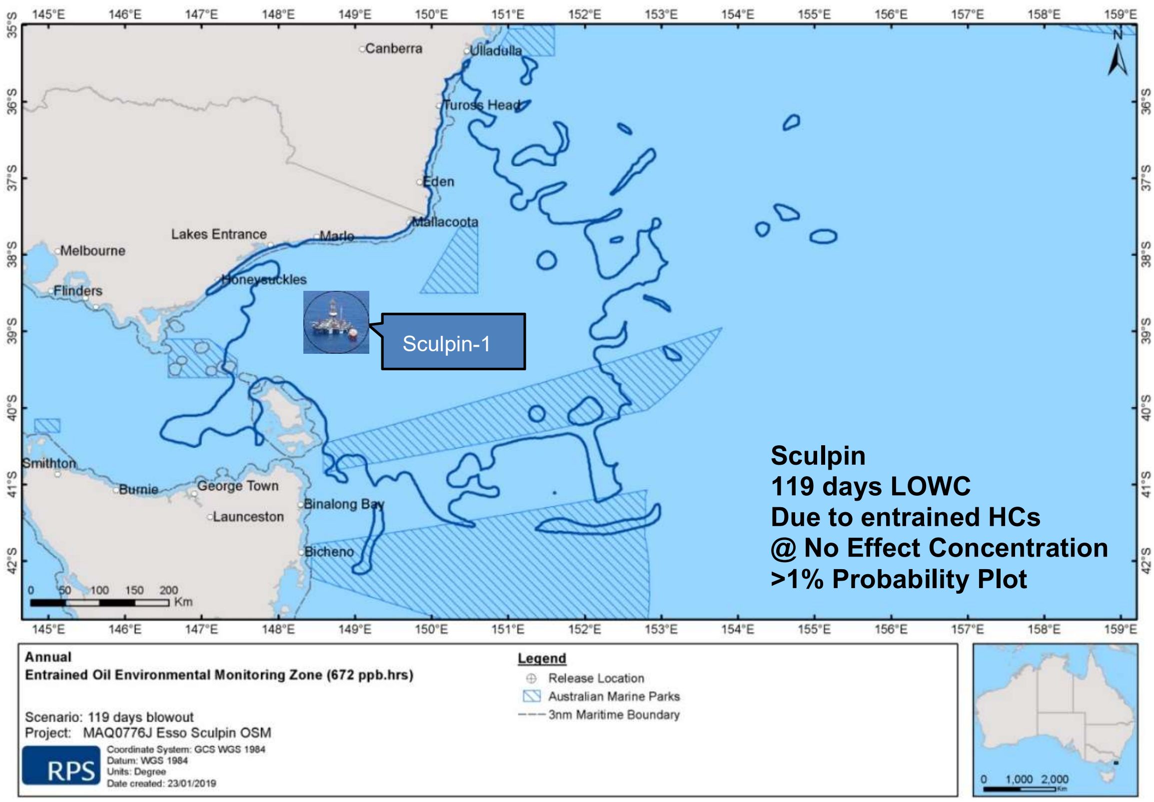


Figure 4-4 **Environmental Monitoring ZPI: Geographic extend of potential impacts from entrained hydrocarbons at ANZECC reference level (7 ppb, 96 hrs) resulting from a LOWC scenario at Sculpin-1 (APASA 2019)**

Table 4-1 EPBC Act threatened species potentially occurring outside the VIC/P70 Exploration Drilling Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence within Environmental Monitoring ZPI but outside Operational ZPI	
			Baldfish/Hairtail[1]	Sculpin[2]
Fish				
Red handfish	*Thymichthys politus*	CE	MO	-
Murray Cod	*Maccoluchella peelii*	V	-	LO
Eastern Dwarf Galaxia	*Galaxiella pusilla*	V	-	MO
Turtles				
Flatback turtle	*Natator depressus*	V, MM	KO	KO
Birds				
Asian dowitcher	*Limnodromus semipalmatus*	MW	RKO	-
Australasian bittern	*Botaurus poiciloptilus*	E	KO	KO
Australian painted snipe	*Rostratula australis*	E	LO	LO
Bar-tailed godwit	*Limosa lapponica*	MW	KO	KO
Bar-tailed godwit (baueri)	*Limosa lapponica baueri*	V	KO	KO
Bar-tailed godwit (menzbieri)	*Limosa lapponica menzbieri*	CE	MO	MO
Black-tailed godwit	*Limosa limosa*	MW	RKO	-
Broad billed sandpiper	*Limicola falcinellus*	MW	RKO	-
Caspian tern	*Hydroprogne caspia*	MM	BKO	-
Common greenshank	*Tringa nebularia*	MW	KO	KO
Common noddy	*Anous stolidus*	MM	MO	MO
Crested tern	*Thalasseus bergii*	MW	BKO	-
Double-banded plover	*Charadrius bicinctus*	MW	RKO	-
Eastern bristlebird	*Dasyornis brachypterus*	E	KO	MO
Fairy prion (southern)	*Pachyptila turtur subantarctica*	V	KO	-
Forty spotted pardalope	*Pardalotus quadragintus*	E	MO	-
Great frigatebird	*Fregata minor*	MM	MO	MO
Great knot	*Calidris tenuirostris*	CE, MW	RKO	-
Greater sand plover	*Charadrius leschenaultii*	V, MW	RKO	-
Grey plover	*Pluvialis squatarola*	MW	RKO	-
Grey tailed tattler	*Tringa brevipes*	MW	RKO	-
Herald petrel	*Pterodroma heraldica*	CE	MO	MO
Hooded plover (eastern)	*Thinornis rubricollis*	V	KO	KO
Kermadec petrel (western)	*Pterodroma neglecta*	V	FLO	FLO
Latham's snipe	*Gallinago hardwickii*	MW	RMO	RMO
Lesser frigatebird	*Fregata ariel*	MM	MO	MO
Little curlew	*Numenius minutus*	MW	RLO	-
Little tern	*Sternula albifrons*	V, MM	FLO	-
Marsh sandpiper	*Tringa stagnatilis*	MW	RKO	-

Masked owl (Tasmanian)	*Tyto novaehollandiae castanops (Tasmanian population)*	V	BKO	-
Mongolian plover	*Charadrius mongolus*	E, MW	RKO	-
Orange bellied parrot	*Neophema chrysogaster*	CE	KO	KO
Oriental plover	*Charadrius veredus*	MW	KO	-
Pacific golden plover	*Pluvialis fulva*	MW	RKO	-
Painted honeyeater	*Grantiella picta*	V	BKO	-
Pin-tailed snipe	*Gallinago stenura*	MW	RLO	-
Red-necked stint	*Calidris ruficollis*	MW	RKO	RKO
Regent honeyeater	*Anthochaera phrygia*	CE	KO	KO
Ruddy turnstone	*Arenaria interpres*	MW	RKO	-
Ruff (Reeve)	*Philomachus pugnax*	MW	RKO	-
Sanderling	*Calidris acuminata*	MW	RKO	-
Short-tailed shearwater	*Ardenna tenuirostris*	MM	BKO	BKO
Soft plumaged petrel	*Pterodroma mollis*	V	MO	-
Sooty shearwater	*Ardenna grisea*	MM	BKO	-
Streaked shearwater	*Calonectris leucomelas*	MM	LO	LO
Swift parrot	*Lathamus discolor*	CE	KO	KO
Swinhoe's snipe	*Gallinago megala*	MW	RLO	-
Tasmanian azure kingfisher	*Ceyx azureus diemenensis*	E	MO	-
Tasmanian wedge-tailed eagle	*Aquila audax fleayi*	E	BLO	BLO
Terek sandpiper	*Xenus cinereus*	MW	RKO	-
Wedge-tailed shearwater	*Ardenna pacifica*	MM	BKO	-
Whimbrel	*Numenius phaeopus*	MW	RKO	-
Wood sandpiper	*Tringa glareola*	MW	RKO	-

Status Key:
E–Endangered (threatened)
V–Vulnerable (threatened)
CE-Critically endangered (threatened)

MM-Migratory marine species
MW–Migratory wetland species
BLO- Breeding likely to occur

Likelihood of Occurrence Key:
FLO-Feeding likely to occur within area
LO–Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area
KO- Species or species habitat nown to occur
BKO – Breeding known to occur within area
RKO – Roosting known to occur within area
RMO – Roosting may occur within area

[1] Baldfish/Hairtail Protected Matters search Environmental Monitoring ZPI May 2018 (DoEE 2018g)
[2] Sculpin Protected Matters search Environmental Monitoring ZPI January 2019 (DoEE 2019c)

The Gingko-toothed beaked whale (listed status only), reporting as occurring in the Baldfish/Hairtail environmental monitoring ZPI, has only recently been confirmed as occurring in Australia through stranding events in southern NSW and western Victoria. It is a deep water species, primarily living off the continental shelf and known only from tropical and warm temperate waters in the Pacific and Indian Oceans (DoEE 2018e).

Incidental sightings of the Red handfish have been reported in Tasmania. The largest previously known population was found in Frederick Henry Bay (South-eastern Tasmania). There have been only two reported observations from the Port Arthur area since the 1980's (DoEE 1018f).

An EPBC Act Protected matters search for the Sculpin-1 Environmental Monitoring ZPI reported 24 threatened species, including 21 birds, two freshwater fish and the flatback turtle. Additionally, four freshwater frog species and nine terrestrial mammals/marsupials, as well as four terrestrial migratory birds and twelve terrestrial plant species were reported (not listed in Table 4-1).

The Eastern Dwarf Galaxia and the Murray Cod (both freshwater fish) were reported in the Sculpin Environmental Monitoring ZPI, but not in the Baldfish/Hairtail ZPI. The Eastern Dwarf Galaxia is on the advisory list of threatened vertebrate fauna in Victoria as endangered. It has a broad distribution along the Gippsland and SA Coastline (DoEE 2019a). The Murray Cod has a wide distribution through the Murray-Darling Basin, including southern and central Queensland, NSW, Victoria and the eastern part of SA (DoEE 2019b).

The Flatback turtle is endemic to Australia and all known breeding sites of this species are located in Australia. They feed in the northern coastal regions of Australia and have a preference for shallow, soft-bottomed sea bed habitats away from reefs. Flatback turtles have been accepted as occurring in the waters of NSW based on occasional records (Manly). The Flatback turtle is a rare visitor to NSW but does not breed in NSW (Cogger 2000).

4.4 Physical Environment

The VIC/P70 Exploration Drilling operational area is located in Commonwealth waters within the Gippsland basin, in Production Licence VIC/P70, approximately 90 - 100 km off the Victorian coast in Bass Strait in a water depth of between 359 – 2,300 m mean sea level (MSL) (Figure 4-5). The physical environment of the VIC/P70 Exploration Drilling operational area and Operational ZPI is described in this section.

Bass Strait is the region of the continental shelf that separates mainland Australia from Tasmania. The VIC/P70 operational area is located at the edge of the continental shelf, with depths increasing from 200m at western boundary, to over 3 km at the south-eastern end of Block VIC/P70 (Figure 4-5). The Operational ZPI further includes a relatively shallow area of the continental shelf (Section 4.2) but is not predicted to extend to Victorian State Waters or the Victorian Coastline.

Bass Strait has a reputation for high winds and strong tidal currents (Jones 1980). The area includes marine parks and reserves, as well as listed endangered or vulnerable species.

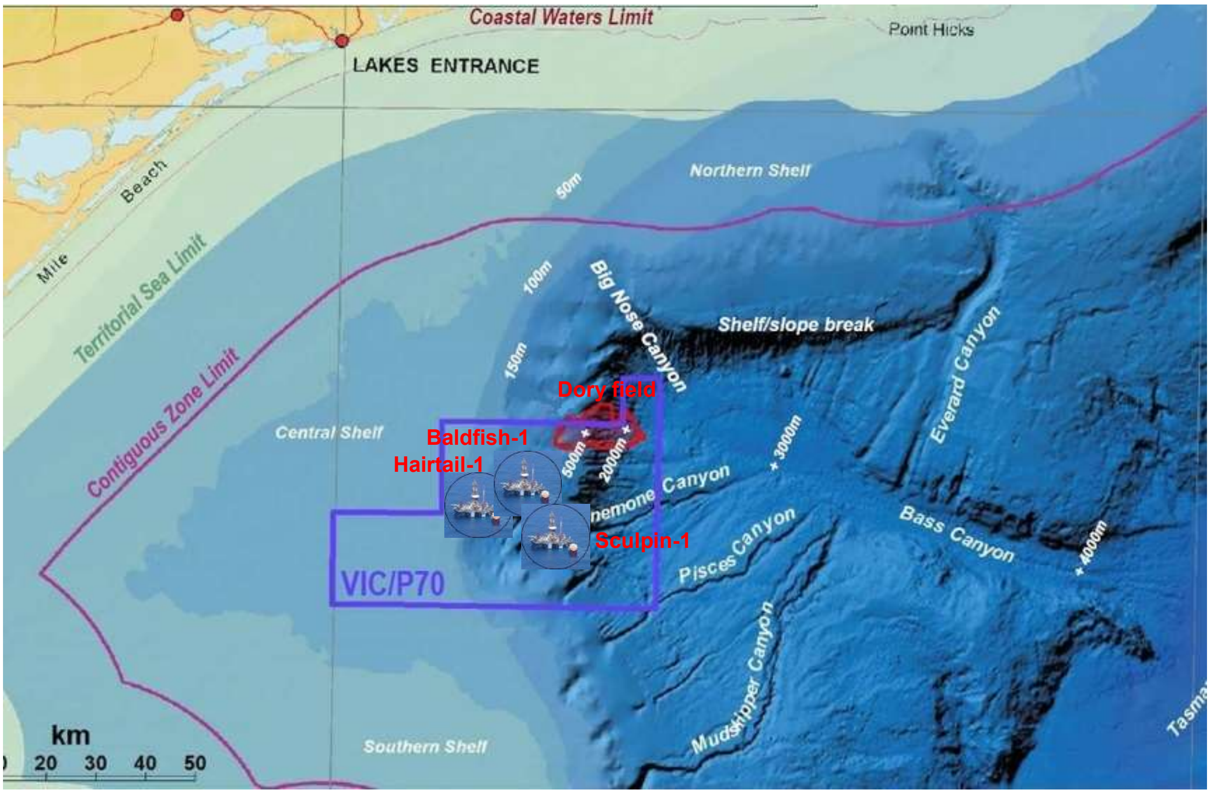


Figure 4-5 Bathymetry within the VIC/P70 Exploration Drilling operational area and surrounds

4.5 Climate and Meteorology

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). Further project-specific meteorological data are developed in dialogue with the Bureau of 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).

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, 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.

4.6 Oceanography

4.6.1 Currents

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).

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).

Further offshore, around the VIC/P70 Exploration Drilling operational area, currents are driven by two parameters, the Sub-Antarctic Water (SAW) movement, coming from the south, and the Bass Strait Water (BSW) movement from the west (Tomczak 1985; Rochford 1975; in Gibbs *et a*l, 1991).

The location of the VIC/P70 Exploration Drilling operational area, in deeper water of the continental slope is outside the previous area of development in Bass Strait for the GBJV. This location exhibits an increased wave climate. The presence of deepwater currents is documented in the Blackback Oceanographic Study (Lawson & Treloar 1996), Kingfish B Wave, Current and Wind data (Lawson & Treloar 1987 1990) and Metocean Design Criteria for Bass Strait Fixed Platforms (Esso 1990).

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

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

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

Lawson and Treloar (1999b) used a low-frequency Acoustic Doppler Current Profiler (ADCP) at the Blackback site to obtain current measurements through the water column. In addition, temperature and salinity profiles were measured. Other relevant studies include Lawson and Treloar (1996b), Lawson and Treloar (1998).

4.6.2 Water Temperatures and Density Stratification

Temperatures in the subsurface waters of the operational area 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).

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.

4.6.3 Waves

The area around the VIC/P70 Exploration Drilling operational area 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 nearby 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.

4.6.4 Bathymetry

The bathymetry in the Operational ZPI is concave shaped, with a shallower rim on the eastern and western entrances to the strait 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 of the Operational ZPI, and a steep slope into the Bass Canyon in the east (Black *et al.* 1991). Block VIC/P70 is at the edge of the Bass Canyon, with water depth of less than 100m at the western side, dropping to 2,500m at the eastern side. The VIC/P70 Exploration Drilling operational area lies between approximately 360 – 2,300 m water depths (Figure 4-5).

4.7 Ecological and Social Receptors

The VIC/P70 Exploration Drilling operational area and Operational ZPI supports a range of diverse benthic invertebrate fauna as well as a variety of vertebrate species such as fish, birds, seals and whales, including listed endangered and vulnerable species. The Environmental Monitoring ZPI (outside the Operational ZPI; Section 4.3) also supports a diverse ecosystem, which is further described in the following sections.

The operational area and Operational ZPI also contains a number of marine fauna that have high commercial value.

The following tables show the presence of ecological (Table 4-1) and social (Table 4-2) receptors that may occur within the operational area and Operational ZPI. Further descriptions of these ecological and social receptors are provided in the following sections:

- Section 4.8: Conservation Values within the Operational ZPI.
- Section 4.9: Nearshore and Shoreline Environments
- Section 4.10: Offshore Marine Environment
- Section 4.11: Commercial Fishing
- Section 4.13: Oil and Gas Industry
- Section 4.14: Recreational Fishing, Boating and Tourism
- Section 4.15: Cultural Heritage

Examples of values and sensitivities associated with each of the ecological or social receptors have been included in these tables. These values and sensitivities have been identified based on:

- Presence of listed threatened or migratory species, or threatened ecological communities;
- Presence of KEFs and BIAs;
- Presence of important behaviours (e.g. foraging, roosting or breeding) by fauna, including those identified in the EPBC Protected Matter searches;
- Provides an important link to other receptors (e.g. nursery habitat, food source, commercial species); or

Provides an important human benefit (e.g. community engagement, economic benefit).

4.8 Conservation Values within the Operational ZPI

Table 4-2 provides details of the features present within the Operational ZPI for those receptors identified by Regulation 13(3) of the OPGGSE Regulations. Note, no Commonwealth Marine Parks, internationally (Ramsar) or nationally important wetlands, World, National or Commonwealth heritage places occur within the Operational ZPI. Descriptions of the features or species and species habitats are provided further in this chapter (see references within Table 4-2).

Table 4-2 Summary of conservation values and sensitivities within the Operational ZPI

Receptor Type	Value and Sensitivities	Features present within the Operational ZPI
Commonwealth Marine Area (Section 4.8.2)	Key Ecological Features	• Big Horseshoe Canyon • Upwelling East of Eden
Fish (Section 4.8.8.1)	Threatened and/or migratory species	• Two threatened fish species or species habitat present (Australian grayling, Black rockcod)
Sharks & rays (Section 4.8.12)	Threatened and/or migratory species	• Three threatened (Grey nurse shark, Great white shark, Whale shark) and four migratory (Great white shark, Shortfin mako shark, Porbeagle shark, Whale shark) shark species or species habitat present
Marine Reptiles (Section 4.8.13)	Threatened and/or migratory species	• Four threatened and migratory marine turtle species or species habitat present (Loggerhead turtle, Green turtle, Leatherback turtle, Flatback turtle)
Seabirds and Shorebirds (Section 0	Threatened and/or migratory species	• Numerous threatened (26) and migratory (18) species or species habitat present (including various albatross, petrel, plover, sandpiper, shearwater and tern species)
Marine Mammals (Section 4.8.16)	Threatened and/or migratory species	• Five threatened whale species or species habitat present (Sei whale, Blue whale, Fin whale, Southern right whale, Humpback • whale); and ten migratory whale species or • species habitat present • One migratory dolphin species or species habitat present (Dusky dolphin)

4.8.1 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 may be considered as components of the Commonwealth marine area. Two KEFs, identified in the Conservation Values Atlas (DoEE 2015b), intersect with the Operational ZPI:

- **Big Horseshoe Canyon**: a feature at the easternmost end of the Bass Canyon System; the hard substrates provide attachment sites for benthic flora and fauna, thus increasing structural diversity and creating sheltering habitat for benthic fishes.
- **Upwelling East of Eden:** an area of episodic upwelling known for high productivity and aggregations of marine life, including Blue whales, Humpback whales, seals, sharks and seabirds.

The upwelling East of Eden and the Big Horseshoe Canyon lie to the east from the VIC/P70 operational area (~22 and 80 km respectively). Other key ecological features of the South-east Marine Region that lie outside of the Operational ZPI include (DoEE 2015a):

- **Bonney Coast upwelling** (along the Great Ocean Road, between Portland, Victoria, and Robe, South Australia): A predictable, seasonal upwelling bringing cold nutrient rich water to the sea surface and supporting regionally high productivity and high species diversity in an area where such sites are relatively rare and mostly of smaller scale. Whales and many endangered and listed species, as well as baitfish frequent this area of high productivity, in turn supporting predator species such as Little penguins and Australian fur seals.
- **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. The phytoplankton blooms attract migratory commercial fish stocks and

are important for krill, which in turn form an important component of the diet of many pelagic species.

- **The Bass Cascade** (along the Bass Canyon System; Section 4.10.2): An “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. The nutrient rich waters leads to increased primary productivity. Some fish and whales are known to aggregate along its leading edge. The Bass Cascade occurs during winter months only.
- **West Tasmania canyons** (west coast of Tasmania): These canyons are productivity and biodiversity hotspots. 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.
- **Seamounts south and east of Tasmania** (south and east of Tasmania): These seamounts create localised upwellings of nutrient rich waters from the seafloor. The hard substrate support sessile invertebrates
- **Shelf rocky reefs and hard substrates** (Bass Strait): 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.
- **Canyons on the eastern continental slope** (widespread along the eastern continental slope): The canyons on the eastern continental slope provide habitat (through changes in topography and productivity) that supports a diverse range of benthic, demersal and pelagic species. 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.

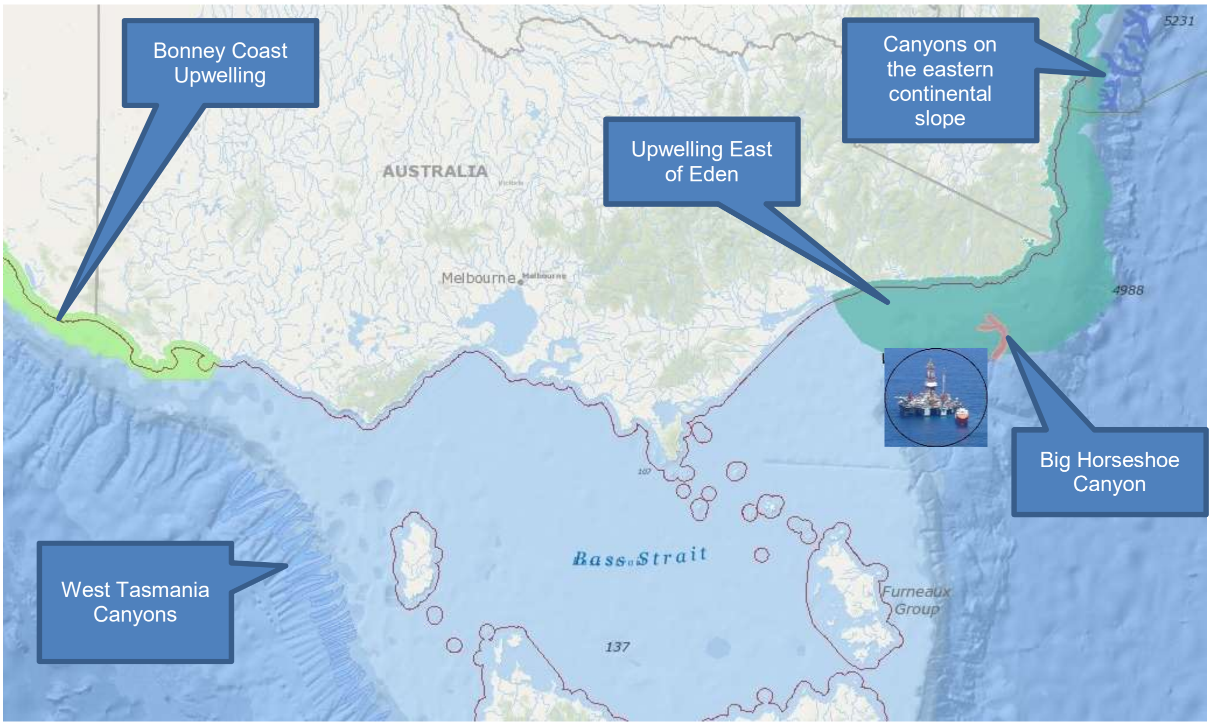


Figure 4-6 Key Ecological Features within the South-east Marine Region Profile (DoEE 2015)

4.8.1.1 Big Horseshoe Canyon

Big Horseshoe Canyon is the easternmost arm of the Bass Canyon System (Figure 4-6). The steep, rocky slopes provide hard substrate habitat for attached large megafauna. Sponges and other habitat forming species provide structural refuges for benthic fishes, including the commercially important pink ling.

The Big Horseshoe Canyon is the largest southeastern canyon sampled for benthic biodiversity (Williams *et al*. 2009). It has a total area of 319 km^2 in 1500m 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). The conservation value of this feature is highlighted by this being the type locality for *M. cyaneus* and it's only known location off southeastern Australia.

Big horseshoe canyon lies south of the coast of eastern Victoria. This feature is the eastern most arm of the Bass Canyon System. The spatial boundary of this KEF, as defined in the Conservation Values Atlas, was identified using the Geoscience Australia geomorphic features dataset (DoEE 2015ab).

4.8.1.2 Upwelling East of Eden

The Upwelling East of Eden is designated a KEF for the high productivity and aggregations of marine life (Figure 4-6). Dynamic eddies of the East Australian Current cause episodic productivity events when they interact with the continental shelf and headlands. Phytoplankton blooms, resulting from mixing and nutrient enrichment, are the basis of productive food chains including zooplankton, copepods, krill and small pelagic fish (DoEE 2015ab).

The upwelling supports high primary productivity that supports higher trophic levels, including top order predators, marine mammals and seabirds. The area supports foraging Blue and Humpback whales, known to arrive when significant krill aggregations form. The area is also important for seals, other cetaceans, sharks and seabirds.

4.8.2 Biologically Important Areas (BIA)

Biologically Important Areas (BIAS) are identified in the Conservation Values Atlas, developed by the Commonwealth Government (DoEE 2015b). BIAs are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. Biologically important areas are designed to assist decision-making under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The Operational ZPI and operational area overlap with BIAs for seabirds (Section 0), sharks (Section 4.8.12) and whales (Section 4.8.16) (Figure 4-7).

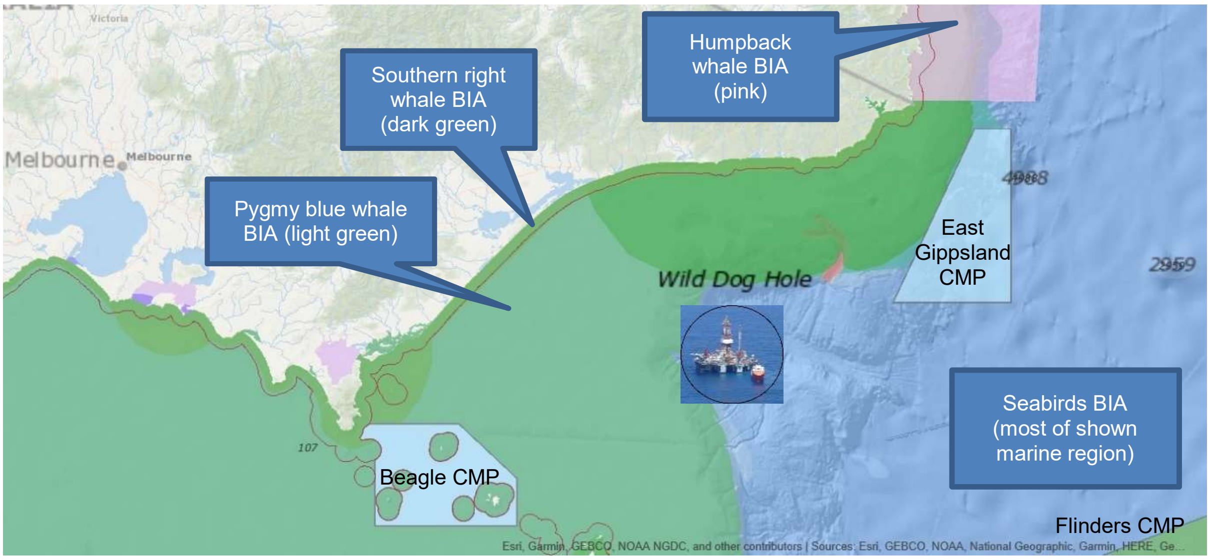


Figure 4-7 Biologically Important Areas within the South-east Marine Region Profile (DoEE 2015)

4.8.3 International, National and State Sites of Significance or Sensitivity

There are no areas of high conservation significance present in the operational area itself, although there are a number of habitats of conservation value, mostly immediately inshore from the Operational ZPI (Section 4.2).

4.8.4 Declared Protected Areas – Commonwealth Protected Areas and National Parks

There are no International Declared Protected Areas or National Parks within the Operational ZPI, although there are a number of habitats of conservation value immediately outside of the Operational ZPI (Section 4.8.6).

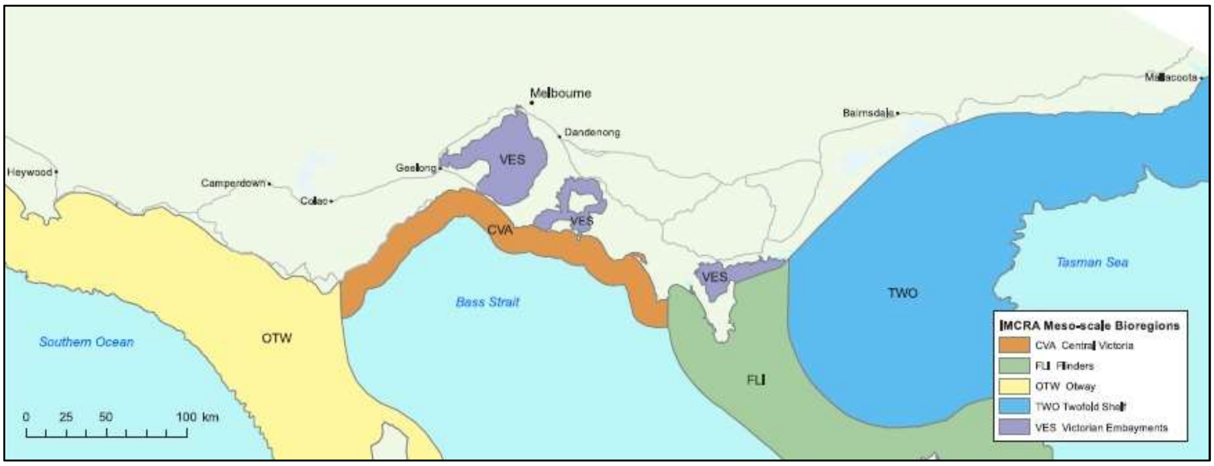
4.8.4.1 The Australian Whale Sanctuary

The Australian Whale Sanctuary, a Commonwealth Protected Areas overlaps with the Operational ZPI.

The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile State waters limit out to the boundary of the Exclusive Economic Zone (i.e., out to 200 nautical miles and further in some places) (DoEE 2017l). Both the VIC/P70 operational area and the Operational ZPI lie within the Australian Whale Sanctuary.

4.8.5 Declared Protected Areas – State Victoria

The Integrated Marine and Coastal Regionalisation of Australia (IMCRA version 4.0; DEH 2006) is a spatial framework for classifying Australia's marine environment into bioregions at a scale useful for regional planning.



From VEAC 2014

Figure 4-8 IMCRA bioregions in Victoria

The five IMCRA bioregions in Victoria are: Otway, Central Victoria, Victorian Embayments, Flinders and Twofold Shelf (Figure 4-8). Although Twofold Shelf overlaps with the Operational ZPI and the VIC/P70 operational area, Victorian Declared Protected Areas lie adjacent to the Operational ZPI (Section 4.8.6). Figure 4-9 provides an overview of sites of conservation value along the Victorian coastline.

4.8.6 Conservation Values within the Environmental Monitoring ZPI

The following ecosystems of conservation value fall within the environmental monitoring ZPI but outside the operational ZPI (Section 4.2).

4.8.6.1 Gippsland Lakes Ramsar Site (Victoria)

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 km^2 and the three main water bodies are Lakes Wellington, Victoria and King.

The Gippsland Lakes Ramsar Site meets six of the Ramsar Criteria (DoEE 2017s):

- **Criterion 1**: Contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
- **Criterion 2**: Supports vulnerable, endangered or critically endangered species or threatened ecological communities.

- **Criterion 4**: Supports plant and/or animal species at a critical stage in their life cycles or provides refuge during adverse conditions.
- **Criterion 5**: Regularly supports 20,000 or more waterbirds.
- **Criterion 6**: Regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.
- **Criterion 8**: Is an important source of food for fish, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere.

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- **Criterion 8**: Is an important source of food for fish, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere.

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Figure 4-9 Sites of conservation significance along Gippsland Coastline relative to VIC/P70 exploration drilling operational area

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 Ramsar Site has 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, 2017s).

The Lakes are protected as a Ramsar Site by the Lakes National Park and the Gippsland Lakes Coastal Park (see Section 0).

The ecological character description (ECD) of the Gippsland Lakes Ramsar Site is summarised in Table 4-3, with limits of acceptable change (LAC) summarised in Table 4-4 (DSEWPAC 2010).

In the context of the VIC/P70 exploration drilling scope, and predicted extend of environmental monitoring ZPI, critical components that may be affected by a major spill event include Marine sub-tidal aquatic beds (C1), Coastal brackish or saline lagoons (C2), Waterbird breeding (P2), Threatened species (S1) and Fisheries resource values (S2).

Table 4-3 Summary of critical components, processes and services/benefits for the Gippsland Lakes Ramsar site (DSEWPAC 2010)

Critical components	Critical processes	Critical services/benefits

Wetland habitats: grouped as follows
• (C1) marine subtidal aquatic beds (seagrass/aquatic plants).
• (C2) coastal brackish or saline lagoons (open water phytoplankton-dominated habitats).
• fringing wetlands that can occur within the site as–
  ◦ (C3) predominantly freshwater wetlands
  ◦ (C4) brackish wetlands
  ◦ (C5) saltmarsh/ hypersaline wetlands.
Wetland flora and fauna:
• (C6) abundance and diversity of waterbirds.
• (C7) presence of threatened frog species (green and golden bell frog; growling grass frog).
• (C8) presence of threatened wetland flora species
	Hydrological regime: (P1) patterns of inundation and freshwater flows into the wetland system, groundwater influences and marine inflows that affect habitat structure and condition.
	Waterbird breeding functions: (P2) critical breeding habitats for a variety of waterbird species.
		Threatened species: (S1) the site supports an assemblage of vulnerable or endangered wetland flora and fauna that contribute to biodiversity.
		Fisheries resource values: (S2) the site supports key fisheries habitats and stocks of commercial and recreational significance.

Supporting Components	**Supporting Processes**	**Supporting services/benefits**
Other wetland habitats: supported by the site (sand/pebble shores, estuarine waters, etc.). **Other wetland fauna:** supported by the site (for example, fish, aquatic invertebrates).	**Climate:** patterns of temperature, rainfall and evaporation. **Geomorphology:** key geomorphologic/ topographic features of the site. **Coastal and shoreline processes:** hydrodynamic controls on coasts and shorelines through tides, currents, wind, erosion and accretion. **Water quality:** water quality influences aquatic ecosystem values, noting the key water quality variables for Gippsland Lakes are salinity, dissolved oxygen, nutrients and sediments. **Nutrient cycling, sediment processes and algal blooms:** primary productivity and the natural functioning of nutrient cycling/flux processes in waterbodies.	**Tourism and recreation:** the site provides and supports a range of tourism and recreational activities that are significant to the regional economy. **Scientific research:** the site supports and contains features important for scientific research.

Table 4-4 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 DSEWPAC 2010, 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.	

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
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 DSEWPAC 2010, 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 Morass; The Heart Morass; Clydebank Morass, Lake Coleman {Tucker Swamp})	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
		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.	

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
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

<table>
<tr><th>Number</th><th>Indicator for Critical Component / Process/Service for the LAC</th><th>Relevant timescale[1]</th><th>Limit(s) of Acceptable Change</th><th>Spatial scale/temporal scale of measurements</th><th>Underpinning baseline data</th><th>Secondary critical C,P,S addressed through LAC</th></tr>
<tr><td>C7</td><td>Presence of threatened frogs</td><td>Medium Term</td><td>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).</td><td>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).</td><td>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.</td><td>P1</td></tr>
<tr><td>C8</td><td>Presence of threatened wetland flora species</td><td>Long Term</td><td>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.</td><td>Based on opportunistic searches.</td><td>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.</td><td>P1</td></tr>
<tr><td colspan="7">Critical processes</td></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</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</td><td>C1 – C8
S1, S2</td></tr>
</table>

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
			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).		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.	
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	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	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
				creeks that drain into the site.	drainages. There are no data describing the population status of this species in these drainages.	
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 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.	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.		
			• 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).	

4.8.7.2 Corner Inlet Ramsar Site (Victoria)

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 2017s): 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, 2017b).

The site is protected as a Ramsar site by the Nooramunga and Corner Inlet Marine and Coastal Parks (see Section 4.8.7.3), and by part of it lying within the Corner Inlet Marine National Park.

The ecological character description (ECD) of the Corner Inlet Ramsar Site is summarised in Table 4-5, with limits of acceptable change (LAC) summarised in Table 4-6 (DSEWPAC, 2010).

In the context of the VIC/P70 Exploration Drilling scope, and predicted extend of environmental monitoring ZPI, 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).

4.8.7.3 Corner Inlet Marine National Park and Nooramunga Marine and Coastal Parks (Victoria)

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, stingarees, flathead, whiting and flounder. The seagrass and surrounding marshes are particularly important for international migratory birds such as the Eastern curlew, and are listed as part of the Corner Inlet RAMSAR site (Parks Victoria 2017e).

Table 4-5 Summary of critical components, processes and services/benefits for the Corner Inlet Ramsar site (DSEWPAC 2011)

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.

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. Shallow Inlet is a large tidal bay enclosed from the sea by a sand barrier complex of spits, bars and mobile dunes. Adjoining the Marine and Coastal Parks is Corner Inlet Marine National Park. 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 and the endangered Hooded plover and 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).

The ecological character description (ECD) of the Corner Inlet Ramsar Site is summarised in Table 4-5, with limits of acceptable change summarised in Table 4-6 (DSEWPAC2010).

In the context of the VIC/P70 exploration drilling scope, and predicted extend of environmental monitoring ZPI, 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).

Table 4-6 Limits of acceptable change (LAC) – Corner Inlet Ramsar site (DSEWPAC 2011)

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 have not been developed from these data.
						S2

	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	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	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
			allowable change recognises that mangroves are a critical habitat resource and generally shows low natural variability)		baseline value should be considered as indicative only.	
	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 habitat resource, generally show low natural variability, but data reliability is low)	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 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
	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

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
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 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)	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
		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						

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
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 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	Recommended baseline monitoring program should comprise a minimum two annual sampling periods separated by at least one year (and within a five year period).	The use of the site by these species is well documented. However, there are no empirical data describing nest or egg production rates. Baseline data will need to be collected to assess this LAC.	C2
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 been undertaken in the site's drainages to date	P1, C1, C2
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	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	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
			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		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.	

4.8.7.4 East Gippsland Commonwealth Marine Park (Victoria)

The East Gippsland Commonwealth Marine Park covers 4,137 square kilometres and is located approximately 116 km north-east of the operational area. The reserve contains representative samples of an extensive network of canyons, continental slope and escarpment in depths from 600 metres to deeper than 4,000 metres.

The East Gippsland Commonwealth Marine Park area includes both warm and temperate waters and free-floating aquatic plants or microscopic plants (i.e., phytoplankton) communities. The reserve supports a diverse phytoplankton community and other sea life. The area may also include foraging area for wandering albatross (DoEE 2017n).

A summary of the East Gippsland CMP as provided in the SE Commonwealth Marine Parks Network Management Plan 2013-2023 (Director of National Parks 2013) is provided in Table 4-7.

Table 4-7 East Gippsland CMP: SE Commonwealth Marine Parks Network Management Plan 2013-2023 (Director of National Parks 2013)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name IUCN VI—Multiple Use Zone	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	4,137 km^2 (413 700 ha).			
Major conservation values	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			
Location	The East Gippsland Commonwealth Marine Park is off the north-east corner of Victoria, on the continental slope and escarpment.			
General description of the reserve	The East Gippsland Commonwealth Marine Park 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.			

4.8.7.5 Beagle Commonwealth Marine Park (Victoria)

The Beagle Commonwealth Marine Park is located >129 km south south-west of the VIC/P70 operational area. The reserve covers an area of 2,928 square kilometres. This Marine Park is situated entirely within the shallow Bass Strait, mostly 50 to 70 m depths, with its north-western edge abutting Victorian waters to the south-east of Wilson's Promontory.

The Beagle Commonwealth Marine Park is a shallow marine park that surrounds a collection of Bass Strait islands. The deep rocky reefs support a rich array of life, and the area provides homes and feeding grounds for seabirds, Little penguins and Australian fur seals. The marine park is located near the Hunter group of islands which is an important breeding area for the Fairy prion, Shy albatross, Silver gull, Short tailed shearwater, Black faced cormorant, Australian gannet, Common diving petrel and Little penguins (DoEE 2017u).

A summary of the Beagle CMP as provided in the SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (Director of National Parks 2013) is provided in Table 4-8.

Table 4-8 Beagle CMP: SE Commonwealth Marine Parks Network Management Plan 2013-2023 (Director of National Parks 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 IUCN VI—Multiple Use Zone</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 km2 (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 Park 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>
<tr><td>General description of the reserve</td><td colspan="4">The Beagle Commonwealth Marine Park 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.</td></tr>
</table>

	The trading ketch Eliza Davies, which lies in the reserve to the east of Wilson's Promontory, sunk under tow in 1924.

4.8.7.6 The Lakes National Park and Gippsland Lakes Coastal Park (Victoria)

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 km^2 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,k).

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 17,600ha 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 (Parks Victoria 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 (Parks Victoria 2003, 2017k).

4.8.7.7 Cape Howe Marine National Park (Victoria)

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).

4.8.7.8 Point Hicks Marine National Park (Victoria)

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 (see Section 4.15.2).

4.8.7.9 Ninety Mile Beach Marine National Park (Victoria)

Located 30 km south of Sale and adjacent to Gippsland Lakes Coastal Park, the Ninety Mile Beach Marine National Park covers kilometres 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).

4.8.7.10 Wilsons Promontory Marine National Park, Wilsons Promontory Marine Park, Wilsons Promontory Marine Reserve and Wilsons Promontory National Park (Victoria)

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).

4.8.7.11 Gabo Island Harbour Special Management Area and Gabo Island Light Station Reserve (Victoria)

Special management areas are recognised for specific values but generally require a lower level of protection than marine national parks and marine sanctuaries. The Gabo Island Harbour Special Management Area includes nature based tourist values of which Little penguin and reef fish are protected.

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.

4.8.7.12 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.

4.8.7.13 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.

4.8.7.14 Beware Reef Marine Sanctuary (Victoria)

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 (Parks Victoria 2009c). Beware Reef is a popular location for recreational divers and the remains of numerous shipwrecks can be encountered in the sanctuary (see Section 4.15.2).

4.8.7.15 Cape Conran Coastal Park (Victoria)

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).

4.8.7.16 Bass Strait Islands in Victoria (Victoria)

Protected areas on Bass Strait islands include Rodondo Island Nature Reserve, West Moncoeur Island Nature Reserve and East Moncoeur Island Conservation Area.

4.8.7.17 Croajingolong Biosphere Reserve and National Park (Victoria) & Nadgee Nature Reserve (NSW)

The Croajingolong Biosphere Reserve and 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).

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 use the rock operational areas and beaches of the reserve. Most of the park’s beaches support a breeding pair of endangered 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).

4.8.7.18 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 Ballendella Lake - Corunna Lake Sanctuary Zone is located within the Batemans Marine Park.

4.8.7.19 Montague Island Nature Reserve (NSW)

The Montague Island Nature Reserve is a breeding 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 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.

4.8.7.20 Central Eastern Commonwealth Marine Park (NSW)

The Central Eastern Commonwealth Marine Park covers an area of more than 70 000 square kilometres with a depth range from approximately 120 to 6000 metres. The reserve provides important habitat for the humpback whale, great white shark and a number of migratory seabirds.

Sea floor features represented in the reserve include abyssal-plain/deep ocean floor, canyons, pinnacles, slope, knoll/abyssal-hills/hills/mountains/peaks, and seamount/guyot. The reserve includes two key ecological features; canyons on the eastern continental slope and Tasmanian seamount chain (known breeding and feeding areas for a number of open ocean species such as billfish and marine mammals) (DoEE 2017w).

4.8.7.21 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).

4.8.7.22 Other NSW Marine Protected Areas

Other NSW marine protected areas (in addition to those National Parks addressed under Section 6.7.2.10), further north along the NSW coastline of the Twofold Shelf or Bateman's Shelf Bioregions include:

- Bushrangers Bay Nature Reserve.
- Comerong Island Nature Reserve.
- Narrawallee Creek Nature Reserve.
- Cullendulla Creek Nature Reserve.

4.8.7.23 Other NSW National Parks

Other NSW National Parks along the coastline of the Twofold Shelf or Bateman's Shelf Bioregion include Mimosa Rocks National Park and Bournda National Park.

Other NSW National Parks in the Bateman's Shelf Bioregion (north of Eden) include Booderee, Clyde River, Jervis Bay, Conjola, Meroo, Eurobodalla, Murramarang, Biamanga, Illawarra, Shoalhaven, Southern Highlands and north to the Hawksbury River: Royal National Park, Seven Mile Beach National Park, Garawarra State Conservation Area, Shiprock Aquatic Reserve, Boat Harbour Aquatic Reserve, Towra Point Nature Reserve, Botany Bay National Park, Cape Banks Aquatic Reserve, Bronte-Coogee Aquatic Reserve, Sydney Harbour National Park, North Sydney Harbour Aquatic Reserve, Cabbage Tree Bay Aquatic Reserve, Long Reef Aquatic Reserve, Narrabeen Aquatic Reserve.

4.8.7.24 Flinders Commonwealth Marine Park (Tasmania)

The Flinders Commonwealth Marine Park comprises an area of 27,043 square kilometres and is located approximately 230 km south-east of the operational area. The reserve covers a depth range from about 40 metres on the shallow continental shelf to abyssal depths of 3,000 metres or more to the edge of the Exclusive Economic Zone (2017b).

Sea bottom dwelling 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 fish, including school shark (AFMA 2014a) and gulper sharks (Harrison's dogfish and southern dogfish) which have been listed as threatened species (DoEE 2017j), and to populations of the giant crab.

The shallower part of the Flinders Commonwealth Marine Park includes habitat important to the white fronted tern, Australian gannet, black faced cormorant, common diving petrel, fairy prion, little penguin, shy albatross, silver gull, crested tern, short tailed shearwater, and white faced storm petrel (DoEE, 2017b).

A summary of the Flinders CMP as provided in the SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (Director of National Parks 2013) is provided in Table 4-9.

Table 4-9 Flinders CMP: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (Director of National Parks 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 IUCN VI—Multiple Use Zone</td><td colspan="4">IUCN II—Marine 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>Marine National Park Zone ($25,812 km^2$)</td><td></td><td>Multiple Use Zone ($1,231 km^2$)</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">$27,043 km^2$ (2,704,300 ha)</td></tr>
<tr><td>Major conservation values</td><td colspan="4">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 and Harrison’s dogfish
Important migration area for:
• humpback whale</td></tr>
<tr><td>Location</td><td colspan="4">The Flinders Commonwealth Marine Park is east of the north-east tip of Tasmania and Flinders Island, and extends over 400 km eastward.</td></tr>
<tr><td>General description of the reserve</td><td colspan="4">The Flinders Commonwealth Marine Park 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.</td></tr>
</table>

4.8.7.25 Freycinet Commonwealth Marine Park (Tasmania)

The Freycinet Commonwealth Marine Park comprises a total area of 57,942 square kilometres and covers a depth range from about 40 m on the shallow continental shelf, to abyssal depths of 3000 m or more at the edge of Australia's exclusive economic zone (DoEE 2017q).

The reserve includes examples of ecosystems, habitats and communities associated with the Tasmania Province, the Tasmanian Shelf Province and the Southeast Transition and associated with the sea-floor features (e.g., abyssal plain/deep ocean floor, canyon, escarpment, knoll/ abyssal hill, saddle, seamount/guyot, shelf and terrace). The reserve also contains features with high biodiversity and productivity (e.g., East Tasmania subtropical convergence zone).

The reserve is a foraging area for Wandering, Black-browed and Shy albatross, Cape petrel and Fairy prion, Sei whales and Killer whales. It is an important migration and resting area for Southern right whales and important migration area for Humpback whales.

Seamounts 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. White sharks also forage in the reserve (DoEE 2017q).

4.8.7.26 Little Waterhouse Lake Ramsar Site (Tasmania)

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 (DoEE 2017a). The Little Waterhouse Lake meets three of the Ramsar Criteria: 1, 2 and 3 (as described in Section 0).

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.

The site supports the green and gold frog and the dwarf galaxias.

The high species richness of the wetland forms an integral part of the coastal community. The lagoon also supports several species and communities which are both rare and poorly reserved in Tasmania. The site is recognised as a key site for two plant species threatened in Tasmania: river clubsedge and sea clubsedge. The lake also supports a significant population of the freshwater species of planktonic dinoflagellate, *Procentrum foveolata*, a recently described species classified in a group previously considered entirely marine.

The area around the Little Waterhouse Lake was significant to Indigenous groups. The North East people used the heaths and plains behind the coast, which they kept open and clear by burning. The Ramsar site is currently used for various recreational activities, particularly fishing for the introduced brown trout and rainbow trout (DoEE 2017a). For an Ecological Character Description (ECD) of Little Waterhouse Lake Ramsar Site see NRMNT 2012.

4.8.7.27 Flood Plain Lower Ringarooma River Ramsar Site (Tasmania)

The Flood Plain Lower Ringarooma River Ramsar site is located on the far north-east coast of Tasmania, between Cape Portland and Waterhouse Point (DoEE 2017z). The site meets four of the Ramsar Criteria: 1, 2, 3 and 4 (as described in Section 0).

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 supports six fauna species listed as nationally threatened: green and gold frog, dwarf galaxias, fairy tern, Australian grayling, Australasian bittern and shiny grasstree.

The Flood Plain Lower Ringarooma River is considered to be a good foraging area for many species of waterbirds due to the large area of shallow water. A number of bird species listed under international migratory conservation agreements have been recorded at the site. These include: cattle egret, great egret, Latham's snipe, curlew sandpiper, red-necked stint, bar-tailed godwit, Caspian tern and greenshank. Australasian shoveler, little tern, hooded plover and fairy tern are also known to breed within the Ramsar site.

The Tasmanian mudfish, Tasmanian whitebait and Australian grayling have been recorded in the Ringarooma River. These species all migrate between fresh and marine waters, which highlights the importance of the estuarine habitat provided by the site and constitutes support for these species during a critical stage of their life cycle (DoEE 2017z). For an Ecological Character Description (ECD) of Flood Plain Lower Ringarooma River Ramsar site see DSEWPAC 2012b.

4.8.7.28 Logan Lagoon Ramsar Site, Flinders Island (Tasmania)

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 (as described in Section 0).

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, 2017e). 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 2017x). For an Ecological Character Description (ECD) of Logan Lagoon Ramsar Site see DSEWPAC 2012a.

4.8.7.29 East Coast Cape Barren Island Lagoons Ramsar Site (Tasmania)

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 (DoE 2017y). The site meets two of the Ramsar Criteria: 1 and 3 (as described in Section 0).

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 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 (DoE 2017y). For an Ecological Character Description (ECD) of East Coast Cape Barren Ramsar Site see DSEWPAC 2008.

4.8.7.30 Strzelecki National Park (Tasmania)

Strzelecki National Park, Flinders Island, Tasmania covers 4216 hectares in the south-western corner of Flinders Island (TPWS 2017b).

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.

4.8.7.31 Mt William National Park (Tasmania)

Mt William National Park is an important area for the conservation of Tasmania's coastal heathlands and dry sclerophyll plants. A variety of seabirds including gulls, terns, gannets, and albatrosses can be seen in the coastal park, as well as both the Pied and Sooty oystercatcher, the White-bellied sea eagle and the Wedge-tailed eagle (TPWS 2017c). The park also provides important habitat for migratory species such as Mutton birds, Silver-eyes and Swamp harriers.

4.8.7.32 Kent Group National Park and Kent Group Marine Reserve (Tasmania)

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 2017a). 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 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).

4.8.7.33 Bass Strait Islands in Tasmania

Protected areas on Bass Strait islands include Hogan Island Group (including a conservation area), Devils Tower Nature Reserve, Curtis Island Nature Reserve, Wright Rock Nature Reserve and Bass Pyramid Nature Reserve (DPIPWE, 2011, 2017a).

4.8.7.34 State Parks and Reserves on or near Flinders Island

Protected reserves on or near Flinders Island include Wingaroo Nature Reserve, Big Green Island Nature Reserve, Low Islets Nature Reserve and Moriarty Rocks Nature Reserve (DPIPWE 2017).

4.8.7.35 State Parks or Reserves on or near the north/east coast of Tasmania

Protected reserves on or near the north/east coast of Tasmania include Little Swan Island Nature Reserve, Little Waterhouse Island Nature Reserve, George Rocks Nature Reserve and Tenth Island Nature Reserve (DPIPWE 2017a). For an Ecological Character Description (ECD) of Little Water house Ramsar site see NRMNT 2012.

4.8.8 Conservation Values outside the Environmental Monitoring ZPI

4.8.8.1 Bunurong Marine National Park, Bunurong Marine Park, Bunurong Coastal Reserve (Victoria)

The main habitats protected by the marine national park include intertidal and subtidal soft sediment, extensive sandstone intertidal reefs, subtidal reefs (including extensive shallow reefs) and the water column.

A wide variety of birds are found in or near the park, including thirty-one conservation listed seabirds and shorebirds. The listed sea cucumber *Pentocnus bursatus*, which is only known from the Cape Patterson area, may also be found in the park.

4.8.8.2 Port Stephens Great Lakes Marine Park (NSW)

Port Stephens Great Lakes Marine Park’s marine life includes many species of dolphins, turtles, fish, invertebrates, seabirds and seaweeds along with threatened species such as the Gould’s petrel, little tern, grey nurse shark and green turtle. Humpback whales travel along the marine park coastline during their annual migration north to breeding grounds. Important oceanic islands, major estuarine wetlands and lake systems feature among a variety of park habitats (DPI 2017a).

Many significant Indigenous cultural and spiritual sites are located within or adjacent to the marine park including middens, burial sites and traditional campsites. Aboriginal association with the sea and land in the area dates back thousands of years and Indigenous people still gather food in the traditional way.

4.8.8.3 Towra Point Nature Reserve Ramsar Site (NSW)

Towra Point Nature Reserve lies on the northern side of Kurnell Peninsula, forming the southern and eastern shores of Botany Bay in New South Wales. It is the largest wetland of its type in the Sydney Basin region and represents vegetation types that are now rare in the area. It is an estuarine complex comprising a mixture of spits, bars, mudflats, dunes and beaches.

Towra Point meets four of the Ramsar Criteria: 2, 4 and 8 (as described in Section 0) and 3 (supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region).

Towra Point supports three nationally threatened species Magenta lilly pilly, Green and golden bell frog and Grey-headed flying fox (DoEE 2017v).

The reserve is recognised as one of the four most important migratory wading bird sites in NSW and Towra Spit Island was named the second most important breeding area in NSW for the little tern. Thirty-four species of migratory birds listed under international agreements have been recorded at Towra Point Nature Reserve, which provides critical habitat. The birds roost in saltmarsh within the Ramsar site and feed in the intertidal zone along the shoreline of Botany Bay to replenish their fat reserves before embarking on a long northward migration.

Towra Point Nature Reserve is an important area for maintaining the biodiversity of the Sydney region. Its seagrass beds, in conjunction with its mangrove and saltmarsh communities, provide critical shelter and food for juvenile fish and crustaceans. Species of fish such as common silver biddy, yellow bream and flat-tail mullet are found in high numbers at Towra Point and use the mangrove habitats exclusively during the vulnerable juvenile stage of their life cycle. Juvenile luderick also prefer the mangroves after an initial stage in the adjacent seagrass beds.

The use of saltmarsh areas by fish and birds allows nutrient cycling and energy transfer and demonstrates the ecological connectivity of the area. The tidal regime in Botany Bay supports the food web at Towra Point by exporting crab and crustacean larvae from saltmarsh to intertidal and subtidal areas, and by transporting detritus from seagrass meadows to intertidal and supratidal areas.

Middens, rock shelters, engravings, burial sites and other items of indigenous heritage have been found within Towra Point Nature Reserve. The Ramsar site is part of a dedicated Nature Reserve, with activities restricted to nature-based recreation such as bird-watching and fishing (DoEE 2017v). For an Ecological Character Description (ECD) of Towra Point Nature Reserve Ramsar Site see DECCW 2010.

4.8.8.4 Jervis Commonwealth Marine Park (NSW)

The Jervis Commonwealth 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.

4.8.8.5 Jervis Bay Marine Park (NSW)

There are a variety of habitats represented in the Jervis Bay Marine Park, which is home to a unique mix of tropical and temperate species including the weedy sea-dragon, eastern blue devil fish, whale, bottlenose dolphin, little penguin, fur seal and the endangered grey nurse shark.

Indigenous people have had strong ties to the Jervis Bay area over thousands of years and there are many sites of cultural significance to them within the marine park.

4.8.8.6 Lord Howe Commonwealth Marine Park (NSW)

The Lord Howe Commonwealth Marine Park covers an area of more than 110,000 square kilometres with a depth range from approximately <15 to 6000 metres. The reserve provides important habitat for humpback whales and a number of migratory seabirds and is a major seabird breeding area, with 14 species found on the islands including masked boobies, grey ternlets, red-tailed tropic birds, black-winged petrels and Kermadec petrels. Due to the convergence of warmer tropical and cooler temperate waters in the area of the reserve, many species found there are at the northern or southern extent of their range. Seafloor features represented in the reserve include basin, plateau, saddle, seamount/guyot and deep ocean valley. The reserve includes three key ecological features: The Lord Howe seamount chain (high productivity; aggregations of marine life; biodiversity and endemism); Elizabeth and Middleton reefs (aggregations of marine life; biodiversity and endemism) and Tasman Front and eddy field (high productivity; aggregations of marine life; biodiversity and endemism) (DPI 2017b, DoEE 2018d). Also see Section 4.8.8.7: Lord Howe Island Marine Park.

4.8.8.7 Lord Howe Island Marine Park (NSW)

Lord Howe Island is a narrow volcanic strip surrounded by several small, environmentally sensitive islets. The marine environment is internationally significant and features the world's southernmost coral reef. In 1982 Lord Howe Island and the surrounding waters were declared a World Heritage site, the first in NSW (DPI 2017b, DoEE 2018c).

4.8.9 Fish and Shellfish

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 recreational and commercial importance are covered in Section 4.10 and 4.14.

4.8.9.1 Fish species listed under the EPBC Act

Fish species listed under the EPBC Act that may occur in the VIC/P70 operational area and Operational ZPI are given in Table 4-10. Two fish species potentially occurring within the Operational ZPI were listed as 'vulnerable' under the EPBC Act; the Australian grayling (*Prototroctes maraena*) and the Black rockcod (*Epinephelus daemelii*) (DoEE 2017a). No EPBC Act listed threatened species were found to occur within the VIC/P70 operational area (DoEE 2018a,b,g).

Table 4-10 EPBC Act threatened and migratory fish potentially occurring in the VIC/P70 operational area and Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin-1[d]
Australian Grayling	*Prototroctes maraena*	V	MO	MO	-	-
Black Rockcod	*Epinephelus daemelii*	V	MO	MO	-	-

Status Key:
L–Listed marine species
V–Vulnerable (threatened)

Likelihood of Occurrence Key:
KO–Species or species habitat known to occur within area
LO–Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

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. Given that these species normally inhabit shallow reefs and kelp beds, they are not found within the VIC/P70 operational area itself but occur around adjacent shorelines in the Operational ZPI (Kuiter 2000).

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 (Figure 4-5) 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 VIC/P70 Operational ZPI 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).

4.8.10 Plankton Species

Plankton species, including both phytoplankton and zooplankton, are a key component in oceanic food chains. Phytoplankton are photosynthetic organisms that spend either part or all of their lifecycle drifting with the ocean currents. 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, and about 0.5 μg/L at the VIC/P70 operational area (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 comprised of small protozoa, crustaceans (such as krill) and the eggs and larvae from larger animals. 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 VIC/P70 Operational area (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).

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.

4.8.11 Benthic Fauna

Benthic fauna in the VIC/P70 operational area and Operational ZPI are varied, and include the following species that exist on the flat sandy seabed:

- Sessile fauna including sponges and bryozoa, hydroids, ascidians, poriferans and mobile fauna including hermit crabs and octopus;
- Benthic infauna including 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).

Parry *et al*. (1990) found high diversity and patchiness of benthos sampled off Lakes Entrance, where a total of 353 species of infauna were 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, and concluded that benthic infauna such as crustaceans and polychaete worms had some small burrows and bioturbation mounds within the area. These burrows and bioturbation mounds were observed on natural sediment as well as on cuttings. Given the lack of hard substrate, there was little to no colonisation of the seabed by benthic marine invertebrates such as bryozoans, ascidians and poriferans (Coffey 2010).

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 metres (m) isobath off eastern Victoria and NSW (Patil *et al*. 2004).

4.8.12 Sharks and Rays

Shark and ray species listed under the EPBC Act that may occur in the VIC/P70 operational area and Operational ZPI are given in Table 4-11. Three shark species potentially occurring within the Operational ZPI were listed as 'threatened' under the EPBC Act; the Grey nurse shark (east coast population) (*Chacharias taurus*), the Great white shark (*Carcharodon carchari*) and the Whale shark (*Rhincodon typus*) (DoEE 2017a). The Great white shark was also identified as known to occur within the VIC/P70 operational area (DoEE 2018a,b,g).

Table 4-11 EPBC Act threatened and migratory sharks and rays potentially occurring in the operational area and Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin-1[d]
Great white shark	*Carcharodon carcharias*	V, MM	BKO	FKO	KO	LO
Grey nurse shark (east coast population)	*Chacharias taurus*	CE	MO	MO	-	-
Mackerel shark (Porbeagle)	*Lamna nasus*	MM	LO	LO	LO	LO
Whale shark	*Rhincodon typus*	V, MM	MO	MO	-	-
Shortfin mako	*Isurus oxyrinchus*	MM	LO	LO	LO	LO

Status Key:
MM–Migratory marine species
V–Vulnerable (threatened)
CE – Critically Endangered

Likelihood of Occurrence Key:
BKO–Breeding known to occur within area
FKO–Feeding known to occur within area
KO–Species or species habitat known to occur within area
LO–Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

The Grey nurse shark (east coast population) (*Chacharias taurus*) is commonly found in coastal waters off southern Queensland and along the entire NSW coast (Environment Australia, 2002). The species is rarely found travelling in the northern section of the Commonwealth south-east marine bioregion (DoEE 2015) and is uncommon in Victorian, South Australian and Tasmanian waters. Not much is known about the migratory habits of Grey nurse sharks in Australian waters, however evidence suggests migrational movement is up and down the east coast. The sharks are found mainly in warmer waters, in water depths of 15 to 40 m but also down to 230 m on the continental and generally occur either alone or in small to medium sized groups (Environment Australia 2002).

The Great white shark (*Carcharodon carcharias*) is normally found in nearshore waters around the areas of rocky reefs and seal colonies. Studies of great white sharks indicate that they are largely transitory. Observations of adult sharks are more frequent around seal and sea lion colonies, at onshore locations including Wilson's Promontory and The Skerries. There is a tendency for juveniles to occur in different areas to adults and these are most likely pupping grounds. In Victoria the areas off Portland and Ninety Mile Beach are seasonally important to juveniles and are frequented between the months of December and June (Holliday 2003). Given their transitory nature and the proximity of known congregation areas it is likely that Great white sharks may transit the VIC/P70 operational area on occasion.

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 VIC/P70 operational area.

Two other species of shark, Shortfin mako (*Isurus oxyrinchus*) and Porbeagle or Mackerel shark (*Lamna nasus*), are listed as migratory marine species under the EPBC Act, likely to occur in the Operational ZPI and operational area.

4.8.13 Reptiles

Reptiles listed under the EPBC Act that may occur in the operational area and Operational ZPI are given in Table 4-12. Three threatened species of turtle, the Loggerhead turtle (*Caretta caretta*) (endangered and migratory), the Leatherback turtle (*Dermochelys coriacea*) (endangered and migratory) and the Green turtle (*Chelonia mydas*) (vulnerable and migratory) are listed as potentially having habitat in the VIC/P70 operational area and Operational ZPI (DoEE 2017e and 2017d). In addition to these species, the Hawksbill turtle (*Eretmochelys imbricata*) (vulnerable) is also listed as threatened and potentially occurring in the Operational ZPI.

The Loggerhead turtle occurs in Australian waters of coral and rocky reefs, seagrass beds and muddy bars throughout eastern, northern and western Australia. Nesting is mainly concentrated in southern Queensland and from Shark Bay to the North West Cape in Western Australia, which are not in the Operational ZPI. Foraging areas are more widely distributed, but also not expected to be present in the Operational ZPI (DoEE 2017d).

The Leatherback turtle is a pelagic feeder found in tropical, sub-tropical and temperate waters. The species is regularly found in the high latitudes of all oceans including waters offshore from NSW, Victoria, Tasmania and Western Australia. Bass Strait is considered to have one of the three largest concentrations of feeding Leatherback turtles in Australia (Parks Victoria, 2017n); however, even though they have not been seen anecdotally in the operational area in the last five years, they may occur in the operational area. No major nesting areas have been recorded in Australia, although scattered isolated nesting occurs outside the Operational ZPI in southern Queensland and the Northern Territory (DoEE 2017j).

The Green turtle are mostly known to nest, forage and migrate across tropical northern Australia. Their distribution in Australia is concentrated around Queensland, the Northern Territory and Western Australia. Green turtles can migrate more than 2,600 km between their feeding and nesting grounds.

The Hawksbill turtle (*Eretmochelys imbricata*) typically occurs in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Other feeding areas include Torres Strait and the archipelagos of the Northern Territory and Western Australia, possibly as far south as Shark Bay or beyond. Hawksbill turtles also feed at Christmas Island and the Cocos (Keeling) Islands. (DoEE 2017g). It is not expected in the VIC/P70 operational area although it may occur further inshore.

Table 4-12 EPBC Act threatened and migratory reptiles potentially occurring in the operational area and Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin-1[d]
Green turtle	*Chelonia mydas*	V, MM, L	KO	KO	LO	LO
Hawksbill turtle	*Eretmochelys imbricata*	V, MM, L	KO	KO	-	-
Leatherback turtle	*Dermochelys coriacea*	E, MM, L	KO	KO	LO	LO
Loggerhead turtle	*Caretta caretta*	E, MM, L	LO	LO	LO	LO

Status Key:
E–Endangered (threatened)
MM–Migratory marine species
V–Vulnerable (threatened)

Likelihood of Occurrence Key:
LO–Species or species habitat likely to occur within area
KO– Species or species habitat known to occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

4.8.14 Birds

Birds listed under the EPBC Act that may occur in the VIC/P70 operational area and Operational ZPI are given in Table 4-13. Many are protected by international agreements (Bonn Convention, JAMBA, CAMBA and ROKAMBA) and periodically pass through the Operational ZPI on their way to or from the Bass Strait islands and mainlands of Victoria, NSW and Tasmania.

Table 4-13 EPBC Act threatened and migratory birds potentially occurring in the operational area and Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin-1[d]
Antipodean albatross	*Diomedea antipodensis*	V	FLO	FLO	LO	LO
Australian fairy tern	*Sternula nereis nereis*	V	FLO	FLO	-	-
Black-browed albatross	*Thalassarche melanophris*	V, MM	FLO	FLO	MO	MO
Blue petrel	*Halobaena caerulea*	V	MO	MO	MO	MO
Buller's albatross	*Thalassarche bulleri*	V, MM	FLO	FLO	MO	MO
Campbell albatross	*Thalassarche impavida*	V	FLO	FLO	LO	LO
Chatham albatross	*Thalassarche eremita*	E	FLO	FLO	LO	LO
Common sandpiper	*Actitis hypoleucos*	MW	MO	MO	MO	MO
Curlew sandpiper	*Calidris ferruginea*	CE, MW	MO	MO	MO	MO
Eastern curlew	*Numenius madagascariensis*	CE, MW	MO	MO	MO	MO
Fairy prion	*Pachyptila turtur subantarctica*	V	MO	MO	MO	MO
Flesh-footed shearwater	*Puffinus carneipes*	MM	FLO	FLO	FLO	FLO
Fork-tailed swift	*Apus pacificus*	MM	LO	LO	-	-
Gibson's albatross	*Diomedea (antipodiennsis) gibsoni*	V	FLO	FLO	LO	LO
Gould's petrel	*Pterodroma leucoptera (P l leucoptera)*	E	MO	MO	MO	MO
Grey-headed albatross	*Thalassarche chrysostoma*	E, MM	MO	MO	MO	MO
Northern Buller's albatros	*Thalassarche bulleri platei*	V	FLO	FLO	MO	MO
Northern giant-petrel	*Macronectes halli*	V, MM	MO	MO	MO	MO
Northern royal albatross	*Diomedea sanfordi*	E	FLO	FLO	LO	LO
Osprey	*Pandion haliaetus*	MW	MO	MO	-	-
Pacific albatross	*Thalasarche* sp. nov.	V	FLO	-	MO	-
Pectoral sandpiper	*Calidris melanotos*	MW	MO	MO	MO	MO
Red knot	*Calidris canutus*	E, MW	MO	MO	MO	MO
Salvin's albatross	*Thalassarche salvini*	V	FLO	FLO	LO	LO
Sharp-tailed sandpiper	*Calidris acuminate*	MW	MO	MO	MO	MO
Sooty albatross	*Phoebetria fusca*	V, MM	MO	MO	MO	MO
Southern giant-petrel	*Macronectes giganteus*	E, MM	MO	LO	MO	MO
Southern royal albatross	*Diomedea epomophora*	V, MM	FLO	FLO	LO	LO
Tasmanian shy albatross	*Thalassarche (cauta) cauta*	V, MM	FLO	FLO	LO	LO
Wandering albatross	*Diomedea exulans*	V, MM	FLO	FLO	LO	LO
White-capped albatross	*Thalassarche (cauta) steadi*	V	FLO	FLO	LO	LO

White bellied storm petrel	*Fregetta grallaria grallaria*	V	LO	LO	LO	LO

Status Key:
E–Endangered (threatened)
V–Vulnerable (threatened)
CE-Critically endangered (threatened)
MM–Migratory marine species
MW–Migratory wetland species

Likelihood of Occurrence Key:
FLO-Feeding likely to occur within area
LO–Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

The Victorian coast and neighbouring islands 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.

No islands are located within the Operational ZPI, although 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 to the west of the operational area 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*). Recent research investigating feeding movements of the little penguin has found individuals that nest on these islands move into eastern Bass Strait (Hoskins *et al*. 2008). Eastern Bass Strait is also a foraging area for at least 16 listed species of albatross, six listed species of petrel and one species of skua. Most also forage in eastern Bass Strait within the Operational ZPI and are expected to occur within the VIC/P70 operational area (Table 4-13). The BIA for many of the migratory marine birds overlap the Operational ZPI and VIC/P70 operational area (Section 4.8.2 and Figure 4-7).

The Operational ZPI excludes the state waters and any of the wetlands along the Gippsland basin. Nearby wetlands periodically inhabit waders (birds), such as Corner Inlet and the Gippsland Lakes due to their migratory nature. Migratory species include the red-necked stint (*Calidris ruficollis*), curlew sandpiper (*Calidris ferruginea*), great knot (*Calidris tenuirostris*), bar-tailed godwit (*Limosa lapponica*) and eastern curlew (*Numenius madagascariensis*). Similarly, a number of oceanic seabirds, such as the little tern (*Sterna albifrons*), crested tern (*Sterna bergii*) and short-tailed shearwater (*Puffinus tenuirostris*) migrate to the East Gippsland region. Over 20 million short-tailed shearwaters nest on Bass Strait islands during summer (Pizzey 2003). Of these, only the curlew sandpiper (*Calidris ferruginea*), and eastern curlew (*Numenius madagascariensis*) may also occur in the VIC/P70 operational area.

Both the hooded plover (*Thinornis rubricollis*) and Australian fairy tern (*Sternula nereis nereis*) nest along the sandy beaches of the Gippsland coast. Nests are predominantly located in the adjacent sparsely vegetated dunes above the high tide level (DoEE 2017h and 2017i) but are not expected within the VIC/P70 operational area.

Little penguins (*Eudyptula minor*) breed in colonies along the southern coast of Australia. They seek prey in shallow short dives, frequently between the 10 to 30 m range and very occasionally extending to 60 m. Its diet varies in different locations but consists mainly of small school fish, some squid or krill (shrimp-like crustaceans). Little penguin colonies can be found at Gabo Island, Tullaberga Island, The Skerries, Rabbit Island, Monkey Point (Wilsons Promontory), Seal Island, Notch Island, Rag Island, Hogan Island Group (Tas.), Curtis Island (Tas) (DoEE 2017m) but are not expected within the Operational ZPI or the VIC/P70 operational area.

It is common to see some migratory birds rest on offshore facilities in the Gippsland Basin before continuing on their migratory flight, however, the presence of the operational area does not appear to significantly disrupt or divert their migratory route or disorient the birds.

4.8.15 Seals

Seals listed under the EPBC Act that may occur in the operational area and Operational ZPI are given in Table 4-14. Dugongs are not expected to occur within the operational area or Operational ZPI. The two species of seal, the Australian fur seal (*Arctocephalus pusillus*) and the New Zealand fur seal (*Arctocephalus forsteri*), do not carry a threatened status under Commonwealth legislation (DoEE 2017j) or Victorian State legislation. Seals are frequently seen throughout Esso's oil and gas operational areas and are usually found resting on the operational area structures and swimming in the vicinity but are not expected within the VIC/P70 operational area.

The 2010 estimate of pup numbers (Kirkwood *et al*. 2010) placed the total number of Australian fur seal pups at 26,000, which increased since 2002. 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 in the Operational ZPI 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.

Table 4-14 EPBC Act listed seals potentially occurring in the operational area and Operational ZPI (Note: No threatened and migratory seals present)

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin-1[d]
Australian fur seal	*Arctocephalus pusillus*	L	LO	LO	-	-
New Zealand fur seal	*Arctocephalus forsteri*	L	MO	MO	-	-

Status Key:
L–Listed marine species

Likelihood of Occurrence Key:
LO- Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

In addition to the colonies, Australian fur seals have over 50 'haul out' or resting sites around south eastern Australia. Pups are not typically born at 'haul out' sites.

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. Australian fur seals are not expected further offshore, within the VIC/P70 operational area.

The New Zealand fur seal also breeds along the south-eastern coast of Australia, ashore (generally on remote islands), and feeds at sea, mostly on cephalopods and fish. Despite breeding in south-eastern waters, the largest populations are found outside Bass Strait on Macquarie Island. This seal may occur within the Operational ZPI, but not within the VIC/P70 operational area.

4.8.16 Cetaceans

Cetaceans listed under the EPBC Act that may occur in the VIC/P70 operational area and Operational ZPI are given Table 4-15. Under the EPBC Act all cetaceans (whales, dolphins and porpoises) are protected in Australian waters. The Australian Whale Sanctuary includes all Commonwealth waters from the 3 nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e., out to 200 nautical miles and further in some places) and within the Sanctuary it is an offence to kill, injure or interfere with a cetacean. All states and territories also protect whales and dolphins within their waters (DoEE 2017l).

Blue whales have extensive migration patterns that are not known to follow any particular coastlines or oceanographic features (Bannister *et al.* 1996). However, they are most likely to be present from November through to December as a result of migration to warmer waters. Blue whales are observed more frequently in western Victoria and southeast South Australia, where they occur along the continental shelf break (Gill 2002; Gill & Morrice 2003) (Figure 4-10). While eastern Bass Strait is not known as a feeding or aggregation area for this mammal species, feeding areas do occur at upwelling locations where nutrient enriched water and krill occur. Irregular upwellings are known to occur at Eden (NSW), however, sightings of blue whales in the Gippsland Basin are reasonably rare (Bannister *et al.* 1996). The VIC/P70 operational area is not located close to any important blue whale habitat.

Table 4-15 EPBC Act threatened and migratory cetaceans potentially occurring in the operational area and Operational ZPI

Common Name	Scientific Name	Status	Likelihood of Occurrence			
			Operational ZPI		Operational Area	
			Baldfish-1/ Hairtail-1[a]	Sculpin-1[b]	Baldfish-1/ Hairtail-1[c]	Sculpin[d]
Dolphins						
Dusky dolphin	*Lagenorhynchus obscurus*	MM	LO	LO	LO	LO
Whales						
Antarctic minke whale	*Balaenoptera bonaerensis*	MM	LO	LO	LO	LO
Blue whale	*Balaenoptera musculus*	E, MM	LO	LO	LO	LO
Bryde's whale	*Balaenoptera edeni*	MM	MO	MO	MO	MO
Fin whale	*Balaenoptera physalus*	V, MM	FLO	FLO	FLO	LO
Humpback whale	*Megaptera novaeangliae*	V, MM	FKO	FKO	KO	LO
Killer whale, Orca	*Orcinus orca*	MM	LO	LO	LO	LO
Pygmy right whale	*Caperea marginata*	MM	FLO	FLO	FLO	FLO
Sei whale	*Balaenoptera borealis*	V, MM	FLO	FLO	FLO	LO
Southern right whale	*Eubalaena australis*	E, MM	KO	KO	MO	MO
Sperm whale	*Physeter macrocephalus*	MM	MO	MO	MO	MO

Status Key:
C–Listed cetacean species
E–Endangered (threatened)
MM–Migratory marine species
MT–Migratory terrestrial species
V–Vulnerable (threatened)

Likelihood of Occurrence Key:
FLO–Foraging likely to occur within area
FKO–Foraging known to occur within area
LO–Species or species habitat likely to occur within area
MO–Species or species habitat may occur within area
KO–Species or species habitat known to occur within area

Notes:
a-EPBC Act Protected Matters Report of Sept 18 (Baldfish-1/Hairtail -1 Operational ZPI) (DoEE 2017a)
b-EPBC Act Protected Matters Report of January 2019 (Sculpin -1 Operational ZPI) (DoEE 2019b)
c-EPBC Act Protected Matters Report of Sept 18 (2 NM buffer around Baldfish-1/Hairtail -1 well) (DoEE 2018a,b)
d-EPBC Act Protected Matters Report of January 2019 (2 NM buffer around Sculpin -1 well) (DoEE 2019a)

The Blue whale (*Balaenoptera musculus*) has four subspecies, two of which occur within Australian waters (Rice 1998), these include the Antarctic blue whale (*B. m. intermedia*) or 'true' blue whale and the Pygmy blue whale (*Balaenoptera musculus brevicauda*). The Bonney Upwelling (Great Australian Bight, between Ceduna, South Australia, and Portland, Victoria) is a known Blue Whale aggregation area. Bass Strait and the waters of the eastern Great Australian Bight are also known feeding areas (Gill 2002, DoEE 2018c). The BIA for the Pygmy blue whale overlaps with the Operational ZPI and straddles the VIC/P70 operational area (Section 4.8.2 and Figure 4-7).

Southern right whales (*Eubalaena australis*) travel along the southern coast of Australia in winter and spring (Kemper *et al.* 1997). They migrate annually along the eastern coastline from high latitude feeding grounds to lower latitudes for calving between mid-May and September (DoEE 2017k). Winter, in particular, is the peak for southern right whale abundance, especially along the southern coast of Australia (Kemper *et al.* 1997). At this time, calving adult females are spotted frequently nearshore in shallow, northeast trending bays over sandy bottoms (Bannister *et al*. 1996). Although sighted along the Gippsland coast during migration, the known southern right whale calving and nursery zone is located in the nearshore waters of western Victoria around Warrnambool, a considerable distance from the operational area and outside of the Operational ZPI (Figure 4-10). The nearest BIA for southern right whales, is largely restricted to Victorian state waters, outside of the Operational ZPI (Section 4.8.2 and Figure 4-7).

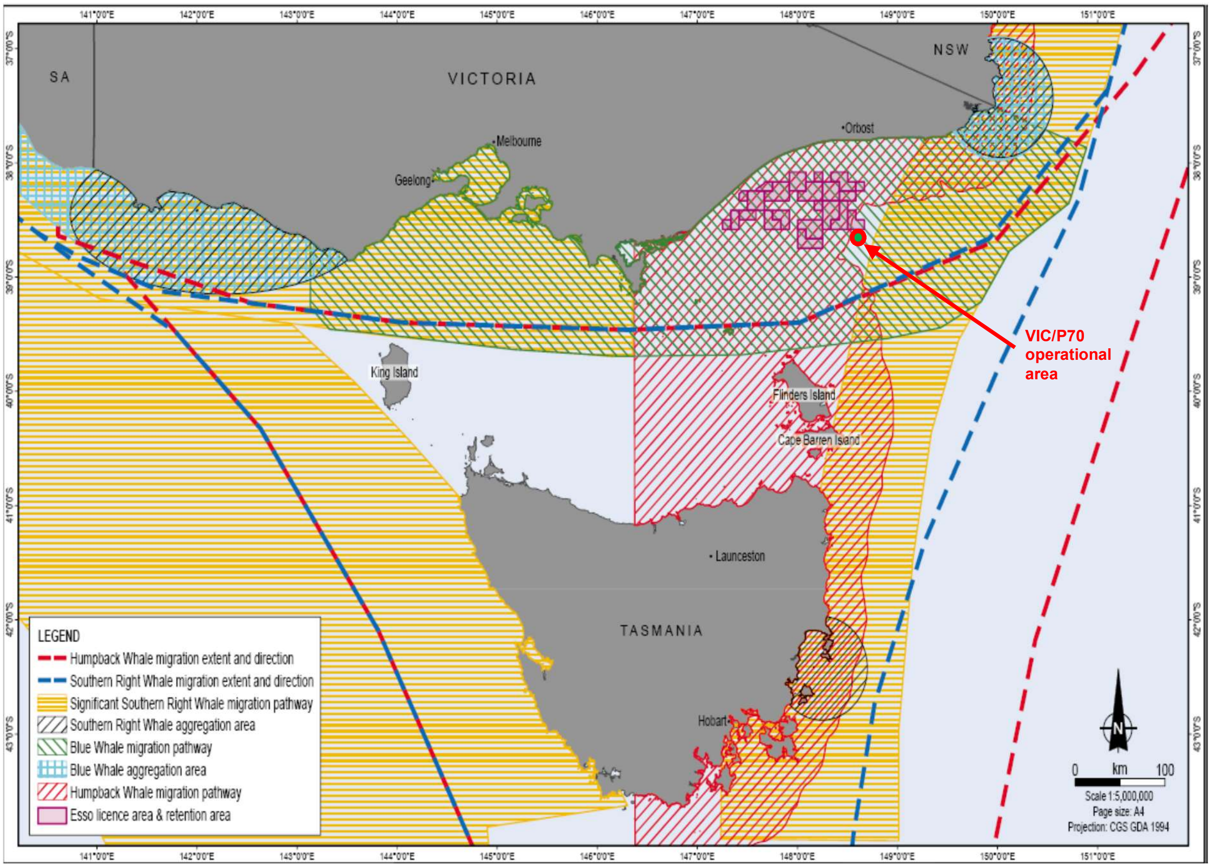


Figure 4-10 Whale migration pathways and aggregation around the VIC/P70 operational area

Table 4-16 Whale Migration in Bass Strait region

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Baldfish-1 /Hairtail-1												
Sculpin-1												
Blue whales												
Southern right whales												
Humpback whales												

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 (Table 4-16). 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 and into the VIC/P70 operational area (Figure 4-10). 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). Humpback whales (*Megaptera novaeangliae*) are regularly spotted from Esso's operational areas within the Gippsland Basin Exclusion Zone. The nearest BIA for humpback whales, along the NSW coastline, lies outside of the Operational ZPI (Section 4.8.2 and Figure 4-7).

The Bottle-nosed dolphin (*Tursiops truncatus*) and the Common dolphin (*Delphinus delphis*) are commonly sighted in near-shore Victorian waters and may be in the Operational ZPI; however they do not carry a threatened status under Commonwealth legislation (DoEE 2017j). These species feed on fish and cephalopods.

Dusky dolphins (*Lagenorhyynchus obscurus*) are listed as a migratory marine species likely to be present in the vicinity of the VIC/P70 operational area and Operational ZPI; however they do not carry a threatened status under Commonwealth legislation (DoEE 2017j). Although dusky dolphins have been sighted off Tasmania, there is no known calving locality for this species in Australian waters (Gill *et al.* 2000).

Whales are known, and observed, to play and display normal breaching, blowing, lobtailing and diving behaviour around the operational area and vessels, including with calves, before moving on again. Although whales are known to migrate through the region during spring and autumn/early winter, the VIC/P70 operational area is not a recognised feeding, breeding or resting area for cetaceans.

4.8.17 Listed threatened species recovery plans

The requirements of the species recovery plans and conservation advices (Table 4-17) have been considered to identify any requirements that may be applicable to the risk assessment (Chapter 6). Recovery plans are enacted under the EPBC Act and remain in force until the species is removed from the threatened list. Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to facilitate the conservation of a listed species or ecological community.

Table 4-17 outlines the recovery plans and conservation advices relevant to those species identified as potentially occurring within or utilising habitat in the operational area and Operational ZPI by the EPBC Protected Matters search (see Section 4.7 to 4.8.16) and summarises the key threats to those species, as described in relevant recovery plans and conservation advices.

Table 4-17 Conservation advice for EPBC listed species and other environmental and heritage sensitivities considered during environmental risk assessment

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
Marine mammals				
Blue whale	Conservation Management Plan for the Blue Whale - A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2015)	Noise interference, vessel disturbance	• Evaluate risk of sound impacts to cetaceans and, if required, ensure appropriate mitigation measures are implemented • Evaluate risk of vessel strikes and, if required, ensure appropriate mitigation measures are implemented • Ensure all vessel strike incidents are reported in the National Vessel Strike Database	6.13 6.23
Fin whale	Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC 2015c)	Noise interference, vessel disturbance	• Once the biologically important areas for fin whales are defined (both spatial and temporal aspects) an assessment of anthropogenic noise impact should be conducted for this species • Develop a national vessel strike strategy that investigates the risk of vessel strikes on fin whales and also identifies potential mitigation measures • Evaluate risk of sound impacts to cetaceans and, if required, ensure appropriate mitigation measures are implemented • Evaluate risk of vessel strikes and, if required, ensure appropriate mitigation measures are implemented • Ensure all vessel strike incidents are reported in the National Vessel Strike Database	6.13 6.23
Humpback whale	Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC 2015e)	Noise interference, vessel disturbance	• Ensure the risk of vessel strike on humpback whales is considered when assessing actions that increase vessel traffic in areas where humpback whales occur and, if required appropriate mitigation measures are implemented to reduce the risk of vessel strike • Evaluate risk of sound impacts to cetaceans and, if required, ensure appropriate mitigation measures are implemented • Ensure all vessel strike incidents are reported in the National Vessel Strike Database	n/a –noise modelling would not reduce potential impact of noise to cetaceans given the low levels expected 6.13 6.23
Sei whale	Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC 2015)	Noise interference, vessel disturbance	• Evaluate risk of sound impacts to cetaceans and, if required, ensure appropriate mitigation measures are implemented • Evaluate risk of vessel strikes and, if required, ensure appropriate mitigation measures are implemented • Ensure all vessel strike incidents are reported in the National Vessel Strike Database	6.13 6.23

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
Southern right whale	Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 (DoSEWPC 2012)	Noise interference, vessel disturbance	• Evaluate risk of sound impacts to cetaceans and, if required, ensure appropriate mitigation measures are implemented • Evaluate risk of vessel strikes and, if required, ensure appropriate mitigation measures are implemented • Ensure all vessel strike incidents are reported in the National Vessel Strike Database	6.13 6.23
Marine reptiles				
Loggerhead turtle Green turtle Hawksbill turtle	Recovery plan for marine turtles in Australia (DoEE 2017)	Vessel disturbance, oil pollution	• Vessel interactions identified as a threat. No explicit relevant management actions relating to vessels prescribed in the plan • Ensure that spill risk response programs and strategies include management turtles and turtle habitats	6.13 6.23 6.28 6.29 6.31 6.32 6.34
Leatherback turtle	Recovery plan for marine turtles in Australia (DoEE 2017) Commonwealth Conservation Advice on *Dermochelys coriacea* (TSSC 2008)	Vessel disturbance	• No explicit relevant management actions. Vessel interactions identified as a threat	
Fish, sharks and rays				
Grey nurse shark (east coast population)	Recovery Plan for the Grey Nurse Shark *(Carcharias taurus)* (DoE 2014)	Habitat modification and pollution	• No explicit relevant management actions	n/a
Great white shark	Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPC 2013)	None	• No explicit relevant management actions	n/a
Whale shark	Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC 2015g)	Vessel disturbance, habitat degradation / modification	• Assess impacts to whale sharks from offshore installations and associated environmental changes (chronic noise, light spill, water temperature changes, altered nutrient levels) and the mitigation measures required • Evaluate risk of vessel interactions and ensure appropriate mitigation measures are implemented if required (collision avoidance systems) • Minimise offshore development and transit of large vessels near habitats which correlate with whale shark aggregations and migration routes	n/a – no installation
Seabirds				
Antipodean albatross, Gibson's albatross, Southern Royal albatross, Wandering albatross, Northern Royal albatross, Sooty	National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DoSEWPC 2011b)	Vessel disturbance, oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.13 6.23 6.28 6.29 6.31 6.32

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
albatross, Buller's albatross, Shy albatross, White-capped albatross, Grey-headed albatross, Chatham albatross, Campbell albatross, Black-browed albatross, Salvin's albatross				6.34
Australian fairy tern	Commonwealth Conservation Advice on *Sternula nereis nereis* (Fairy Tern) (TSSC 2011)	Habitat degradation / modification - oil pollution	• Ensure appropriate oil-spill contingency plans exist to manage subspecies' breeding sites which are vulnerable to oil spills	6.28 6.32 6.34
Australian painted snipe	There is no adopted or made Recovery Plan for this species.	Habitat degradation / modification - oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Blue petrel	Conservation Advice *Halobaena caerulea* blue petrel (TSSC 2015a)	None	• No explicit relevant management actions	n/a
Curlew sandpiper	Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (TSSC 2015d)	Habitat degradation - oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Eastern curlew	Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC 2015f)	Habitat degradation / modification - oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Fairy prion (southern)	Conservation Advice *Pachyptila turtur subantarctica* fairy prion (southern) (TSSC 2015b)	None	• No explicit relevant management actions	n/a
Fork-tailed swift	There is no adopted or made Recovery Plan for this species	None	• No explicit relevant management actions	n/a
Gould's petrel	Gould's Petrel (*Pterodroma leucoptera leucoptera*) Recovery Plan (DoEC (NSW) 2006)	Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Little tern	There is no adopted or made Recovery Plan for this species	Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Osprey	There is no adopted or made Recovery Plan for this species	Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Pectoral sandpiper	There is no adopted or made Recovery Plan for this species	Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
Red knot, knot	Approved Conservation Advice for *Calidris canutus* (Red knot) (TSSC 2016a)	Habitat degradation - oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Red knot, Bar-tailed godwit	Wildlife conservation plan for migratory shorebirds (Commonwealth of Australia 2015c)	Habitat degradation / modification - oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.32 6.29 6.34
Sharp-tailed sandpiper	There is no adopted or made Recovery Plan for this species	Oil pollution	• No explicit relevant management actions. Oil pollution is recognised as a threat	6.28 6.32 6.34
Southern giant petrel, Northern giant petrel	National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DSEWPC 2011)	Vessel disturbance, oil pollution	• Evaluate risk of oil spill impact to nest locations and implement appropriate mitigation measures if required	6.28 6.32 6.34
White-bellied storm-petrel (Tasman Sea)	Lord Howe Island Biodiversity Management Plan (DoECC (NSW) 2007)	Habitat degradation / modification	• No explicit relevant management actions. Degradation / modification to threatened habitat recognised as a threat	6.28 6.32 6.34
Commonwealth marine parks.				
Plans of management for Commonwealth marine parks.	Director of National Parks 2013, South-east Commonwealth Marine Parks Network management plan 2013-23, Director of National Parks, Canberra.	South-east Commonwealth Marine Parks Network: SE CMR MP 2013 lists the following CMPs: • Apollo CMP • Beagle CMP • Boags CMP • East Gippsland CMP • Flinders CMP • Franklin CMP • Freycinet CMP • Huon CMP • Macquarie Island CMP • Murray CMP • Nelson CMP • South Tasman Rise CMP • Tasman Fracture CMP • Zeehan CMP Of these, none are within the Operational ZPI (EP Figure 4-1), while Beagle, East Gippsland and Flinders CMP fall within the Environmental Monitoring ZPI (Figure 4-3).	The plan lists 7 strategies: 1. **Improve knowledge** and understanding of the conservation values of the Marine Reserves Network and of the pressures on those values 2. **Minimise impacts** of activities through effective assessment of proposals, decision-making and management of reserve-specific issues 3. **Protect** the conservation values of the Marine Reserves Network through management of environmental incidents 4. Facilitate **compliance** with this Management Plan through education and enforcement 5. Promote **community understanding** of, and stakeholder participation in, the management of the Marine Reserves Network 6. Support **involvement of Indigenous people** in management of Commonwealth Marine Parks 7. **Evaluate and report** on the effectiveness of this Management Plan through monitoring and review. Of these, Strategy 1 (scientific monitoring), 2 (stakeholder consultation) and 3 (reporting and responding to environmental incidents) are relevant in case of a spill event, where measurable impacts may occur to any of the CMPs.	• EP Section 7.56 (OSMP); • EP Chapter 7; Emergency Response Planning; Section 8.6; Reporting and Inspections; Chapter 9: Stakeholder consultation. • Section 9; Incident Reporting. • OPEP (Chapter 4: Notifications; Chapter 5: MES).

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
World Heritage properties and National Heritage Places				
Plans of management for World Heritage properties, or National Heritage Places, including Indigenous and historic heritage.	• The Commonwealth Heritage List. • World Heritage listing. • National heritage list	**The Commonwealth Heritage List:** The Commonwealth Heritage List is a list of natural, Indigenous and historic heritage places owned or controlled by the Australian Government. **World Heritage listing:** Sites accepted to the World Heritage listing are only inscribed if considered to represent the best examples of the world's cultural and natural heritage. There are no World Heritage properties that intersect with the ZPI. **The National Heritage list:** The National Heritage list is Australia's list of natural, historic and Indigenous places of outstanding significance to the nation. There are no National Heritage properties that intersect with the ZPI.	No actions required on indigenous or indigenous heritage as no impact is predicted. CMP addressed above. Other natural heritage actions outlined in the sensitivities summarised above.	• World heritage: Section xx. • Historic heritage: Section 4.15. • Indigenous heritage: Section 4.15. • Natural heritage: Chapter 4 (see above).
EPBC Act				
EPBC Act-related Guidelines	EPBC Act	Relevant guidelines/policies are considered in the management of impacts and risks (e.g. EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales: Industry guidelines). Various threatened and/or migratory species were identified within the ZPI.	**Cetacean interactions**: preventative actions as per EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 (Part 3(9)). **Seismic activities**: preventative actions as per EPBC Act Policy Statement 2.1. Other conservation actions summarised by risk element in Chapter 6.	• Section 6.13 (interaction with fauna). • Section 6.23 (Noise and light). • Chapter 6: (other conservation actions)
Ramsar wetlands				
Ramsar wetland ecological character descriptions	Ramsar wetland ecological character descriptions	There are no Ramsar wetlands that have coastal boundaries intersecting with the Operational ZPI. The following wetlands lie within the ecological monitoring ZPI: • Gippsland Lakes Ramsar site • Corner Inlet Ramsar site	**Operational ZPI**: No actions required. **Ecological ZPI**: See OSMP S10.	Chapter 4: Description of the Environment. Ramsar sites are listed in Section 4.8.6: Gippsland Lakes, Corner Inlet, Little Waterhouse, Flood Plain Lower Ringarooma River. Logan Lagoon, East Coast Cape Barren

Species / Sensitivity	Recovery Plan / Conservation Advice (Date Issued)	Key Threats Identified in the Recovery Plan / Conservation Advice	Relevant Conservation Actions	Relevant Section of EP
				Island, Towra Point Nature Reserve. Long term impacts to Ramsar values addressed in OSMP, S10.
Key Ecological Features (KEF) and Biological Important Areas (BIA)				
Key Ecological Features (KEF) Biological Important Areas (BIA)	Marine bioregional plan. DoEE 2015b. Conservation Values Atlas.	Two KEFs were identified within the Operational ZPI (Big Horseshoe Canyon; Upwelling East of Eden). BIAs for whales and seabirds were identified within the ZPI.	Marine bioregional plans are identified and considered in the EP.	Chapter 4: Description of the Environment. Section 4.8: Conservation Values

4.9 Nearshore and Shoreline Environments

The Operational ZPI does not extend into Victorian state waters and no shoreline impact is expected based on the oil spill modelling (Section 4.2), therefore description of the nearshore and shoreline environments of the Gippsland basin have largely been omitted from this EP. However, for completeness, further details on the Gippsland basin shoreline, between Nooramunga Marine Coastal Park (east of Wilsons Promotory National Park) and Cape Howe Marine National Park (near the NSW border), have been included below.

The shoreline, from Wilson's Promontory in the west to Cape Howe in the east, including the offshore islands at the extremities of the region, consists mainly of steep rock, sand beaches and rocky outcrops. The shoreline is generally one of high sea activity due to prevailing weather patterns.

The coastline of the Gippsland Region is a mixture of rocky outcrops and long stretches of high energy beaches. There are some short lengths of beach, particularly on the Eastern shore of Wilsons Promontory where the action of the sea is considerably less than the more open beaches.

The shoreline of the inland waters in the Operational ZPI which include Corner Inlet, the Gippsland Lakes and Mallacoota Inlet consist of sandy beach, salt marsh, mangrove or mudflats. These shores are generally protected from all but the worst weather conditions and therefore have very low sea activity.

Nearshore environments include:

- Intertidal rocky shores.
- Intertidal, emergent, sub tidal aquatic vegetation.
- Sheltered intertidal flats and bare sediment (mudflats).
- Marshes.
- Mangroves.
- Sandy beaches and dunes.
- Cliffs/exposed rocky headlands.
- International, national, state, regional or coastal sites of significance or sensitivity (see Section 4.9.3).

4.9.1 Subtidal Rocky Reefs

This habitat occurs either as extensions of intertidal rocky shores or as isolated offshore reefs. They are scattered throughout Operational ZPI waters from the low-water mark to a depth of 100 m. The rocky reefs of southern Australia support a highly endemic marine flora and fauna. Over 1,400 species of algae have been recorded from southern Australia, with 70% endemic to the area (ParksVic 2017m). The shallow reefs (0 to 20 m) are dominated by kelps or other brown seaweeds. Bubble kelp (*Phyllospora* sp.) and leather kelp (*Ecklonia* sp.) combine to cover many of the exposed reefs. *Sargassum* spp. and *Cystophora* spp. are dominant in more sheltered areas.

This habitat consists of subtidal substrates composed of rock, boulders, or cobbles, though there can be patches of sand veneer covering a hard bottom. There may be rich, diverse communities of attached and associated algae and animals; often there is little open space. Some of these habitats form a relief (reef or bank) several metres high that attracts a diversity of fish (NOAA 2010d).

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

4.9.2 Estuaries

Estuaries are near coastal waters partially surrounded by land and more sheltered than offshore habitats. They consist of limited circulation and flushing, with depths frequently 10 metres. Suspended sediment concentrations can be high.

Many species spawn in these habitats during spring, and their sensitive early life stages can persist in shallow waters. Large numbers of migratory or wintering waterfowl, wading, diving birds and marine mammals are also often found here. Estuaries and bays are used by commercially or recreationally important finfish, shellfish, and other organisms that migrate seasonally (NOAA 2010d).

There are a number of estuaries around the Gippsland Basin inlets, e.g., Lakes Entrance, Wingan River and Mallacoota; Twofold Bay, Saltwater Creek, Woodburn Creek, Bittangabee Bay, Wonboyn Lake, Nadgee Lake and various others intermittently open.

4.9.3 Intertidal Rocky Shores

Sheltered rocky shores are characterised by a rocky substrate that can vary widely in permeability. Sheltered clay scarps are characterised by a steep, usually vertical scarp in hard-packed and stiff clay. Vegetation usually occurs landward of the scarp (NOAA 2010d). Most animals on the intertidal rocky shores are herbivorous molluscs, grazing algae off rock surfaces. Filter feeding organisms abound, including tube building worms, sea squirts (cunjevoi), mussels and barnacles.

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.

4.9.4 Intertidal, Emergent, Sub Tidal Aquatic Vegetation (Seagrass and Kelp)

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.

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 2010d).

The Giant Kelp Marine Forests of South East Australia ecological community, consisting mostly of giant kelp (*Macrocystis pyrifera*) plants, is listed as endangered under the EPBC Act and may occur within the Operational ZPI. The Giant Kelp Marine Forests are found predominately in temperate south eastern waters. The largest extent of the ecological community is found in Tasmanian coastal water, but some patches may also be found in Victoria.

Intertidal, emergent and sub tidal aquatic vegetation occurs at Mallacoota and Mallacoota Inlet Special Management Area, Tamboon Inlet, Cann River Estuary (continuously open), Sydenham Inlet, Snowy River Estuary, Yeerung River Estuary (intermittently open), Lake Tyers estuary (intermittently open), Inside Lakes Entrance - Gippsland Lakes Ramsar Site and Corner Inlet Ramsar Site.

4.9.5 Sheltered Intertidal Flats and Bare Sediment

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. 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 2010d).

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

4.9.6 Marshes

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.

Intertidal wetlands contain emergent, herbaceous vegetation, including both tidal and muted tidal marshes. 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 marsh width may vary from a narrow fringe to extensive areas. Sediments are composed of organic muds except where sand is abundant on the margins of exposed areas. Exposed areas are located along bays with wide fetches and along heavily trafficked waterways. Sheltered areas are not exposed to significant wave or boat wake activity. Abundant resident flora and fauna with numerous species and high use by birds, fish, and shellfish (NOAA, 2010d).

4.9.7 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.

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, 2010d).

4.9.8 Sandy Beaches and Dunes

Sandy beaches and dunes form a distinctive group of marine habitats with their own biological communities. These beaches are flat to moderately sloping and relatively hard-packed. They can be important areas for nesting by birds. This environment occurs along the coastline of Victoria and NSW.

The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community is listed as critically endangered under the EPBC Act and occurs along the Gippsland coastline (DoEE, 2017t). The ecological community provides habitat for over 70 threatened plants and animals and provides a buffer to coastal erosion and wind damage (DoEE, 2017t). The ecological community occurs close to the coast from northern Queensland to eastern Victoria and on offshore islands. It occurs on a range of landforms including dunes and flats, headlands and sea-cliffs.

4.9.9 Cliffs/Exposed Rocky Headlands

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 Ram Head, Sandpatch Point, Wingan Point, The Skerries, Ram 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.

4.10 Offshore Marine Environment

Offshore marine environments that occur in the operational area operational area and Operational ZPI include:

- Open Marine Environment
- Seabed

Offshore waters are those where the water depth is >10 metres with no surrounding land. Animals within offshore waters include marine mammals, sea turtles, pelagic birds, and many commercially and recreationally important fish and pelagic invertebrates.

4.10.1 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).

Schlacher et al. (2007) provides description of sponge communities along SE Australia, including Big Horseshoe Canyon (at the northern section of the Everard canyon, almost 100km from Sculpin), based on the 2004 RV Southern Surveyor survey, with samples largely originating from 200 – 600 m depth. The paper confirmed that species richness declined with depth. Sponge distribution is to a large extent dependent on availability of stable/hard substrate (sponges are slow-growing sessile organisms) and adequate food supply, neither of which are prevalent at the Sculpin location.

Beaman et al. (2005) studied the geology-benthos relationships of New Zealand Star bank (about 6 NM off Rame Head and inshore from Big Horseshoe Canyon) at around 100 m water depth. Although this paper is of marginal relevance to deepwater benthic communities, it confirms that high biodiversity is correlated with the presence of hard substrate in this region.

4.10.2 Bass Canyon System

The Bass Canyon System, including the Blackback Canyon and other nearby canyons, was the subject of a comprehensive study (Mitchell *et al.* 2007). The study comprised bottom core sampling, sediment grabs and seabed photography. The Bass Strait canyons are characterised by dense shelf water cascades (Godfrey *et al*. 1980).

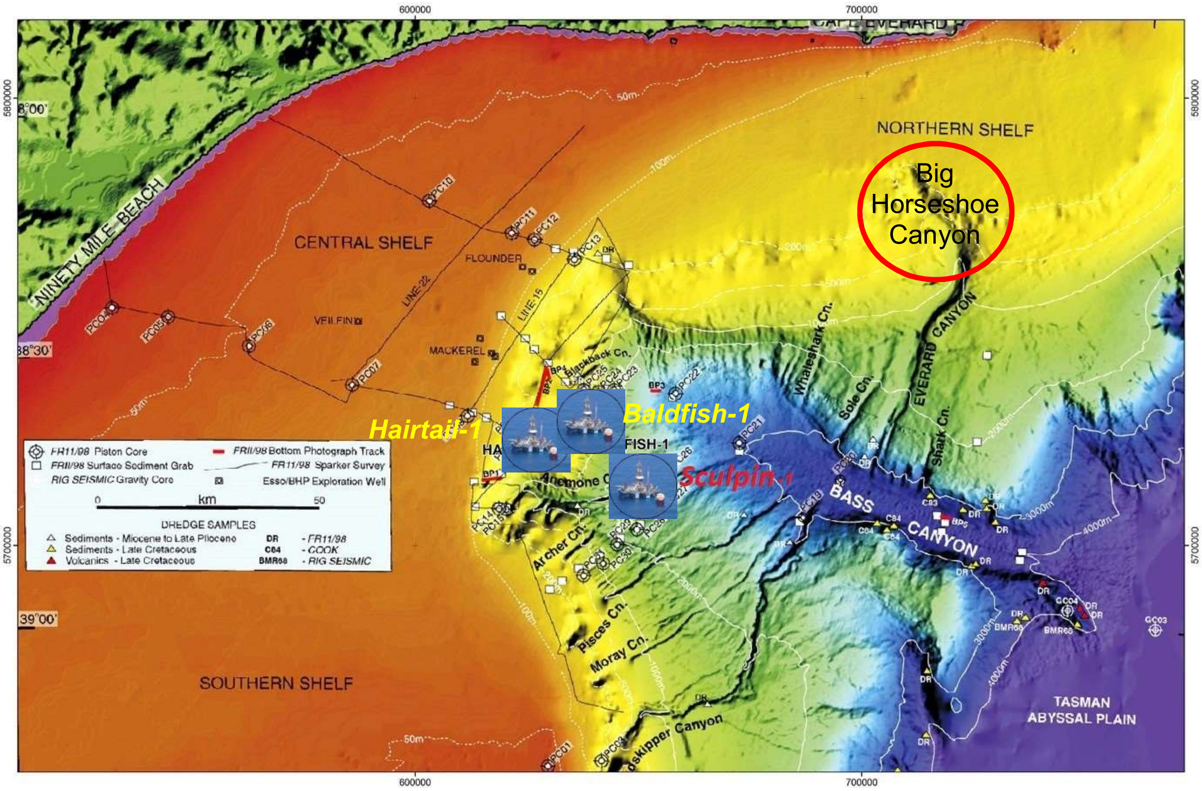


Figure 4-11 **VIC/P70 well locations relative to seafloor bathymetry of the Offshore Gippsland Basin and Bass Canyon (after Mitchel *et al*., 2007)**

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. Entering the head of the Bass Canyon at 3,000 m depth are five shelf-breaching tributary canyons and three slope-confined tributary canyons. The Bass Canyon was first described in 1968 by Conolly, after which sediments were described in various studies. Comprehensive sediment sampling was undertaken in 1998, during the *RV Franklin cruise* (*FR11/98*), by the HMAS Cook cruise (Marshall 1988; Exon *et al*. 2002) and the Rig Seismic cruise (Colwell *et al.* 1987). To date, the most comprehensive study of sediments in the offshore Gippsland Basin is that of Holdgate *et al* (2003). The FR11/988 collected sediment samples along the Gippsland basin, including the Bass Canyon System.

The VIC/P70 operational area straddles the Anemone Canyon, one of the five major tributary canyons, and is typified by U-shaped tributary canyons and canyon heads (Facies: MS), followed by scoured canyon walls further down the slope. The broad channels on the shelf break, referred to as the Blackback Canyon (Henry *et al*, 2000), surrounds the VIC/P70 operational area. Stations PC16, PVC17 and PC18 (immediately inshore from the Hairtail- and Baldfish -1 well locations), PC23, PC24 and PC25 (immediately north of the Hairtail- and Baldfish -1 well locations) and PC26, PC27 (close to the Sculpin-1 well location) are most representative for the VIC/P70 operational area. The boundary between the middle and lower slope is approximately defined at 1,750 m depth. Baldfish-1 and Hairtail-1 are located on the upper slope of Anemone Canyon, while Sculpin-1 lies on the lower slope.

Backscatter studies typify the slopes as mudflows with down-slope sediment transport flow patterns, funnelling down the Bass Canyon. At the lower slopes (>1,750m depth) there is a marked change, from mud to a sandy composition. The VIC/P70 operational area (Facies: MS) is described as muddy, fine-grained calcarenite (Packstone & Wackestone), consisting of 55-80% calcium carbonate, composed of medium-coarse sand sized bioclasts (i.e. derived from shell fragments or similar organic remains containing mollusc, forams, bryozoan), with a fine quartz sand, pelloids & organic-rich calcareous mud matrix. Wackestone is defined (Dunham 1962) as a mud-supported carbonate lithology containing >10% grains, while Packstone a grain-supported fabric containing 1% or more mud-grade fraction. Unlike Baldfish-1 and Hairtail-1, Sculpin-1 is expected to be dominated by a sandy composition.

Deposition in the VIC/P70 operational area may be attributed to the mixing of shelf and pelagic particles during remobilisation in downslope low-energy sediment gravity flows, similar to sediment facies described by Passlow (1997) from the adjacent Otway, and are interpreted as mud-lubricated, sandy debris flow deposits.

Because of the lack of had substrate and relative sediment mobility, canyon fauna the area is expected to generally impoverished, in analogy with similar observations for canyons with high rates of flow and sediment accumulation (see above).

4.10.3 Blackback Subsea Development

Above observations are confirmed by other studies in the area (Fugro 1995, 1996), including a site survey as part of the Blackback Subsea Development, less than 5 NM north of Baldfish-1 and Hairtail-1, and about 15 NM from Sculpin-1.

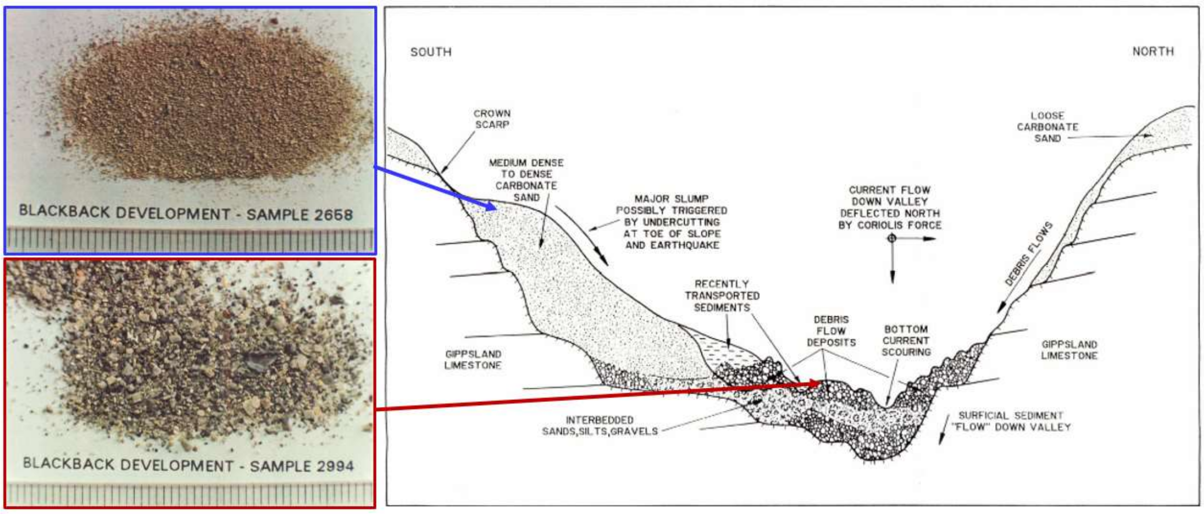


Figure 4-12 Generalised cross section taken from the Blackback Site survey report, and accompanying representative sediment photographs

Samples indicate that the seabed sediments 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. Evidence of anchor slipping in areas of steep dip has been recorded. There is evidence of channelization south of the VIC/P70 well locations, which may be due to strong ocean bottom currents moving sediments along meandering channel fairways to deeper water to the east.

Sediment from ROV seabed studies undertaken at the Snapper operational area in 2010 (approximately 32.1 km from Baldfish), shows that the seabed is entirely comprised of soft sandy sediments with no areas of hard substrate or rocky reef and is predominantly flat. No significant mounds, banks, depressions or channels were observed (Coffey 2010).

A number of surveys were also undertaken within Block VIC/P59 (now incorporated into Block VIC/P70), including the Apache Elver 3D and CSEM seismic surveys, and the Esso Tuskfish 3D seismic survey in VIC/L20, south of the Blackback field.

Additionally, the Dory-1 geophysical survey (Tri-Surv, 2008) assessed bathymetry, seabed features and shallow geology. The Dory-1 site is interpreted to consist of near surface unconsolidated sandy silts, with sediments becoming more solid with depth. Due to the variable high relief of the bathymetry across the Dory-1 site, sidescan sonar coverage was unachievable.

4.11 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.

The main commercial Commonwealth fisheries within the Operational ZPI are the Southern and Eastern Scalefish and Shark Fishery (SESSF) which includes ((AFMA, 2014a, 2016, ABARES, 2016a, 2017) :

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

Other Commonwealth fisheries operational within the Operational ZPI include the Eastern Skipjack Tuna Fishery and the Eastern Tuna and Billfish Fishery.

The total annual fishing intensity within Bass Strait is shown in Figure 4-14. Total catch is generally concentrated inshore of the VIC/P70 operational area. Of the commercial fisheries, Danish seiners (Figure 4-16) and otter-board trawlers of the Commonwealth Trawl Sector are most likely to be encountered within the Operational ZPI. However, these are unlikely to occur near the VIC/P70 operational area.

4.11.1 Southern and Eastern Scalefish and Shark Fishery (SESSF)

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 (Figure 4-13). The SESSF extends from waters off southern Queensland, south around Tasmania and then west to Cape Leeuwin in Western Australia.

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, 2012c).

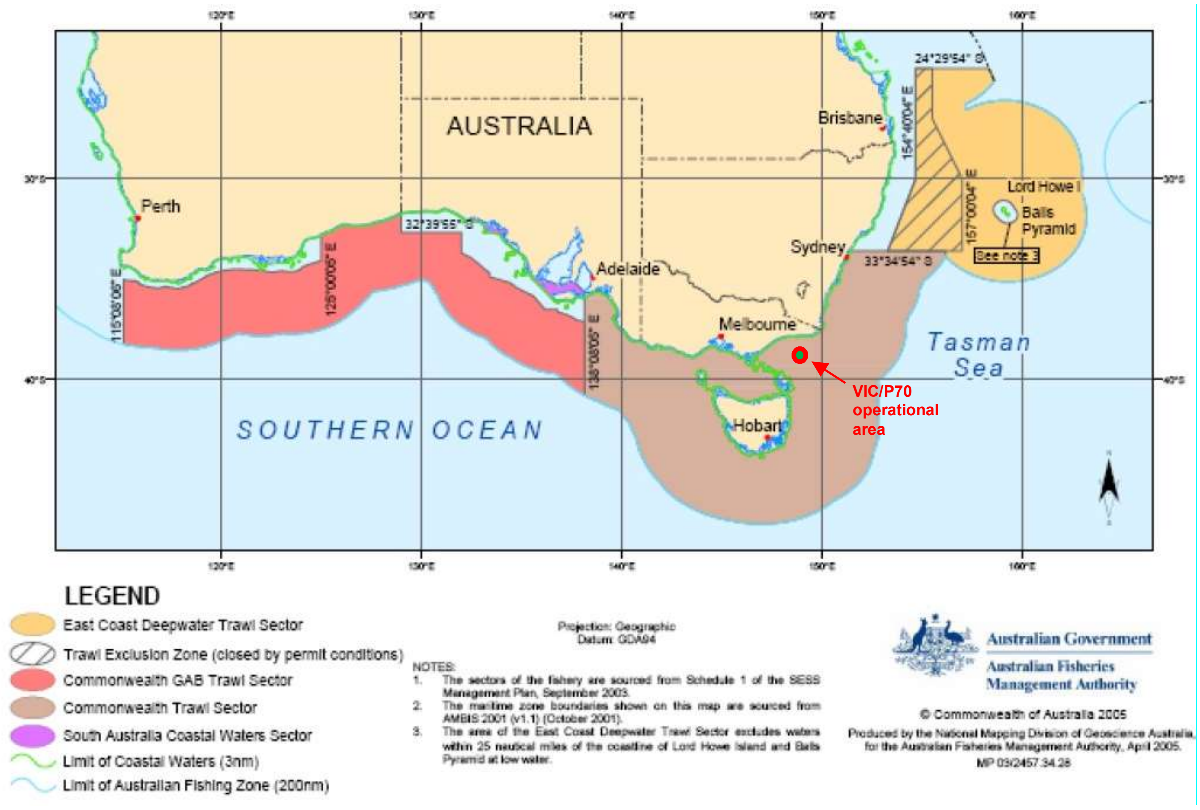
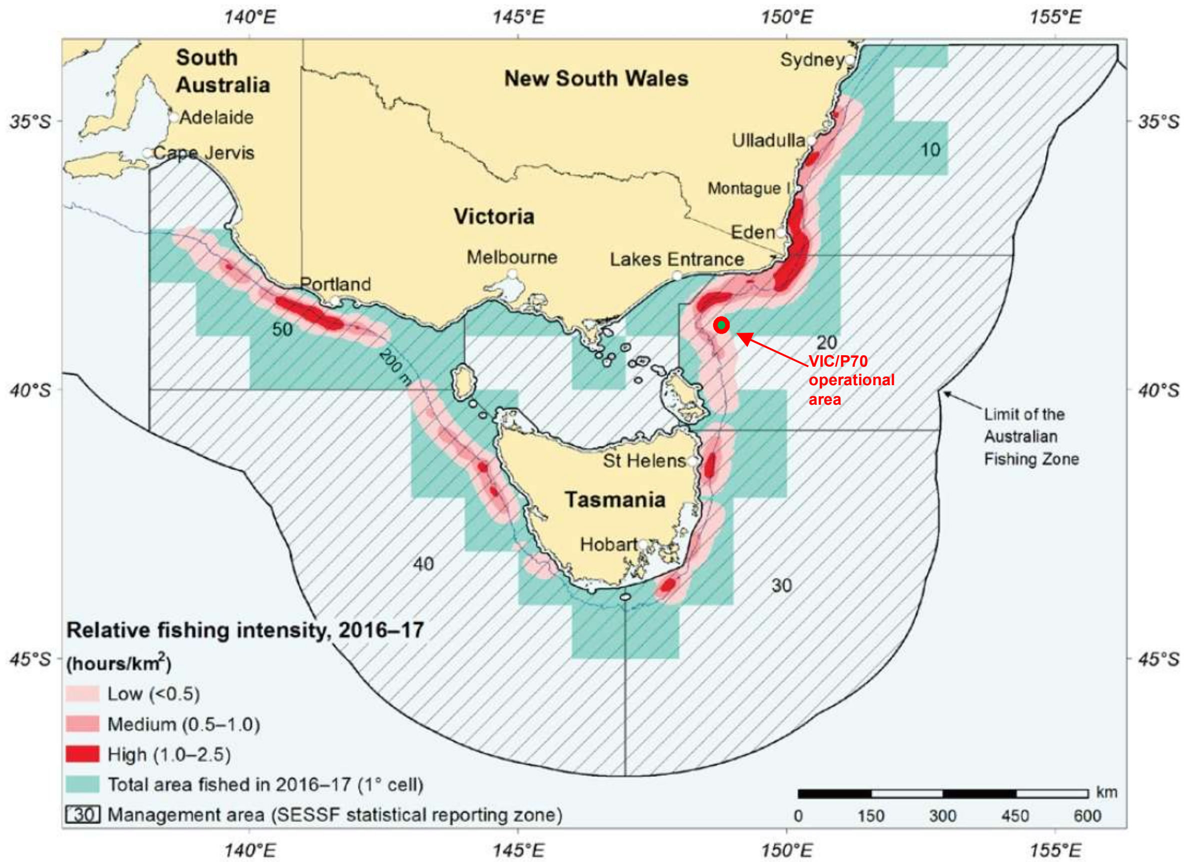


Figure 4-13 Commonwealth Trawl Sector and East Coast Deepwater Trawl Sector of Victoria coastline within the Southern and Eastern Scalefish and Shark Fishery (SESSF) (AFMA 2010)

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 (Figure 4-15).

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 (Figure 4-16).



Note: Fishing vessels are prohibited from entering the 500 m PSZ.

Figure 4-14 Relative fishing intensity in the Commonwealth Trawl Sector, 2016–17 fishing season (ABARES 2017)

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).

The blue grenadier (*Macruronus novaezelandiae*) is a benthic species that is found inshore as juveniles and in continental slope waters at depths from 450 m to 800 m as adults. They mature between 4 and 5 years and live to a maximum of 25 years. They spawn between May and September (ABARES, 2012).

Jackass morwong (*Nemadactylus macropterus*) are found in the waters between 10 and 450 m, but most commonly in waters 100 to 200 m deep. They live to between 20 and 35 years and mature at three years old. The spawning season is late summer and early autumn (ABARES, 2012).

Silver warehou (*Seriolella* spp.) are found at depths of 25 to 500 m. They live for 15 years – maturing at 3 to 4 years old. The spawning season is between September and October (ABARES, 2012).

Tiger flathead are found in deeper waters on the continental shelf in waters up to 350 m deep. They live to approximately 20 years and mature between 4 to 5 years old. They spawn between September and February (ABARES, 2012).

School whiting (*Sillago flindersi*) are found between 1 to 100 m on soft and sandy bottoms. They live for 7 years and mature at 2 years old. They spawn between October and January (ABARES, 2012).

The eastern gemfish (*Rexea solandri*) are found in waters 100-800m deep on sea mounts and smooth areas of the continental slope. They live to 16 years and mature between 3 to 6 years old. They spawn during the winter months (ABARES, 2012).

Redfish (*Centroberyx affinis*) are found on the continental shelf and slope in reef and soft bottom habitats between 10 and 450 m. They live to approximately 35 years and mature between 5 and 7 years old. Their spawning season is between February and May (ABARES, 2012).

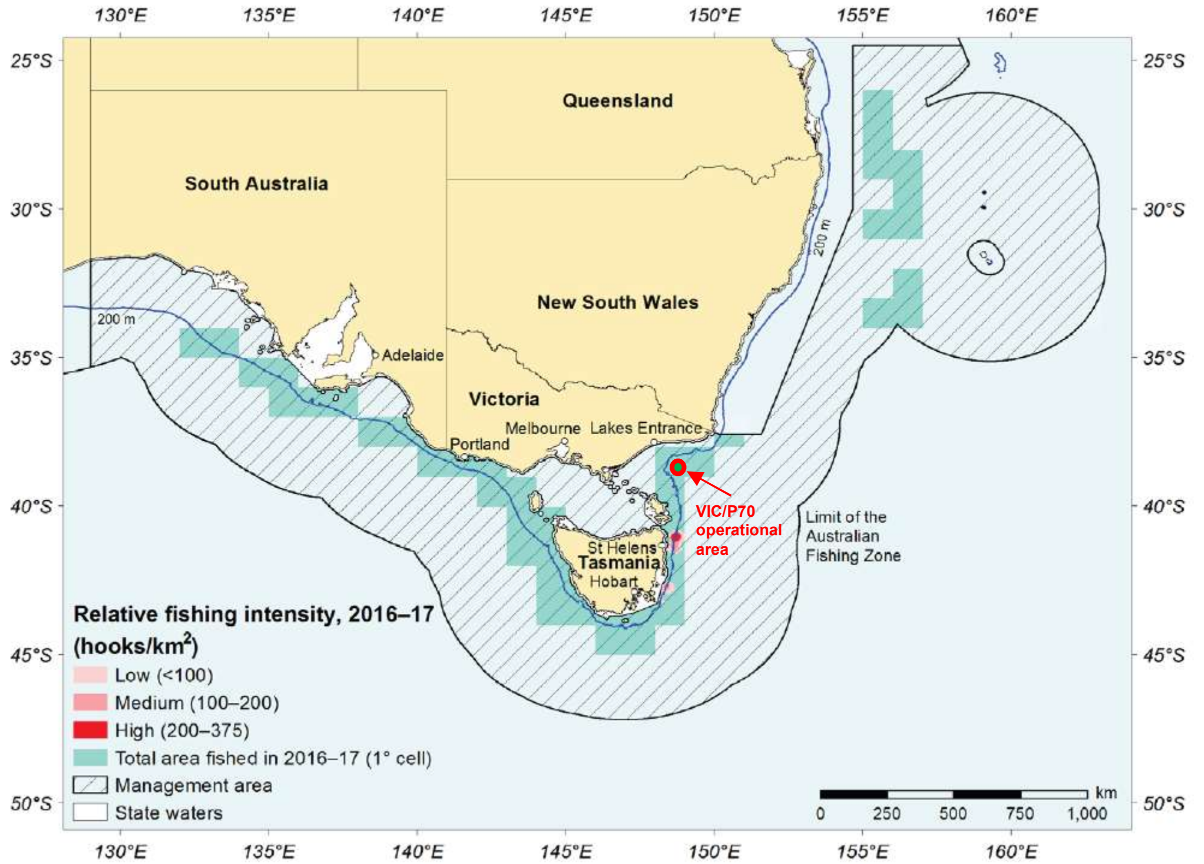


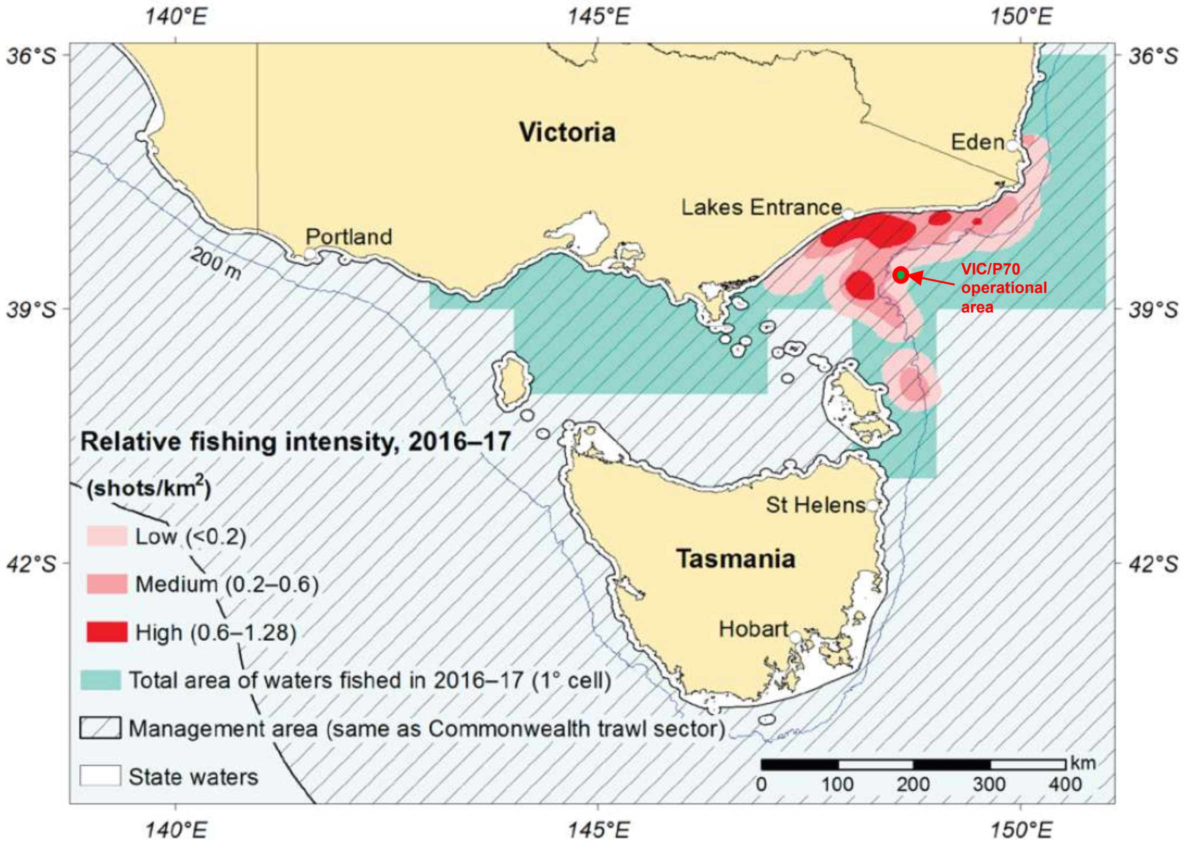
Figure 4-15 Relative fishing intensity in the Scalefish Hook Sector (SHS), 2016–17 fishing season (ABARES 2017)

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).

Otter trawling is the main fishing activity on the continental slope. Trawling ground targeted by the otter trawl fishery is usually flat ground, free from undulations or rocky outcrops which could damage the gear or jeopardise the safety of the vessel. In the mid-slope depths around 400m, trawling is along contours on ledges where nets may be shot for up to 4 hours.

Distribution of the fishing effort shows a predominance of effort concentrated along the 100-250 m contour (Figure 4-14; ABARES 2017) The VIC/P70 operational area largely lies outside the main areas of trawling effort.

The shark fishery extends throughout the continental shelf areas of Bass Strait. The gill net consists of a stationary net, anchored and buoyed at each end. The net is normally monofilament polyamide webbing. Shark fishing is usually in depths less than 100 m and is thus unlikely to operate in the vicinity of the VIC/P70 operational area. However, the most significant aspect of the shark fishery is the trend in the use of gear (both gill net and long line) to target deeper water SESSF quota species.



Note: Fishing vessels are prohibited from entering the 500 m PSZ.

Figure 4-16 Relative fishing intensity by Danish-seine operations, 2016–17 fishing season (ABARES 2017)

4.11.2 Small Pelagic Fishery

The Small Pelagic Fishery (SPF) targets Australian sardines (*Sardinops sagax*), jack mackerel (*Trachurus declivis*), blue mackerel (*Scomber australasicus*) and redbait (*Emmelichthys nitidus*). The fishery extends from the Queensland/New South Wales border, typically outside 3 nautical miles, to southern Western Australia (Figure 4-17). The fishery includes purse-seine and midwater trawl fishing vessels.

The key target species for the purse-seine vessels are Australian sardine (*Sardinops sagax*), blue mackerel (*Scomber australasicus*) and jack mackerel (*Trachurus declivis*). The key target species for the midwater trawl fishery are blue mackerel, jack mackerel and redbait (*Emmelichthys nitidus*) (ABARE 2017).

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 SPF fisheries near the VIC/P70 operational area.

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, 2012).

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, 2012).

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 2012).

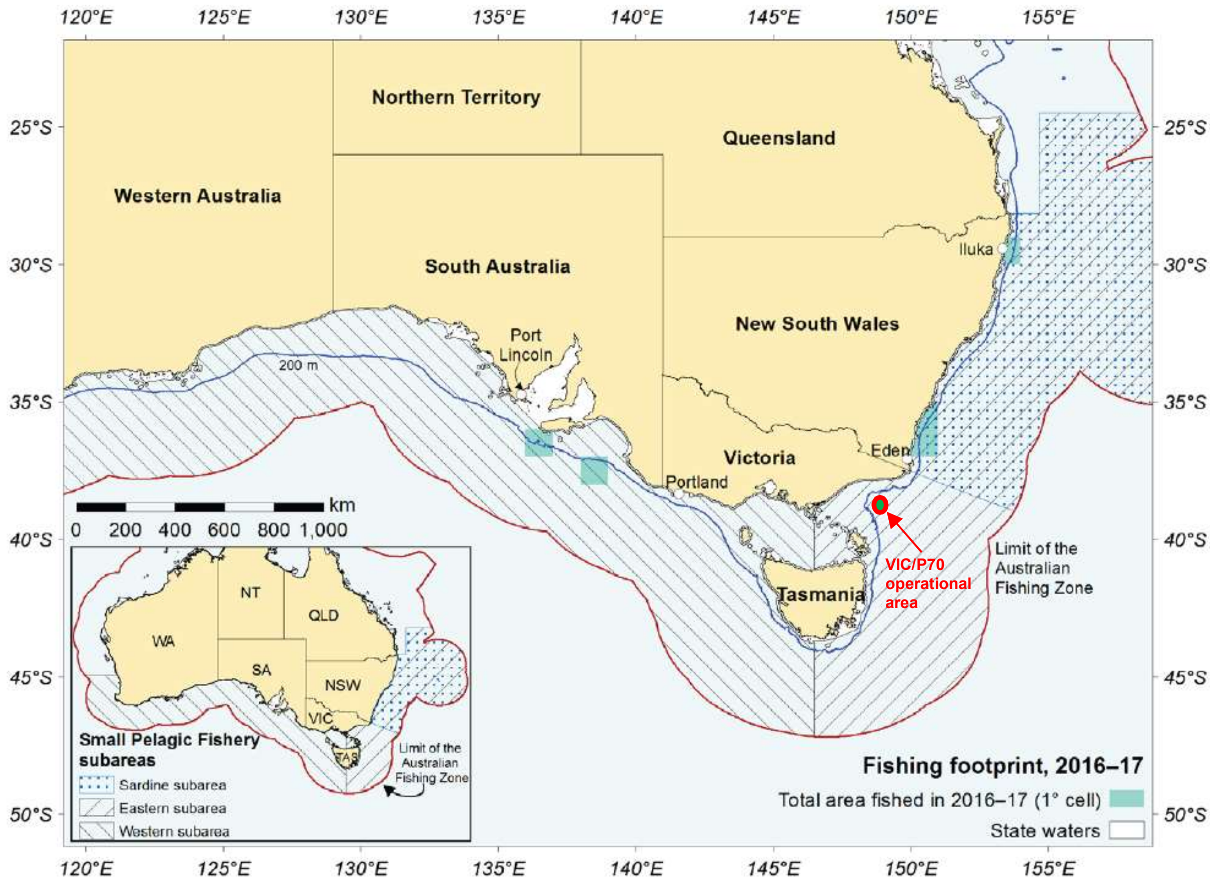


Figure 4-17 Area fished in the Small Pelagic Fishery, 2016–17 (ABARES 2017)

4.11.3 Fishing activity around Block VIC/P70

A review of fishing activity for 2010-16 within a 1 degree grid square (111 x 111 km) around Block VIC/P70, based on data provided by AFMA (2017d), confirms that of the three main fisheries in this area, Danish seine fishing made up the largest component (around 53%), followed by otter trawling (43%) and gillnet fishing (4%).

Less than five boats were hook-fishing in this area between 2011 and 2016, with catch data not available due to confidentiality. However, in 2010, hook fishing made up around 5% of total catch in this area (85 T), landing mainly Pink ling (63%), followed by Reef ocean perch, and Ribaldo (9% each), Blue eyed trevally and Gummy shark (6% each) and Hapuku (3%).

Scallop fisheries within this area yielded around 34 T in 2012, with no data available for other years due to low fishing intensity (less than five boats). Although Small Pelagic Fishery, Eastern Skipjack Fishery, as well as Southern Bluefin, Eastern Tuna and Billfish Fishery exist in this area, none of these took place between 2010 and 2016. Southern Squid Jig Fisheries yielded about 79T in 2012, with no fishing activity in 2010, 2011, 2014 and 2015. Less than 5 squid boats operated in this area in 2016 (no data available).

Danish seine fisheries around Block VIC/P70 between 2010 and 16 (average of 754 T/a) largely yielded Flathead (89%), while gillnet fisheries (average 55 T/a) mainly yielded Gummy sharks (72%) and other shark species (25%).

Otter trawling within the Commonwealth Trawl Sector around Block VIC/P70 between 2010-16 (average 609 T/a), yielded a range of fish species, dominated by Flathead (33%), Pink ling (12%), Blue grenadier (9%) and Silver warehou (7%). An average of 0.9 T/a of Orange roughy was landed in this area between 2010 and 2016, decreasing from 1.4 T in 2010 to 0.4 T in 2016.

However, as outlined above, the fisheries around Block VIC/P70 are largely concentrated in shallower waters, further inshore from the VIC/P70 operational area.

4.11.4 Scallop Fisheries (BSCZSF, Victorian and Tasmanian)

The Bass Strait scallop fisheries are predominantly single-species fisheries targeting aggregations (‘beds’) of the commercial scallop (*Pecten fumatus*) using scallop dredges, which are towed along the bottom of the sea in much the same way as trawl equipment (ABARES 2016b). The management of scallops in Bass Strait is divided into three zones, of which the Commonwealth manages the Central Zone (the Bass Strait Central Zone Scallop Fishery; BSCZSF). The remaining zones, which extend up to 20 nautical miles off the coasts of Victoria (Victorian Scallop Fishery) and Tasmania (Tasmanian Scallop Fishery), are managed by those states respectively (AFMA, 2017c).

The areas open to fishing vary from year to year depending on the location of commercially viable scallop beds. In 2015 fishing was concentrated on beds east of King Island (well outside the operational area) (ABARES 2016b). The season typically extends from May to December but the fishery is not opened unless the abundance of scallops in specific locations meets regulatory criteria.

The commercial scallop usually matures at about 12 to 18 months of age. Once maturity has been reached (fecundity increases with age), spawning occurs from winter to spring (June to November) although there are periods when spawning may be at a peak. The timing of these peaks may vary according to location and also according to environmental conditions, but appears to be in spring in Victoria (Sause *et al*. 1987). There is also some very limited evidence for a smaller, autumn peak in spawning for scallop populations in Bass Strait (Coleman 1988).

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 2017a). Scallops are seldom found in commercial quantities in depths greater than 60-70 m.

4.11.5 Abalone Fisheries

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, from 0 m to 40 m depth range and are widely distributed along the southern half of Australia as far as Rottnest Island in the West to Coffs Harbour in the East, but are not present at the VIC/P70 operational area.

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 2014). The Tasmanian abalone fishery is the largest wild abalone fishery in the world and the fishery area surrounds the entire island extending northwards into Bass Strait to include Bass Strait islands such as the Furneaux Group.

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 (as shown in the Oil Spill Response Atlas for Victoria).

Abalone are hand harvested by divers, who typically operate from small, trailable or tender vessels using low-pressure surface–air supply equipment (hookah). Abalone are removed from the reef using a tool known as an abalone iron. Fishing is open all year round.

Abalone grow to at least 21 cm in length and growth rates vary with location and time of year. Abalone mature at 6 to 10 years of age in Tasmania and spawning occurs from October through to March.

4.11.6 Rock Lobster Fisheries

The Victorian and Tasmanian Rock Lobster Fisheries are based primarily on one species, the southern rock lobster (*Jasus edwardsii*). 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 Wilson’s 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. Fishers use baited rock lobster pots which are lowered to the bottom in rocky areas. The lobsters crawl down the funnel in the top of the pots and are unable to escape.

4.11.7 Victorian 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.

4.11.8 Tasmanian 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 2017).

Temperate climate bivalves generally have two spawning periods within a year following spring and autumnal peaks in phytoplankton production.

4.11.9 NSW Ocean Trawl Fishery

There are two sectors to the NSW Ocean Trawl Fishery: The prawn trawl sector (within 1.5 NM of the coastline) and the fish trawl sector (west of the 90 m depth contour). Both sectors use the otter trawl net (see Section 6.9.1). The major species taken in this fishery include school whiting (comprising of stout whiting and red spot whiting), eastern king, school and royal red prawns, tiger flathead, silver trevally, various species of sharks and rays, squid, octopus and bugs (DPI 2014).

4.11.10 NSW 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 fishery uses a variety of methods, most commonly involving traps or lines with hooks. Snapper, yellowtail kingfish, leatherjackets, bonito and silver trevally form the bulk of the commercial catch. Other key species include rubberlip (grey) morwong, blue-eye trevalla, sharks, bar cod and yellowfin bream (DPI 2014).

4.11.11 NSW Estuary General Fishery

The Estuary General Fishery is a diverse, multi-species, multi-method fishery that operates in many of the State’s estuarine systems. 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).

4.11.12 NSW Ocean Hauling Fishery

The Ocean Hauling Fishery targets approximately 20 finfish species using commercial hauling and purse seine nets from sea beaches and in ocean waters within 3 NM of the NSW coast. The catch is mainly made up of pilchards, sea mullet, Australian salmon, blue mackerel, yellowtail scad and yellowfin bream (DPI 2014).

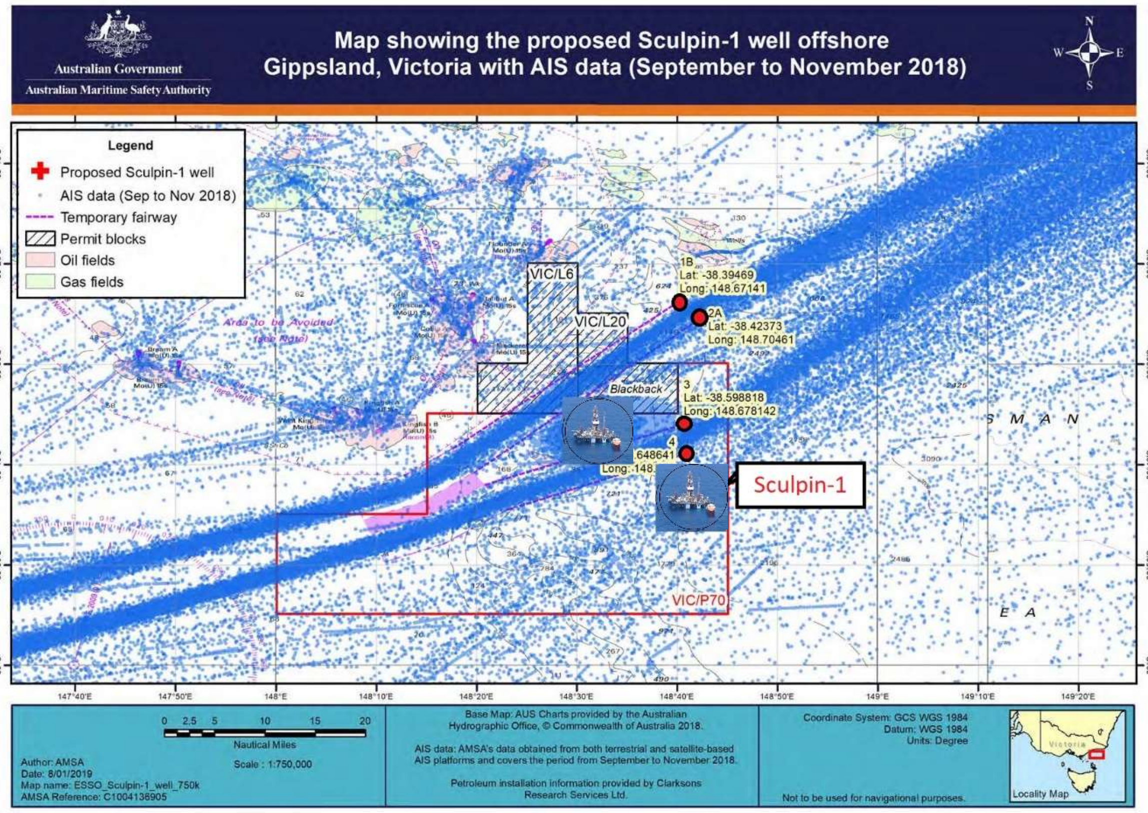
4.11.13 NSW Oyster Aquaculture

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 spatfall. 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.

4.12 Commercial Shipping

Bass Strait is one of Australia’s busiest shipping areas, with more than 3,000 vessels passing through Bass Strait each year (see Figure 4-18). Bass Strait is a transit route for shipping traffic connecting the eastern and western ports of Australia (NOO 2002). A shipping exclusion area (Area to Be Avoided; Refer chart AUS357) surrounds much of the Gippsland basin operational area.



Based on AIS observations between September and November 2018 (AMSA map dated 8 January 2019). Each dot represents a vessel location at a 1 hour interval

Note: Vessel activity around Hairtail-1 and Baldfish-1 between September and November 2018 coincides with VIC/P70 drilling activity, and results from the presence of support and supply vessels.

Figure 4-18 Shipping activity through Traffic Separation Scheme (TSS), temporary fairways and VIC/P70 operational area during drilling activities at Baldfish-1 and Hairtail-1 in October 2018

Block VIC/P70 contains an International Maritime Organization (IMO) adopted Traffic Separation Scheme (TSS). While the VIC/P70 operational area lies outside the TSS boundary, it is in the middle of the traffic lanes of the TSS (Figure 4-18). This area has some of the heaviest commercial shipping traffic in Australia.

Each blue dot on the plot in Figure 4-18 represents a vessel’s position, as broadcast by AIS (Automatic Identification System; AMSA 2017a) at 1 hour intervals. Analysis (AMSA, 2017b) reveals that some

80% of the vessels are cargo vessels, 12% are tankers and 2% are passenger ships. The rest are a combination of fishing vessels, pleasure craft, tugs etc. On average, every day, one large vessel will transit the TSS every 2 hours in the vicinity of the VIC/P70 operational area.

In response to the identified collision risk, and in dialogue with AMSA, temporary fairways were established in February 2018 (see RA 21; Section 6.25 and Figure 6-4). Figure 4-18 confirms that commercial vessels generally follow the temporary fairways, with vessel activity around Baldfish-1 and Hairtail-1 between September-November 2018 due to presence of project support and supply vessels during VIC/P70 drilling activity.

The temporary fairways are envisaged to be removed in consultation with AMSA on completion of the Blackback P&A campaign (Q1 2019).

4.13 Oil and Gas Industry

The Gippsland basin has been producing hydrocarbons since 1969 (a total of 4 billion barrels of liquids and 7 tcf of gas to date). Although a mature basin by comparison with other Australian basins, by world standards it is relatively unexplored. The Gippsland basin includes offshore production facilities (operational platforms, monotowers and subsea completions), a pipeline network of over 600 km; and various fields under exploration or development. Other titleholders of production licences in the Operational ZPI are given in Table 6-7.

Table 4-18 Production licences, Exploration Permits and Retention Leases within Gippsland Basins

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/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/Hairtail/Sculpin
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

From NOPTA 2018. Prefix: VIC/L: Production License; VIC/P: Exploration Permit; VIC/RL: Retention Lease

4.14 Recreational Fishing, Boating and Tourism

The Gippsland region is estimated to attract more than 7 million visitors annually. These visitors are estimated to spend an estimated $1 billion in the region per annum, with flow-on expenditure estimated at over $699 million per annum. There are more than 1,000 specialised tourism businesses in Gippsland and more than 12,000 people estimated to be employed as a direct result of tourism in Gippsland (Ainsaar *et al*. 2007).

The operational area is 90km offshore and will not be visible from shore, the Operational ZPI does not extend to state waters and as such there is little risk to recreational fishing boating and tourism. The Environmental Monitoring ZPI includes State waters and coastline which may be monitored for impacts on water quality in the event of a spill (depending on the spill trajectory). Any impacts on recreational fishing, boating and tourism outside the Operational ZPI are likely to be due to public perception rather than visible or actionable hydrocarbon presence.

4.15 Cultural Heritage

There are no World Heritage properties or National Heritage places in the Operational ZPI. The Lord Howe Island Group, which is inscribed on both the World Heritage List and National Heritage List, is located approximately 1,500 km from the VIC/P70 operational area and well outside the Operational ZPI. It lies approximately 900 km NE of Ulladulla, which is the northern extent of the Environmental Monitoring ZPI (Figure 4-3).

4.15.1 Aboriginal Heritage

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 4-20). It also includes offshore sea territory between Lakes Entrance and Marlo, outside the VIC/P70 Operational ZPI but within the Environmental Monitoring ZPI (Figure 4-3). The area includes 10 parks and reserves that are jointly managed by the Victorian government and the Gunai-Kurnai people (NNTT, 2010).

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.

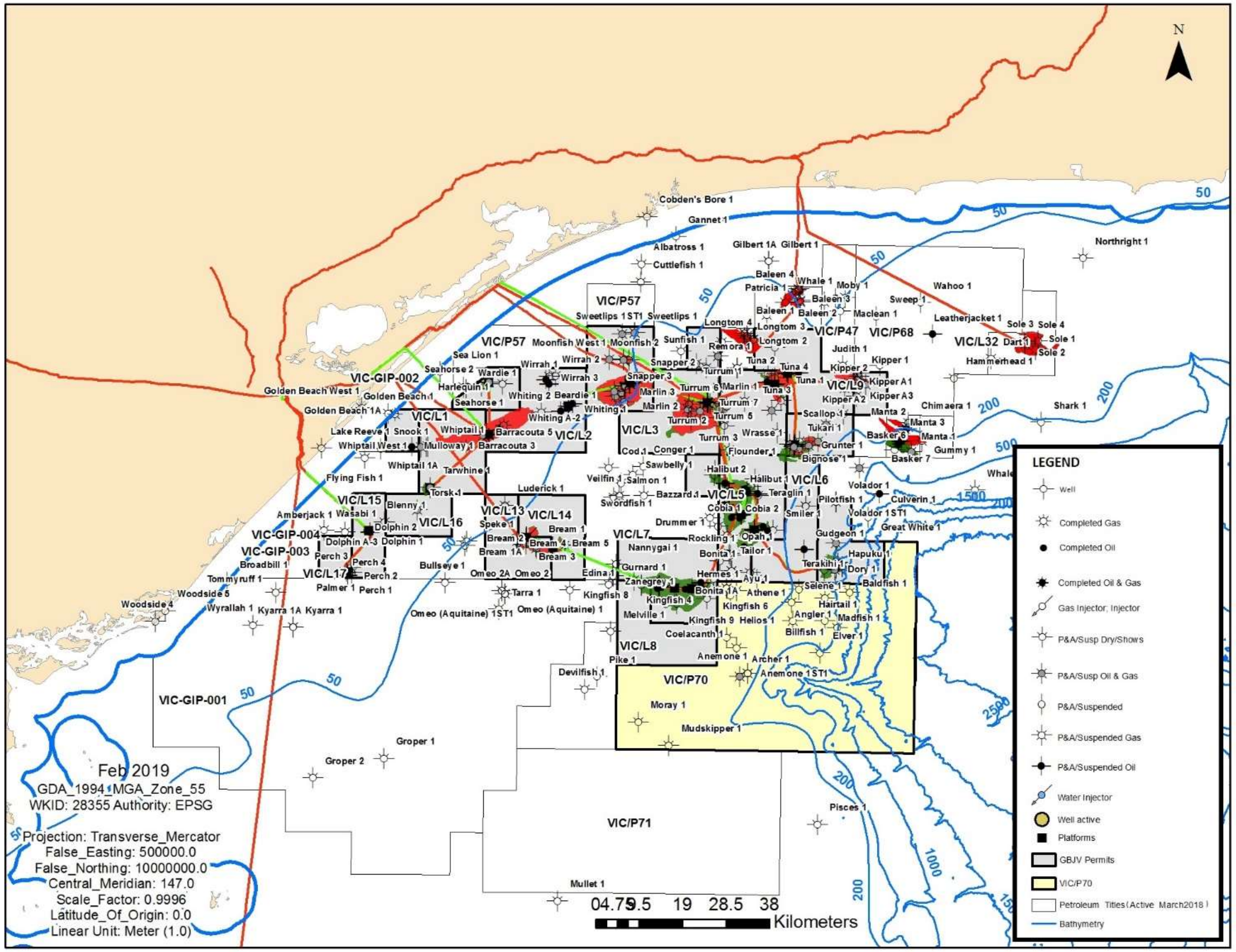


Figure 4-19 Offshore operations in Gippsland Basin

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.

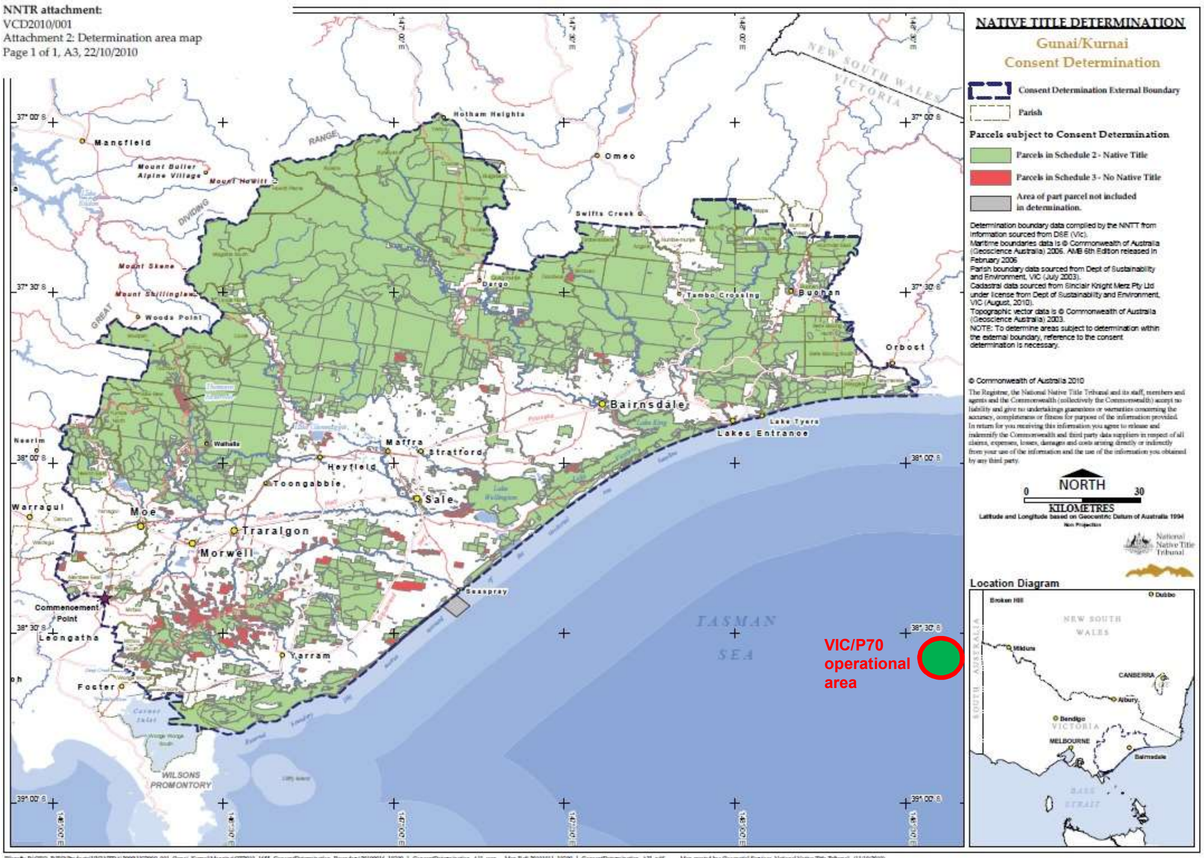
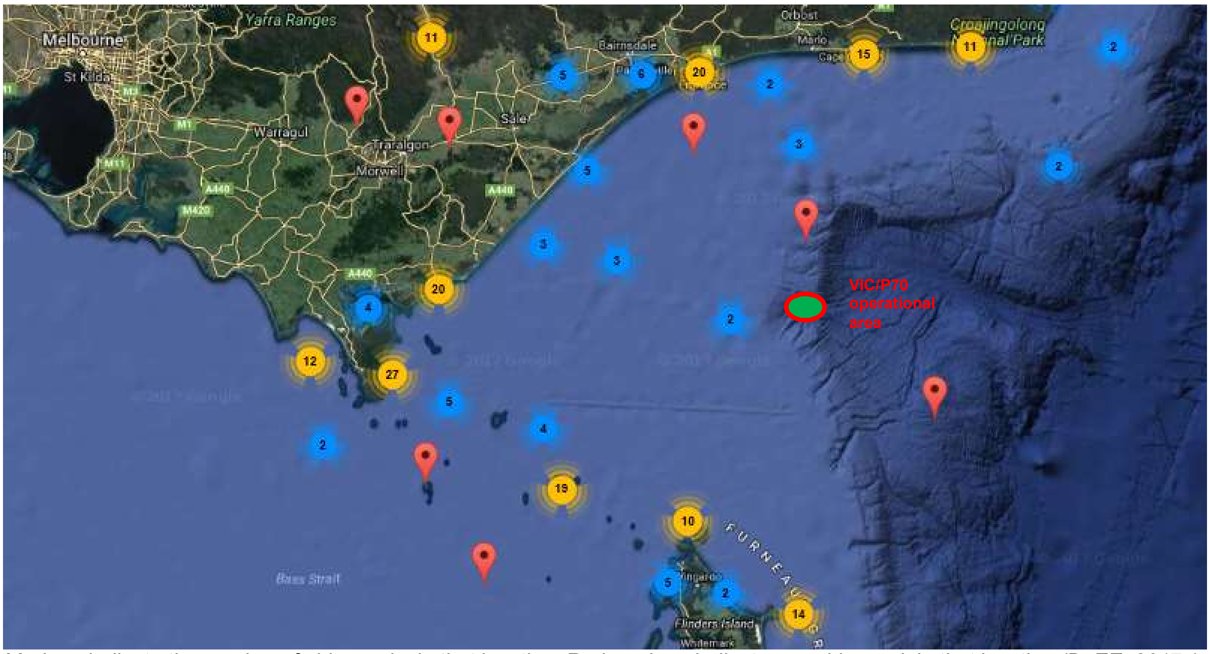


Figure 4-20 Gunai-Kurnai Native Title Determination Area (VCD2010/01)

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).

4.15.2 Shipwrecks

A search of the National Shipwrecks Database identified 255 wrecks between Latitude 37° 00’ to 40° 00’, and Longitude 146° 00’ to 150° 00’, with none in the VIC/P70 operational area (Figure 4-21). One wreck, AHO 6528 (wrecked in 1940; Latitude 38° 33, Longitude 148° 30), lies near the VIC/P70 Operational area. No further details are available on this wreck (DoEE, 2017c).



Markers indicate the number of shipwrecks in that location. Red markers indicate one shipwreck in that location (DoEE, 2017c)

Figure 4-21 Shipwreck sites around the Gippsland Basin

5 Environmental Impact and Risk Assessment Methodology

The approach and methodology used within this Environment Plan are consistent with AS/NZS ISO 31000 Risk management – Principles and Guidelines and AS/NZS ISO14001 Environmental Management Systems – Requirements with Guidance for Use.

The Environmental Aspects Guide (ExxonMobil 2012) describes the process used for comprehensive and rigorous identification and risk based assessment of environmental aspects. This involves five steps:

1. Identify and Characterize Environmental Aspects.
2. Characterize the Environmental, Social, and Regulatory Setting.
3. Identify Project or Operational Alternatives.
4. Develop Risk Scenarios.
5. Assess Significance.

5.1 Risk Assessment Methodology

Environmental impacts and risks for planned activities that have the potential to impact the environment and for unplanned spill scenarios were evaluated first by determining the consequence severity, and estimating the probability or likelihood that the consequences could occur.

- **Consequence severity**: There are four consequence categories (I through IV, with I being the highest consequence level). The consequence categories consider environmental effects (in terms of duration, size/scale, and intensity) and sensitivity (in terms of irreplaceability, vulnerability and influence).
- **Probability**: There are five probability categories (A through E, with A being the most likely level). The probability categories consider the probability for each failure, event or condition necessary to produce the consequences, given the implementation of controls that prevent and mitigate the risk.

The combination of consequence severity and probability of occurrence determines the position on the ExxonMobil Risk Matrix. The ExxonMobil Risk Matrix is divided into four categories, with Category 1 being the highest risk category and Category 4, the lowest. A risk could have a low consequence severity and high probability of occurrence, and result in the same risk ranking as a risk with a high consequence severity and low probability of occurrence.

As described above the Risk Matrix is divided into four risk categories. The significance of each Risk Category is as follows:

Category 1: A higher risk where specific controls should be established in the short term and should, when possible, be reduced to a Category 2 risk or below. Continued operation requires annual review and approval by the Production Manager or equivalent.

Category 2: A medium risk that should be reduced unless it is not "reasonably practicable" to do so.

Category 3: A lower level medium risk that should again be reduced unless it is not "reasonably practicable" to do so.

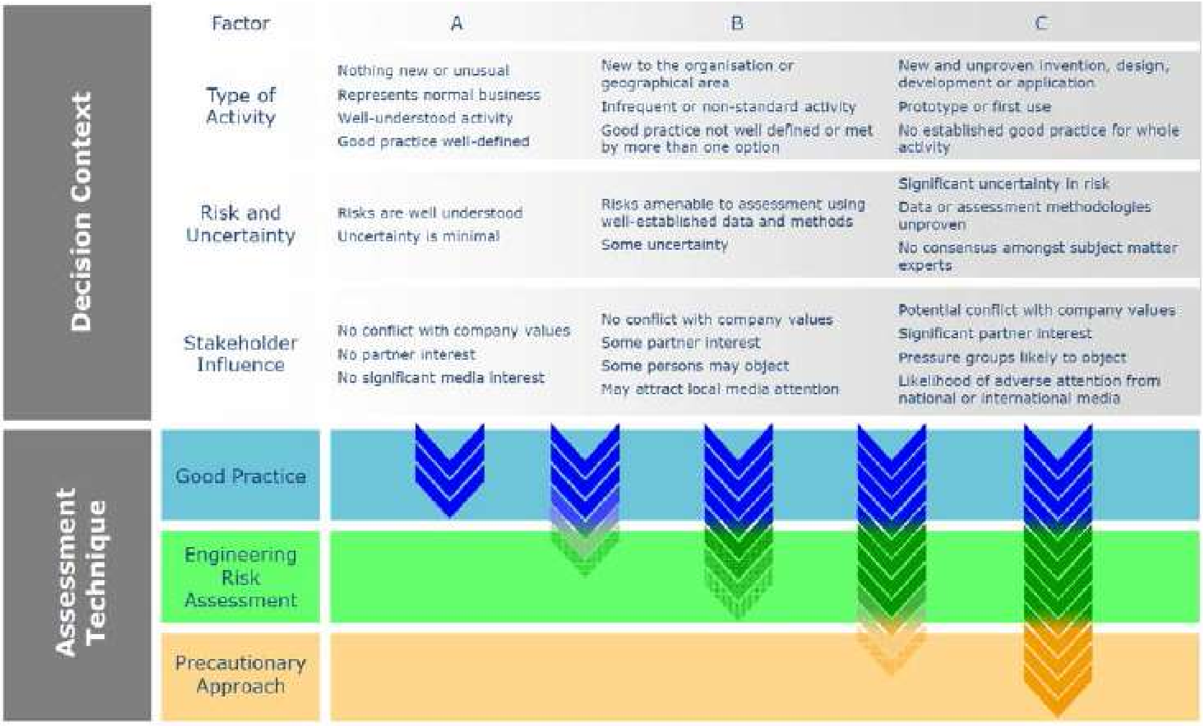
Category 4: A lower risk that is expected to be effectively managed in base OIMS practices and therefore typically requires "No Further Action." Risk mitigation measures that are in place to manage the risk to Category 4 should be continued.

RA 21 (Interference with commercial shipping activity) and RA 28 (LOWC: Loss of well control) were categorised as Category 3 risks. All other environmental hazards and impacts were assessed to be Category 4 risks.

5.2 Demonstration of ALARP

Determining whether risks have been reduced to ALARP requires an understanding of the nature and cause of the risk to be avoided and the sacrifice (in terms of impact on personal safety and/or the environment, time, effort and cost) involved in avoiding that risk. Where the nature of a risk is well-understood, in the context of the receiving environment, and the activity is a well-established practice, the application of control measures specific to systems and specified in international standards or design codes may be sufficient and obvious to demonstrate that the risk is ALARP. For complex situations it may be difficult to reach a decision on the basis of 'good practice' or standards alone. Therefore for each risk, a discussion on ALARP demonstration has been provided which considers elimination of the activity, availability of practical alternatives where they exist, and the decision to rule out adoption of additional control measures (where they exist) because they involve grossly disproportionate sacrifices to the resultant reduction in risk.

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, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 5-2).



Source: NOPSEMA Decision-making – Criterion 10A(c) Acceptable level. N-04750-GL1637, Rev 0, Nov 2016

Figure 5-1 ALARP Decision Support Framework

Specifically, the framework considers impact severity and several guiding factors:

- activity type
- risk and uncertainty
- stakeholder influence.

Type A decision:
Risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. However, if good practice is not sufficiently well-defined, additional assessment may be required.

Type B decision:
There is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, and there are no conflict with company values, although there may be some partner interest, some persons may object, and it may attract local media attention. In this instance, established good practice is not considered sufficient and further assessment is required to support the decision and ensure the risk is ALARP.

Type C decision:
Typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met, additional assessment is required, and the precautionary approach applied for those controls that only have a marginal cost benefit.

These decision types (Figure 5-1) were applied in determining the level of assessment required to demonstrate that environmental impacts and risks are ALARP (Chapter 6).

The assessment techniques include:

- good practice
- engineering risk assessment
- precautionary approach.

5.2.1.1 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.

5.2.1.2 Engineering Risk Assessment

All potential impacts and risks that require further assessment are subject to an 'Engineering Risk Assessment'. In accordance with OGUK (2014), a comparative assessment of risks, costs, and environmental benefit was applied, based on a cost–benefit analysis between the environmental benefit and the cost of implementing the identified measure.

5.2.1.3 Precautionary Approach

Where the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to hazard management is applied (OGUK 2014).

Under the precautionary principle, environmental considerations take precedence over economic considerations, and a control measure that may reduce environmental impact is more likely to be implemented. This approach could have significant economic consequences to an organisation.

5.2.2 Demonstration of Acceptable Level

The environmental impact and risk is considered to be reduced to acceptable levels if:

- The level of residual environmental risk was assessed as being as low as reasonably practicable (ALARP; per Section 5.2); and
- The level of residual environmental risk associated with the activity was either Category 2, 3 or 4; and
- The activity is commonplace in current offshore practice (i.e., benchmarked), and is compliant with current industry/ExxonMobil Australia policy and standards, and Australian legislation; and
- Valid claims or objections to the risk from relevant persons or stakeholders, if any, are considered.

These factors are used to demonstrate acceptability in Section 6.

6 Environmental Risk and Impact Evaluation

The risk assessment process undertaken as part of the preparation of this environment plan assessed the environmental impacts and risks associated with Gippsland wide co-ordinated activities and activities specific to the VIC/P70 scope.

This section outlines:

1. A description of the hazards.
2. The potential impact on the environment.
3. A description of the controls in place to eliminate the risk where possible or reduce the risk of these events occurring to as low as reasonably practicable (ALARP).
4. A description of the risk ranking
5. A demonstration of ALARP; this outlines any other measures that were considered or actions taken to reduce the risks to ALARP.

   Under this heading the following elements are further addressed:

   - Impact on KEFs, BIAs, and MNES
   - Concerns raised by stakeholders
   - Ecologically Sustainable Development (ESD) evaluation
6. A demonstration of acceptability.

Thirty risks have been identified and assessed. Of these risks, 11 (RA 1 to RA 11) were identified and assessed as support activities, 11 (RA 12 to RA 22) were identified and assessed as drilling related activities within the operational area, with a further 8 risks (RA 23 to RA 30) identified and assessed as resulting from unplanned events.

6.1 Routine Offshore Activities

- MODU/Vessel Sewage discharge (RA 1)
- MODU/Vessel Seawater intakes (RA 2)
- Disposal of food wastes from MODU/vessels (RA 3)
- Accidental release of general, solid or hazardous waste (RA 4)
- MODU/vessel deck drainage (RA 5)
- MODU/Vessel oily water (bilge) discharge (RA 6)
- MODU/Vessel Ballast water discharge (RA 7)
- MODU/Vessel Biosecurity & Hull Biofouling (RA 8)
- Vessel and helicopter movements - Interaction with fauna (RA 9)
- Emissions to Air from MODU/Vessels (RA 10)
- Cooling water and brine Discharges (RA 11)

6.2 Operational Area Presence and Drilling Operations

- Hydraulic fluid discharge during ROV operations (RA12)
- Hydraulic Fluid Discharge from BOP Operations (RA 13)
- Planned Discharge - drilling mud and cuttings to seabed (RA 14)
- Planned Discharge - Drilling mud and cuttings at the sea surface (RA 15)
- Planned Discharge - Cement discharges at the seabed (RA 16)
- Planned Discharge - Cement at the sea surface (RA 17)
- Drilling Operations - Use and storage of radioactive sources (RA 18)
- Physical presence - Noise and light (RA 19)
- Physical presence - Interference with Commercial Fishing (RA 20)
- Physical presence - Interference with Commercial Shipping (RA 21)
- Physical presence – Seabed Disturbance (RA 22)

6.3 Unplanned Events

- Accidental Release – Dropped Objects (RA 23)
- Accidental Release - Loss of containment from vessel collision (RA 24)
- Accidental Release - Spills during Bulk transfer via bunkering hose (RA 25)
- Accidental Release - Foam Deluge System (RA 26)
- Accidental Release - Spills during Chemical and oils storage and handling (RA 27)
- Accidental Release - Loss of well integrity (RA 28)
- Accidental Release - Mooring failure/Emergency Disconnect (RA 29)
- Impacts resulting from Spill Response Strategies (RA 30).

The hazards associated with unplanned events are described in detail under each of the risk aspects listed below.

6.4 Environmental Performance Outcomes, Performance Standards and Measurement Criteria

This section outlines:

- The environmental performance outcomes against which the performance in protecting the environment can be measured and set the overall goals for the project.
- The performance standards that are applied to ensure control measures are operational at a level of performance which will manage the identified environmental impacts and risks of the activity to ALARP and acceptable levels.
- The measurement criteria that will define how environmental performance is measured against performance outcomes and performance standards.

The list of performance outcomes, performance standards and measurement criteria that have been developed for Esso's VIC/P70 exploration drilling operations are tabled under each risk element in the following sections. The responsibility for each performance standard has been assigned and accepted by the person in the designated role.

Note each line item numbered refers to the environmental "RA" Number for each item listed in Chapter 6 and also corresponds to the full risk assessment line item.

Every control listed in Chapter 6 is listed with the corresponding Environmental Performance Outcomes (EPO), Environmental Performance Standards (EPS) and Measurement Criteria.

6.4.1 Environmental Performance Outcomes (EPO)

Performance outcomes are a measurable level of performance required for the management of the environmental impacts and risks to ALARP and to an acceptable level.

Environmental performance outcomes have been developed for each environmental hazard in Section 6 as defined in the OPGGSE Regulations 2009.

6.4.2 Environmental Performance Standards (EPS)

Performance standards are a statement of performance required of a control measure. The Performance Standards have been set for every outcome and every control outlined in Section 6 in order to demonstrate how these controls will perform effectively to ensure that the risk of impacts to the environment are managed to ALARP and to an acceptable level.

6.4.3 Measurement Criteria

Measurement criteria have been outlined to demonstrate how the Outcomes and Standards are measured. This forms an auditable trail and can be used to measure and monitor the performance of all controls, to ensure they are working effectively to reduce the risk of impacts to the environment to ALARP and to an acceptable level.

6.5 MODU/Vessel Sewage discharge (RA 1)

At the time of preparation of this EP, Reference Case 2017: 1001: Planned discharge of sewage, putrescible waste and grey water (NERA 2917b) was open for comment but not yet finalised.

6.5.1 Hazard

Disposal of sewage overboard may temporarily increase nutrients and pathogens in the water column over a localised area, potentially impacting aquatic organisms and stimulating population numbers of some plankton organisms. Black and grey water volume is estimated at around 190 L per person per day, consisting of 30 L sewage, and the remainder consisting of kitchen waste, bathing and laundry waste (Shen & Xing, 2017). MODUs typically generate around 5-15 m^3 of waste water (consisting of sewage and grey water) per day depending on the number of persons on board (EMSA 2016).

6.5.2 Impact Assessment

Disposed waste may also impact shoreline areas if a large quantity of material is discharged or if discharge is conducted in proximity to shore.

A discharge of sewage and greywater has the potential to result in impacts to marine fauna from nutrient enrichment and increased scavenging behaviour.

The discharge of sewage and grey water from a moving vessel is broadly acceptable due to the high level of dilution achieved on release to the receiving waters. Several studies have quantified the high levels of dilution which are in the order of approx. 200,000 – 640,000 for effluents discharged behind large ships (USEPA 2002; Loehr *et al*. 2006). The discharge and subsequent level of dilution was shown to be adequate for mitigating localised toxicity impacts to marine biota from any changes in water quality.

This mixing zone boundary has been studied in the industry. Monitoring of sewage discharges has demonstrated that a 10 m^3 sewage discharge over 24hrs from a stationary source in shallow water, reduced to approximately 1% of its original concentration within 50 m of the discharge location. In addition to this, monitoring at distances 50, 100 and 200 m downstream of the platform and at five different water depths confirmed that discharges were rapidly diluted or nutrients rapidly metabolised and no elevations in water quality monitoring parameters (e.g. total nitrogen, total phosphorous and selected metals) were recorded above background levels at any station (NERA 2017b).

The ecological receptors with the potential to be exposed to changes in surface water quality are transient marine fauna, including whales, sharks, fish and marine reptiles. Specifically, the operational area lies within a foraging BIA for the Pygmy Blue Whale.

McIntyre and Johnson (1975) indicate that the influence of nutrients in open marine areas is much less significant than that experienced in enclosed areas and suggest that zooplankton composition and distribution are not affected in these areas. Black *et al.* (1994) state that BOD of treated effluent is not expected to lead to oxygen depletion in the receiving waters.

Sewage discharges promote scavenging behaviour by marine fauna or seabirds, resulting in localised increases, in turn promoting predatory behaviour. This may impact on plankton, marine mammals, fish and seabirds near the point of discharge (the operational area lies within a foraging BIA for the Pygmy Blue Whale). The rapid consumption of this food waste by scavenging fauna, and physical and microbial breakdown, ensures that the impacts of food waste discharges are insignificant and temporary, and receptors that may potentially be in the water column are not impacted.

The release of grey-water, sewage and their associated cleaning agents into the marine environment will increase nutrient availability and biological oxygen demand and potentially impact on the water quality around the discharge point. However, there have been no recent observations of phytoplankton blooms in the Gippsland Basin as a result of sewage discharge from platforms. No significant impacts are expected from the release of grey-water, sewage and their associated cleaning agents given the small quantities involved, the localised area of impact, rapid mixing in the high energy environment and high biodegradability/low persistence of the wastes.

As impacts on plankton are highly localised and temporary, impacts to the Pygmy Blue Whale (or other fauna) food source and any predator-prey dynamics is negligible. Several species of seabirds are known to have a large foraging range, and consequently may be exposed to these discharges.

However, as impacts from sewage discharge on water quality is highly localised, any potential change to scavenging behaviours from seabirds is expected to be incidental.

Consequently, the potential impacts and risks from the planned discharge of sewage and greywater have been evaluated as Category 4 (low), given this type of event is very unlikely to result in localised short-term impacts to a species of conservation value (seabirds; Pygmy Blue Whale) through impacting their foraging habitat.

6.5.3 Controls

The disposal of sewage and grey-water from MODU and vessels (AHT, Standby) is required to be in accordance with MARPOL Annex IV – Regulations for the Prevention of Pollution by Sewage from Ships, which requires appropriate processing of sewage wastes prior to discharge to the marine environment, through a certified sewage treatment system in accordance with MARPOL Annex IV - Regulation 11 - Discharge of sewage).

Comminuted and disinfected sewage using a MARPOL approved system is permitted as long as no less than 3 nautical miles from nearest land, while sewage not comminuted or disinfected may be discharged as long as no less than 12 nautical miles from nearest land (AMSA Discharge Standards under Protection of the Sea (Prevention of Pollution from Ships) Act 1983, AMSA Marine Orders Part 96 − Marine Pollution Prevention (Sewage) and the Navigation Act 2012).

Despite this, all project vessels are fitted with a MARPOL compliant sewage treatment system. Compliance of support vessel will be verified as part of premobilisation audits (Section 8.6.9). The MODU is also fitted with a MARPOL compliant sewage treatment system (Omnipure 12MX) which treats black and grey water and is suitable for a POB of 150 (Section 3.4.7). Sewage is disposed of onshore if the vessel cannot meet the regulatory requirements for sewage discharge. Therefore the likelihood of impacts to marine organisms within the drilling area are considered to be low. Sewage discharges are within parameters as defined within the draft Reference Case for Sewage discharges (NERA 2017b).

- Maintained and operational MARPOL compliant sewage treatment facility.
- A Planned Maintenance System (PMS) is in place to ensure that the MARPOL-approved sewage system continue to operate at the required standard.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessel contractors have a certified sewage treatment system for sewage treatment prior to discharge, via the pre-mobilisation inspection of the MODU and support vessels.

6.5.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.5.5 Demonstration of ALARP

Having a maintained and operational MARPOL compliant sewage treatment plant, confirmed by the pre-mobilisation inspection of the MODU, is considered sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2. As the nature of this risk is well understood, the activity is a well-established practice and the control measures are well established, the residual risk resulting from this activity is considered to be low (Category 4). The requirements under MARPOL for the sewage treatment plant to be operational and maintained, combined with inspection to confirm the MARPOL requirements are being complied with, are appropriate for managing the day to day risk of this activity.

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. The activity is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required. No stakeholder concerns have been raised to date regarding treated sewage discharges.

The alternatives, such as onboard holding tanks and onshore disposal, are not considered practicable due to cost considerations (i.e., the costs of implementing these measures are grossly disproportionate to the reduction in risk) and the environmental impacts (emissions, additional fuel use) associated with alternatives (onshore disposal; evaporation units). On this basis Esso considers the risk to be ALARP.

6.5.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. This is a type A ALARP decision. As all relevant standards (Esso, Australian Standards, MARPOL and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-1.

Table 6-1 RA 1: Environmental performance outcomes, standards and measurement criteria – Sewage Discharge

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
1	Sewage discharge from MODU/vessels	Impact from sewage disposal to the marine environment.	Sewage discharges comply with MARPOL Annex V requirements.	MARPOL-approved Sewage Treatment Plant	A MARPOL-approved sewage system will be fitted to the MODU and support vessels	Valid International Sewage Pollution Prevention certificate.	MODU OIM/Vessel Master
				Diamond MODU and vessel Planned Maintenance System (PMS)	Sewage treatment plants are maintained in accordance with the corrective and preventative maintenance program.	MODU inspection records confirm the on-board Sewage Treatment Plant is maintained as per equipment maintenance schedules	MODU OIM

6.6 MODU/Vessel Seawater intakes (RA 2)

6.6.1 Hazard

Marine fauna may be trapped or entrained in seawater intakes. This may result in morbidity or mortality.

6.6.2 Impact Assessment

Open ocean intakes are equipped with coarse bar screens, which have openings between the bars of 20 mm to 150 mm followed by smaller-size screens with openings of 1 mm to 10 mm, which preclude the majority of the adult and juvenile marine organisms (fish, crabs, etc.) from entering the plants. Most marine organisms are removed by screening and downstream filtration before this seawater enters the plant.

6.6.3 Controls

- All seawater intakes on MODU and support vessels are designed so that the risk of entrapment of marine fauna is minimised.
- A Planned Maintenance System is in place to ensure that grating on the seawater intakes are maintained and in good working order.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel design meets industry best practise with regards to seawater intakes, via the pre-mobilisation inspection of the MODU and support vessels.

6.6.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.6.5 Demonstration of ALARP

Ensuring that the grating on the seawater intakes is in place and maintained is considered a sufficient control measure to reduce the impacts and risks associated with this hazard to ALARP.

Use of fine screens would further reduce the risk of entrapment, especially for smaller organisms. However, this would result in rapid fouling and blockages of the seawater intakes, requiring in-water intervention and /or regular disassembly to rectify. The expense, operational losses and the additional safety considerations are not considered justifiable against the benefits. This is a Type A ALARP decision, as this approach is best industry practise, the risks are well understood, and the potential impacts are low.

The potential impact is localised and short-term, and is not considered as having the potential to affect biological diversity and ecological integrity or result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.6.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards, MARPOL and Industry best practice) have been met, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-2 .

Table 6-2 RA 2: Environmental performance outcomes, standards and measurement criteria - Seawater intakes

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
2	Seawater intakes	Injury to marine mammals at water intakes	No injury to marine mammals at water intakes	Seawater intakes are designed to minimise the risk of entrapment of marine fauna	• All seawater intakes on MODU and support vessels are designed so that the risk of entrapment of marine fauna is minimised.	• Pre-mobilisation inspection confirms that MODU/vessel seawater intakes have been fitted with grates or other measures to minimise the risk of entrapment of marine mammals.	Contract Administrator
				Diamond MODU and vessel Planned Maintenance System	• The PMS confirms record of maintenance of seawater intakes.	• PMS records confirm that vessel & MODU contractors have met their environmental performance requirements and deficiencies have been corrected in relation to seawater intakes.	MODU OIM

6.7 Disposal of food wastes from MODU/vessels (RA 3)

6.7.1 Hazard

Disposal of food scraps/putrescible wastes overboard may temporarily increase nutrients in the water column over a localised area, potentially impacting aquatic organisms and stimulating population numbers of some plankton organisms, fish and seals. Ingestion by marine fauna may result in morbidity or mortality.

6.7.2 Impact Assessment

The food scraps from the vessels are required to be treated in accordance with MARPOL Annex V – Regulations for the Prevention of Pollution by Garbage from Ships (MARPOL, 2007), which requires macerating of food waste prior to discharge to the marine environment . The MODU has adopted MARPOL requirements.

Food scraps are biodegradable and macerated scraps (to <25 mm diameter) will be rapidly dispersed and assimilated in the high energy marine environment. Food scraps are disposed of onshore if the vessel cannot meet the regulatory requirements for discharge. Therefore the likelihood of impacts to marine organisms within the drilling area is considered to be low (see Section 6.5.2).

There have been no recent observations of phytoplankton blooms as a result of food scraps discharge from vessels in the Gippsland Basin. No significant impacts are expected from food waste given the small quantities involved, the localised area of impact, the rapid mixing in the high energy environment and the high biodegradability/low persistence of the wastes. Disposal of food wastes within parameters, as defined MARPOL Annex V and the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 and the Navigation Act 2012 will be verified as part of audits and inspections (see Section 8.6.9 for an overview).

Esso's OIMS Framework, as described in Section 0, establishes expectations for addressing risks inherent in the business and ensuring hazards are safely controlled. OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) contributes to the control of this risk through the pre-mobilisation inspection of the MODU and support vessels.

6.7.3 Controls

- Maintained and operational MARPOL compliant macerator.
- Discharge of putrescible waste in accordance with MARPOL Annex V, the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 and the Navigation Act 2012. Discharge permitted if food waste comminuted or ground to particle size less than 25 mm, while en-route, as far as practicable from the nearest land, but in any case, greater than or equal to 3 NM from the nearest land.
- A Planned Maintenance System is in place to ensure that the food/putrescible waste macerators continue to operate at the required standard.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessel contractors macerate putrescible waste (< 25mm size) prior to discharge, or the waste will be taken ashore for disposal via the pre-mobilisation inspection of the MODU and support vessels.

6.7.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.7.5 Demonstration of ALARP

Having a maintained and operational MARPOL compliant macerator, confirmed by the pre-mobilisation inspection, is considered a sufficient control measure to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The requirements under MARPOL, as confirmed by inspection, are appropriate for managing the day to day risk of this activity.

Other controls and alternatives were considered, in accordance with Section 5.2, including the disposal of food scraps onshore. This would require storage in dedicated holding tanks for which there is limited space on a MODU/vessel, additional lifting operations and transport to an onshore port. Although food scraps are stored temporarily for onshore disposal during equipment malfunction and maintenance, this is not considered to be practicable on a permanent basis. In addition to safety and hygiene considerations, additional vessel trips to shore increases the consumption of diesel and hence atmospheric emissions. The time and cost involved in implementing these measures is grossly disproportionate to the reduction in risk.

The potential impact is localised and short-term, which is not considered as having the potential to affect biological diversity and ecological integrity, and is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required. No stakeholder concerns have been raised to date regarding treated sewage discharges. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.7.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-3.

Table 6-3 RA 3: Environmental performance outcomes, standards and measurement criteria – Food Wastes

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
3	Food discharge from MODU/vessels	Impact from food disposal to the marine environment.	Putrescible waste complies with MARPOL Annex V requirements.	Food waste macerated	Discharge of food waste shall be controlled by macerating galley waste to ≤25 mm (using an onboard food macerator) before discharge	Garbage Record Book shows that putrescible waste is macerated before discharge	MODU OIM/Vessel Master
				Food waste discharges	Macerated putrescible waste is only discharged overboard when the vessel is greater than 3 NM from the coastline and while proceeding en-route. Un-macerated putrescible waste is only discharged overboard when the vessel is more than 12 NM from the coastline and while proceeding en-route.	Discharge log verifies location of vessel is >3 NM from the coast (if waste is macerated) of >12 NM at time of discharge (if waste is not macerated).	MODU OIM/Vessel Master
						All crew are aware of the garbage management arrangements through the information provided in the induction	
				Diamond MODU and vessel Planned Maintenance System	Macerators are maintained in accordance with the corrective and preventative maintenance program.	MODU inspection records confirm the on-board macerator is maintained and operational as per equipment maintenance schedules	MODU OIM/Vessel Master

6.8 Accidental release of general, solid or hazardous waste (RA 4)

6.8.1 Hazard

The handling and storage of materials and waste on board MODUs and vessels has the potential for accidental over-boarding of hazardous/non-hazardous materials and waste.

The types of waste generated by the MODU and support vessels include general and hazardous wastes (solid and liquid). When generated, waste materials are segregated according to the type, contained in appropriately labelled containers or covered skips and placed in a waste store pending transport for onshore disposal, or recycling where possible. The types of waste that will be disposed of to shore, but have the potential to be accidentally dropped or disposed overboard due to overfull bins or crane operator error are summarised in Table 6-4.

Table 6-4 General and Hazardous waste generated during drilling campaign

Non-hazardous materials	Hazardous materials
• Paper and cardboard • Wooden pallets • Scrap steel, metal, aluminium, cans • Glass • Plastics.	• Hydrocarbon-contaminated materials (e.g., oily rags, pipe dope, oil filters) • Batteries, empty paint cans, aerosol cans, fluorescent tubes, printer cartridges • Contaminated personal protective equipment (PPE) • Acids and solvents (laboratory wastes) • Laboratory wastes • Waste chemicals • Empty drums containing oil or chemical residues.

6.8.2 Impact Assessment

Inappropriate disposal of general refuse, solid and hazardous waste into the marine environment could cause visual pollution, temporary change in the water quality and death or injury of marine fauna (through ingestion, entanglement, suffocation).

6.8.2.1 Hazardous Materials and Waste

The Hazardous Waste (Regulation of Exports and Imports) Act 1989, which covers hazardous waste only, defines hazardous waste as:

- **Waste prescribed by the regulations**, where the waste has any of the characteristics mentioned in Annex III to the Basel Convention. These characteristics include Explosive, Flammable Liquids/Solids, Poisonous, Toxic, Ecotoxic and Infectious Substances.
- **Wastes that belong to any category contained in Annex I to the Basel Convention**, unless they do not possess any of the hazardous characteristics contained in Annex III. Wastes in Annex I include: clinical wastes; waste oils/water; hydrocarbons/water mixtures; emulsions; wastes from the production, formulation and use of resins, latex, plasticizers, glues/adhesives; wastes resulting from surface treatment of metals and plastics; residues arising from industrial waste disposal operations; and wastes which contain certain compounds such as: copper, zinc, cadmium, mercury, lead and asbestos.
- **Household waste**; or
- **Residues** arising from the incineration of household waste.

Hazardous materials and wastes released to the sea causes pollution and contamination, with either direct or indirect effects on marine organisms. Impacts from an accidental release would be limited to the immediate area surrounding the release, prior to the dilution of the chemical with the surrounding seawater. In an open ocean environment such as the operational area, it is expected that any release – unless substantial - would be rapidly diluted and dispersed.

Solid hazardous materials, such as paint cans containing paint residue, batteries and so forth, would settle on the seabed if dropped overboard (see Section 6.27: Dropped Objects). Over time, this may result in the leaching of hazardous materials to the seabed, which is likely to result in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. Given the size of materials release it is expected that only very localised impacts to benthic habitats within the operational area would be affected and unlikely to contribute to a significant loss of benthic habitat or species diversity.

All hazardous waste will be disposed of at appropriately licensed facilities, by licenced contractors, therefore impacts such as illegal dumping or disposal to an unauthorised onshore landfill that is not properly lined are unlikely to result from the project.

6.8.2.2 Non-hazardous Materials and Waste

Discharged overboard, non-hazardous wastes can cause smothering of benthic habitats as well as injury or death to marine fauna or seabirds through ingestion or entanglement (e.g., plastics caught around the necks of seals or ingested by seabirds and fish).

C&R Consulting (2009) reported that at least 77 species of marine wildlife found in Australian waters have been impacted by entanglement in, or ingestion of, plastic debris during the last three and a half decades (1974-2008). The affected species include six species of marine turtles, 12 species of cetaceans, at least 34 species of seabirds, dugongs, six species of pinnipeds, at least 10 species of sharks and rays, and at least eight other species groups.

Most records of impacts of plastic debris on wildlife relate to entanglement, rather than ingestion. However, the rate of ingestion of plastic debris by marine wildlife is difficult to assess as not all dead animals are necropsied or ingested plastic debris may not be recorded where it is not considered as the primary cause of death.

The patterns of reports of entanglement in and ingestion of plastic debris by wildlife in Australian waters are likely to be influenced by factors such as the size and distribution of populations, foraging areas, migration patterns, diets, proximity of species to urban centres, changes in fisheries equipment and practices, weather patterns, and ocean currents, as well as the frequency of monitoring and/or observation of wildlife.

Species dominating existing entanglement and ingestion records are turtles and humpback whales. Australian pelicans and a number of cormorant species are also frequently reported. If dropped objects such as bins are not retrievable by ROV, these items may permanently alter very small areas of seabed, resulting in the loss of benthic habitat. However, as with most subsea infrastructure, the items themselves are likely to become colonised by benthic fauna over time (e.g., sponges) and become a focal area for sea life, so the net environmental impact is likely to be neutral. This would affect extremely localised areas of seabed and would be unlikely to contribute to the loss of benthic habitat or species diversity.

Seals have been observed offshore with injuries from entanglement with plastic that have occurred either onshore or en-route to offshore facilities within Gippsland basin. There are no recent records of incidents associated with the disposal of floating waste to the marine environment from offshore facilities within Gippsland basin that has caused either visual pollution or death or injury to marine fauna.

Given the restricted exposures and limited quantity of marine pollution expected from this program, it is expected that any impacts from marine pollution may have an impact resulting from a localised short-term impact to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

Vessels are required to be compliant with MARPOL Annex V, while MODU waste management procedures are in compliance with MARPOL Annex V (Regulations for the Prevention of Pollution by Garbage from Ships) (Section 3.4.7.3). This is enforced through AMSA Marine Order Part 95 (Marine pollution prevention — garbage) and Marine Order Part 94, (Packaged harmful substance). MARPOL Annex V requires that a garbage / waste management plan and garbage record book is in place and implemented.

Victorian legislative instruments for waste management include the Environment Protection Act 1970 (Vic) and the State Environment Protection Policy (Waters of Victoria) – Clause 47 (Ports, marinas and vessels).

Vessel waste management procedures require housekeeping provisions be made for the safe handling and storage of materials such as dirty rags, trash, waste oil, and chemicals. Flammable liquids and chemicals spilled on vessel should be immediately cleaned up. Particular care should be taken to provide proper storage for paint and chemicals.

The potential impact is localised and short-term, and is not considered as having the potential to affect biological diversity and ecological integrity, or to result in serious or irreversible environmental damage.

Consequently, no further evaluation against the principles of ESD is required. No stakeholder concerns have been raised to date regarding waste management on the MODU/support vessels. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.8.3 Controls

- Vessel waste management procedures will be in compliance with MARPOL Annex V (Prevention of Pollution by Garbage from Ships) Requirements.
- A waste management plan for the VIC/P70 Exploration Drilling project will be in place at start of field operations, as a bridging document between MODU waste management procedures and Esso waste management procedures. The waste management plan will require all waste to be transported ashore for appropriate disposal.
- Inductions for all vessel crew provide an opportunity to make personnel aware of the requirements of the Waste Management Plan and housekeeping provisions during the implementation of the activity
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors store general refuse, solid and hazardous waste appropriately on the vessels and transfer the waste onshore for disposal, via the waste management bridging document and the pre-mobilisation inspection.
- OIMS System 6-5 (Environmental Management) ensures a waste management manual is in place that establishes and maintains waste management procedures for each type of waste generated including documentation requirements for handling, storage, and disposal of hazardous materials. The bridging document establishes links between Esso's waste management procedures and the MODU/vessels' waste management procedures.
- Also see Section 6.27: Dropped Objects.

6.8.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.8.5 Demonstration of ALARP

The controls listed above are considered sufficient to reduce the impacts and risks associated with waste management to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, well-established practices are in place and the residual risk resulting from this activity is considered to be low (Category 4). The waste management plan, in compliance with the requirements under MARPOL, is appropriate for managing the day to day risk of this activity.

The potential impact of incorrect waste management is localised and short-term, and is not considered as having the potential to affect biological diversity and ecological integrity, or to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required. No stakeholder concerns have been raised to date regarding waste management on the MODU/vessels. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.8.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-5.

Table 6-5 RA 4: Environmental performance outcomes, standards and measurement criteria – Solid Wastes (RA4)

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
4	Disposal of solid/general waste from MODU/vessels	Accidental release of solid general / hazardous waste to marine environment from MODU/vessels.	No discharge of solid general or hazardous waste to the marine environment from MODU/vessels.	Garbage / waste management plan	A Garbage Management Plan will be in place and implemented by the MODU and support vessels	Review of the Garbage Management Plan confirms it is in place and maintained	MODU (OIM)/Vessel Master
				Garbage record book	A garbage record book /log will be in place and maintained for the MODU and support vessels	Review of the garbage record book confirms it is in place and maintained	
				Waste management training / induction	All MODU crew undertake site inductions, which include a component on storing and handling hazardous materials and wastes	Presentation and attendance sheets verify that MODU personnel attended the induction	
				Waste Handling and Disposal	Handling of solid and hazardous wastes on-board the MODU and support vessels will comply with the requirements of Protection of the Seas (Prevention of Pollution from Ships) Act 1983, Marine Order – Part 95 – Garbage. This may include measures such as: • No discharge of general wastes or plastics to the marine environment. • Waste containers covered with lids to prevent any solid wastes from blowing overboard. • All solid, liquid and hazardous wastes (other than bilge water, sewage and food wastes) are incinerated or compacted (if possible) and stored in designated areas before being sent ashore for recycling, disposal or treatment. • Any liquid waste storage on deck must have at least one barrier (i.e. bunding) to prevent deck spills entering the marine environment. This can include primary bunding	Garbage Record Book verifies relevant garbage transferred to shore for treatment/ disposal. Visual inspection verifies that waste is stored and handled according to its waste classification. Waste receptacles are properly located, sized, labelled, covered and secured for the waste they hold.	

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					and/or secondary containment measures. • Containment pallets, absorbent pad barriers in place and storage at designated waste location onboard vessel or MODU. • Correct segregation of solid and hazardous wastes. containment pallet, transport		

6.9 MODU/Vessel deck drainage (RA 5)

6.9.1 Hazard

Discharge of deck drain water from vessels and MODU, contaminated with hydrocarbons and / or other chemicals (e.g., detergents) may cause a temporary change in the water quality and acute or chronic impacts to marine organisms.

Periodic deck wash-down is necessary to prevent the build-up of dirt and grime which causes decks to become slippery and unsafe. During these wash-down events it is possible that minor diluted quantities of oil and grease, mud and chemicals may be discharged.

Spills within designated deck containment areas where chemicals, oils and wastes are stored are either pumped out to the waste oil settling tank or mopped up utilising spill clean-up materials.

6.9.2 Impact Assessment

A discharge of contaminated deck drain water has the potential to result in chronic effects to plankton through potential toxicity in the water column.

Decks or deck drains which only contain rainwater are directed overboard and all overboard drains are fitted with scupper plugs to be closed in the event of a spill on the deck. MODU drainage meets industry best practise (Section 3.4.7) while vessel drainage is required to meet MARPOL requirements (Annex 1: Regulations for the Prevention of Pollution by Oil). Low concentrations of contaminants are likely to be present in the overboard discharges and any localised change in water quality will rapidly disperse in the high energy marine environment; therefore the impact on marine organisms is assessed to be low.

As outlined in Section 3.4.7, deck drainage onboard the MODU is separated in open and closed drain systems:

- **Uncontaminated open drain system**: non-hazardous water from the decks (e.g. stormwater) passes through a scupper system directly to the sea by way of piping chutes or dumps.
- **Contaminated open drain system**: Drainage from separate higher risk collection areas is led directly to the skimmer tank and automatic oily water separator (OWS). The OWS processes the fluid, passing the clean phase with less than 15 ppm oil directly to the sea and any oil is forced to the dirty oil tank for eventual disposal to shore facilities (as per bilge water). Any discharge detected with higher than 15 ppm oil is redirected back to the skimmer tank. Equipment with the potential to leak hazardous materials have coamings fitted to contain any potentially polluting fluids and these are either drained to drain tanks or emptied manually into storage containers for disposal.
- **Bilge water system** (Section 6.10): The drainage from engine room and auxiliary machine pit bilges is collected in the dirty oil tank for eventual onshore transfer for disposal. Spent grease and lubricants for other equipment is collected in storage drums and stored in a designated hazardous storage area away from potential sources of heat or flames. All fuel and bulk lubricant disposal is fully documented using an oil record book.

Discharge of deck drainage is permissible under MARPOL Annex I (Regulations for the Prevention of Pollution by Oil), provided it meets MARPOL requirements.

The drain, effluent and waste systems onboard the MODU are designed to comply with the requirements of:

- ABS Rules for Building and Classing Mobile Offshore Drilling Units 2001; and applicable updates and corrigenda's, effective at 10 March 2006, Part 4, Chapter 2, Section 4, Fuel oil and other piping systems
- IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units, 1989, Chapter 9 Fire Safety
- IMO International Convention for Prevention of Pollution from Ships, 1973, 1978 Protocol (MARPOL 73/78)
- IMO Resolution MEPC.107(49) 2003, Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships.

Given the low concentration of hydrocarbon being discharged, the infrequent nature of this discharge, the rapid dispersion in the high energy marine environment, the dilution effect once discharged and the low number of sensitive receptors known to occur in the operational area, the discharge is anticipated to have little or no impact on the receiving environment.

There is potential for short-term impacts to species that rely on plankton as a food source. Any impact to prey species would be temporary as the duration of exposure would be limited, and fish larvae and other plankton are expected to rapidly recover as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985).

Consequently, the potential impacts and risks from discharge from deck drains are considered to be localised and short-term, and have been rated as a Level IV consequence, with the probability of this discharge having significant impacts to be very unlikely (D), resulting in a Category 4 risk.

6.9.3 Controls

- MODU vessel and deck drainage procedures meet MARPOL Annex I (Regulations for the Prevention of Pollution by Oil) requirements.
- Drainage from separate higher risk collection areas is led directly to the skimmer tank and automatic oily water separator (OWS), for discharge through bilge water system (Section 6.10).
- Selection of lox toxicity chemicals, in accordance with Esso chemical selection procedure (Section 8.9.1).
- A Planned Maintenance System (PMS) is in place to ensure that the OWS and ODME (appropriate to the vessel size) are routinely calibrated and maintained.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessel meet MARPOL requirements.

6.9.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.9.5 Demonstration of ALARP

Having a maintained and operational drainage system, compliant with MARPOL, is considered sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The requirements under MARPOL are appropriate for managing the day to day risk of this activity. This is a Type A ALARP Decision. Since uncontaminated open drain discharges do not affect biological diversity and ecological integrity, and the risk is low, no further evaluation against the principles of ESD is required.

Other controls and alternatives that have been considered, in accordance with Section 5.2, include the treatment and/or collection of all stormwater discharges. This would require storage in dedicated holding tanks for which there is limited space either on or below deck, as well as increased capacity of OWS systems. This is not considered to be practicable due to the time and costs of implementing these measures being grossly disproportionate to the reduction in risk, and safety considerations involved.

The installation of an electric marine water evaporator to evaporate away the water portion of deck drainage water is not considered practicable due to cost considerations and the environmental impacts associated with emissions from the generator. Such a generator would also necessitate additional fuel storage (most likely to be diesel), which increases diesel spill related risks.

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-6.

Table 6-6 RA 5: Environmental performance outcomes, standards and measurement criteria – Deck Drainage

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
5	MODU/Vessel deck drainage	Impact on marine ecosystems.	Discharge of contaminated deck drainage to marine environment is in accordance with MARPOL Annex I (Regulations for the Prevention of Pollution by Oil) requirements.	Separation of uncontaminated and contaminated open drain system	Non-hazardous water from the decks (e.g. stormwater) passes through a scupper system directly to the sea by way of piping chutes or dumps.	Oil record book verifies deck drainage systems discharges were compliant with these requirements	MODU OIM/Vessel Master
					Drainage from separate higher risk collection areas is led directly to the skimmer tank and automatic Oily Water Separator (OWS).		
				MARPOL Compliant Oily Water Separation (OWS) Equipment	For vessels > 400 tonnes, bilge water passes through a MARPOL approved Oily Water Separator (OWS).	OWS International Oil Pollution Prevention (IOPP) certificate or equivalent documentation appropriate to vessel class.	MODU OIM/Vessel Master
				Comply with MARPOL Annex I bilge discharge requirements.	For vessels > 400 tonnes, discharge of contaminated deck drainage occurs if: • Treatment is via a MARPOL compliant oily water separator; • The OIW content is less than 15 ppm; • Oil Detection Monitoring Equipment (ODME) and control equipment are operating. For vessels < 400 tonnes treated bilge is discharged if: • Vessel is proceeding en-route; • Approved treatment equipment ensures oil content less than 15 ppm. • If the above is not met the oil residue must be retained in on-board storage tanks for onshore disposal or further treatment.	Pre-mobilisation inspection confirms that oily water discharges comply with MARPOL Annex I bilge discharge requirements.	Vessel Contract Administrator
						Oil record book verifies bilge discharges were compliant with these requirements	MODU OIM/Vessel Master
				Oil-in water separators (OWS) System Reliability	OWS and Oil Detection Monitoring System (ODME) (appropriate to vessel size) are routinely maintained	Planned Maintenance System (PMS) records confirm OWS and ODME are routinely	MODU OIM/Vessel Master

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					and system elements calibrated to ensure reliable discharge concentrations are being met.	calibrated and maintained	
				Onshore disposal of residual oil	The residual oil from the OWS is pumped to tote tanks and disposed of onshore.	The Oil Record Book verifies that bulk oil is transferred to shore.	MODU OIM/Vessel Master

6.10 MODU/Vessel oily water (bilge) discharge (RA 6)

6.10.1 Hazard

Discharge of machinery space drainage (bilge) contaminated with hydrocarbons and/or other chemicals (e.g., detergents) may cause a temporary change in the water quality.

The MODU is fitted with MARPOL-compliant oil-in water separators (OWS), with effluent monitored through an inline Oil Detection Monitoring System (ODME), and with out-of-spec waste water (>15 ppm Oil-in-Water, OIW) returned to slops tanks (Section 3.4.7).

6.10.2 Impact Assessment

A discharge of contaminated bilge water has the potential to result in chronic effects to plankton through potential toxicity in the water column.

Marine equipment and machinery spaces on the MODU/vessels are fully contained and have dedicated drains leading to the oily water separator system, which is required to comply with MARPOL and is tested and certified to verify compliance. Oily residues/concentrate generated in this process are containerised in transit tanks and returned to shore for disposal at licenced waste disposal facilities. Each shipment of wastes to shore is accompanied by a manifest and recorded in the shipboard oil record book.

Discharge of treated effluent from vessel bilges is permissible under MARPOL Annex I (Regulations for the Prevention of Pollution by Oil), provided it meets MARPOL requirements for vessels over 400 T (MARPOL compliant OWS, OIW <15 ppm, ODMS), and vessels contracted to undertake activities for Esso are equipped with an oil-water separator capable of achieving effluent standards specified by the Marine Environment Protection Committee of the IMO.

The drain, effluent and waste systems onboard the MODU are designed to comply with the requirements of:

- ABS Rules for Building and Classing Mobile Offshore Drilling Units 2001; and applicable updates and corrigenda’s, effective at 10 March 2006, Part 4, Chapter 2, Section 4, Fuel oil and other piping systems
- IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units, 1989, Chapter 9 Fire Safety
- IMO International Convention for Prevention of Pollution from Ships, 1973, 1978 Protocol (MARPOL 73/78)
- IMO Resolution MEPC.107(49) 2003, Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships.

OSPAR (2014) indicates that the predicted no effect concentration (PNEC) for marine organisms exposed to dispersed oil is 70.5 ppb. It should be noted that this PNEC is based upon no observed effect concentrations (NOEC) after exposure to certain concentrations for an extended period that was greater than 7 days (OSPAR 2014).

USEPA (2002) modelled the plume off liquid discharges, in addition to tracking the plume of liquid. The effluent was marked with a fluorescent dye for tracing dilution rates in the plume. Predicted initial dilution rate was 40,000:1, whereas measured values varied between 200,000:1 and 640,000:1.

Given the low concentration of hydrocarbon being discharged, the infrequent nature of this discharge, the rapid dispersion in the high energy marine environment, the dilution effect once discharged and the low number of sensitive receptors known to occur in the operational area, the discharge is anticipated to have little or no impact on the receiving environment.

There is potential for short-term impacts to species that rely on plankton as a food source. Any impact to prey species would be temporary as the duration of exposure would be limited, and fish larvae and other plankton are expected to rapidly recover as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP 1985).

Consequently, the potential impacts and risks from planned discharge of treated bilge are considered to be localised and short-term, and have been rated as a Level IV consequence, with the probability of this discharge having significant impacts being very unlikely (D), resulting in a Category 4 risk.

6.10.3 Controls

- Maintained and operational oily water separator and oil in water analyser compliant with MARPOL Annex I: Regulations for the Prevention of Pollution by Oil
- MODU procedures for oily water discharges (e.g. Section 3.4.7)
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessels meet MARPOL requirements.

6.10.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.10.5 Demonstration of ALARP

Having a maintained and operational oily water separator and oil in water analyser compliant with MARPOL is considered sufficient control measure to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The requirements under MARPOL are appropriate for managing the day to day risk of this bilge water discharge. This is a Context A ALARP Decision. Since bilge water discharges do not affect biological diversity and ecological integrity, and risk is low, no further evaluation against the principles of ESD is required.

Other controls and alternatives that have been considered, in accordance with Section 5.2, including the disposal of oily water onshore. This would require storage in dedicated holding tanks for which there is limited space either on or below deck, additional lifting operations and/or transport to an onshore port for transfer by road tanker to a licensed waste treatment plant. This is not considered to be practicable due to the time and costs of implementing these measures being grossly disproportionate to the reduction in risk, and safety considerations involved.

The installation of an electric marine water evaporator to evaporate away the water portion of oily bilge water is not considered practicable due to cost considerations and the environmental impacts associated with emissions from the generator. Such a generator would also necessitate additional fuel storage (most likely to be diesel), which increases diesel spill related risks.

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.10.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-7.

Table 6-7 RA 6: Environmental performance outcomes, standards and measurement criteria – Bilge Discharges

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
6	MODU/Vessel oily water (bilge) discharge	Impact on marine ecosystems	Bilge discharges from vessels and MODU comply with MARPOL Annex I bilge discharge requirements.	Oily-water Separation (OWS) Equipment	For vessels > 400 tonnes, bilge water passes through a MARPOL approved Oily Water Separator (OWS).	OWS International Oil Pollution Prevention (IOPP) certificate or equivalent documentation appropriate to vessel class.	MODU OIM/Vessel Master
				Comply with MARPOL Annex I bilge discharge requirements.	For vessels > 400 tonnes, treated bilge water discharge occurs if: • Treatment is via a MARPOL compliant oily water separator; • The OIW content is less than 15 ppm; • Oil Detection Monitoring Equipment (ODME) and control equipment are operating. For vessels < 400 tonnes treated bilge is discharged if: • Vessel is proceeding en-route; • Approved treatment equipment ensures oil content less than 15 ppm. • If the above is not met the oil residue must be retained in on-board storage tanks for onshore disposal or further treatment.	Pre-mobilisation inspection confirms that an OIW Separator is in place, that an ODME is operational, and certification demonstrates compliance with MARPOL Annex I for bilge discharge requirements.	Vessel Contract Administrator
						Vessel/MODU oil record book shows all discharges met <15ppm oil in water requirements	MODU OIM/Vessel Master
				Oil-in water separators (OWS) System Reliability	OWS and Oil Detection Monitoring System (ODME) (appropriate to vessel size) are routinely maintained and system elements calibrated to ensure reliable discharge concentrations are being met.	Planned Maintenance System (PMS) records confirm OWS and ODME are routinely calibrated and maintained	MODU OIM/Vessel Master
				Onshore disposal of residual oil	The residual oil from the OWS is pumped to tote tanks and disposed of onshore.	The Oil Record Book verifies that bulk oil is transferred to shore.	MODU OIM/Vessel Master

6.11 MODU/Vessel ballast water discharge (RA 7)

6.11.1 Hazard

Marine vessels can carry ballast seawater containing marine species that, when discharged, has the potential to translocate the marine species into areas where they could displace native species, or interfere with ecosystem processes in other ways.

Note that biofouling risk has been addressed separately, under RA 8 (Section 6.12).

6.11.2 Impact Assessment

Planned discharge of ballast water has the potential to introduce a marine pest. The Australian Government biosecurity department indicates that ballast water is responsible for 20-30% of all marine pest incursions into Australian waters (DAWR, 2015a). The Department of Agriculture & Water Resources (DAWR) (formerly AQIS) declares that all saltwater from ports or coastal waters outside Australia's territorial seas presents a high risk of introducing foreign marine pests into Australia (AQIS 2011).

The DAWR has introduced mandatory ballast water regulations, where ballast water must be exchanged outside Australia's territorial sea. The Territorial Sea is a belt of water not exceeding 12 NM in width, measured from the territorial sea baseline. Australia's sovereignty extends to the territorial sea, its seabed and subsoil, and to the air space above it. This sovereignty is exercised in accordance with international law as reflected in the Convention. The major limitation on Australia's exercise of sovereignty in the territorial sea is the right of innocent passage for foreign ships. The territorial sea around certain islands in the Torres Strait is 3 NM.

This measure greatly reduces the risk of Invasive Marine Pests (IMPs) from international shipping, so that the risk of IMP introduction into territorial waters from international shipping should be negligible to low. Risk from ballast water exchange by domestic ships within the territorial sea (e.g. at any Australian port) depends on where the ballast water was last acquired.

The Marine Pests Interactive Map (DAFF 2017) indicates that ports such as Portland, Geelong, Melbourne and Eden are known to harbour the following species:

- Northern pacific sea star – See Section 6.12.2.
- European shore crab – See Section 6.12.2.
- New Zealand screw shell – See Section 6.12.2
- European fan worms (*Sabella spallanzannii* and *Euchone* sp.) – attaches to hard surfaces, artificial structures and soft sediments, preferring sheltered waters up to 30 m deep. It reached Port Phillip Bay in the mid-1980s and is a nuisance fouler (ParksVic 2017).
- Japanese kelp (*Undaria pinnatifida*) – occupies cold temperate oceanic waters up to 20 m deep, growing on rock, reef, stones and artificial structures. It rapidly forms dense forests and overgrows native species. It first established in Port Phillip Bay in the 1980s (ParksVic 2017).
- Asian date mussel (*Musculista senhousia*) – prefers soft sediments in waters up to 20 m deep, forming mats and altering food availability for marine fauna.
- European shell clam (*Varicorbula gibba*) – burrows into soft-bottomed habitats in waters up to 150 m deep in temperate waters, forming mats and altering food availability for marine fauna.

These species have the potential to be picked up in the ballast water and transferred to other areas. Two species (Pacific oyster and European green crab) are also known to occur in the Gippsland Lakes (Hirst & Bott 2016).

The known and potential impacts of IMP introduction include:

- Reduction in native marine species diversity and abundance;
- Displacement of native marine species;
- Socio-economic impacts on commercial fisheries; and
- Changes to conservation values of protected areas.

No ballast water discharge or exchange is expected to occur within the Australian territorial sea boundary. Open-ocean ballast water discharge or exchange is considered the best compromise between efficacy, environmental safety and economic practicality to manage the potential risk if IMPs (DOF 2009). The two key assumptions underpinning this are:

- Changes in biological condition (including salinity) of source and recipient waters (i.e. coastal or estuarine IMPs) are presumed unlikely to survive in ocean waters, and vice versa.
- The transport of viable released non-indigenous organisms from open-ocean to coastal and estuarine waters, by ocean currents, is considered extremely unlikely.

Research indicates that biofouling has been responsible for more foreign marine introductions than ballast water (DAWR 2015b). Section 6.12 (Vessel Biosecurity) provides an overview of recent biosecurity incidents in Victorian waters, largely relating to hull biofouling.

The potential risks from ballast water discharge are considered to be low, considering that support vessels and MODU are operating well outside the Australian Territorial Sea, are required to meet Australian Ballast Water Management Requirements (DAWR 2017). The MODU and support vessels have been continuously operating in Australian waters, thereby further reducing this risk. Consequently, this risk has been rated as a Level IV consequence, with the probability of ballast water impacts to be very unlikely (D), resulting in a Category 4 risk.

6.11.3 Controls

- All project vessels have fulfilled the requirements of the Australian Ballast Water Management Requirements (DAWR 2017) if they have mobilised from outside of Australian territorial waters.
- Under the Biosecurity Act 2015, pre-arrival information must be reported through the Maritime Arrivals Reporting System (MARS) before arriving in Australian waters.
- Vessel adherence to the Australian Ballast Water Management Requirements (DAWR 2017) noting that the acceptable area for a ballast water exchange between an installation and an Australian port is in sea areas that are no closer than 500 metres from the offshore installation, and no closer than 12 nautical miles from the nearest land.
- Vessels only discharge low-risk domestic ballast water into Victorian state waters (on entry to a Victorian port and throughout the survey) in accordance with:
    - The Victorian Environment Protection (Ships Ballast Water) Regulations 2017 (EPA 2017a)[2].
    - EPA Protocol for Environmental Management (PEM): Domestic Ballast Water Management in Victorian Waters (Publication 949.7, EPA 2017b).
    - DAWR Ballast water risk assessment undertaken (Australian Ballast Water Management Information Tool[3]) and submitted by the Vessel Master prior to entering Victorian state waters (https://management.marinepests.gov.au/bw/).
- Non-compliant discharges of domestic ballast water are reported to the EPA Victoria immediately.
- Suspected or known introductions of IMS will be reported to the DELWP immediately.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) requires pre-mobilisation inspection to ensure MODU/vessel contractors comply with the requirements of the Biosecurity Act which includes exchange at sea outside of Australian territorial waters for 'high risk' ballast water from port or coastal waters.

6.11.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

[2] The International Convention for the Control and Management of Ships' Ballast Water and Sediments ("the Ballast Water Management Convention"), introduces global regulations to control the transfer of potentially invasive species. It entered into force both internationally and in Australia, from 8 September 2017. As a result, EPA Victoria will no longer be regulating domestic ballast water management in Victoria from this date. This means vessels visiting a Victorian port from 8 September 2017 will no longer need to provide ballast water documentation to EPA Victoria.

[3] Developed by the Australian Ballast Water Unit (ABWU), custodian of the of Australian Ballast Water Management Infoirmation System (ABWMIS)

6.11.5 Demonstration of ALARP

Compliance with Australian Ballast Water Management Requirements (DAWR 2017) is considered a sufficient control measure to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). This is a Context A ALARP Decision.

The project aims to use vessels / MODUs that are currently operating in Commonwealth Waters to reduce the potential for introducing IMS. However, use of international vessels (e.g. during well intervention / source control; Section 7.5) cannot be fully eliminated. Limiting vessel / MODU selection to use of those currently operating in Commonwealth Waters could potentially pose a significant risk in terms of time and duration for sourcing a vessel, as well as the ability of those chosen to perform the required tasks. This potential cost is grossly disproportionate to the minor environmental gain (of reducing the potential likelihood of IMS introduction) achieved, and is not reasonably practicable.

There is potential for a localised, but irreversible, impact to benthic communities. However, VIC/P70 drilling operations are in deep water (>350m), and a long distance from the shore (90-100 km), so that the potential for irreversible impacts is very unlikely to affect biological diversity and ecological integrity.

Further considerations against the remaining Principles of ESD include that there is little uncertainty associated with this aspect as the activities are well known, the cause pathways are well known, and activities are well regulated and managed. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied.

Other controls and alternatives were considered, in accordance with Section 5.2, including the use of ballast free vessels; however ballast free vessels are not commercially available or viable. No stakeholder concerns have been raised for this risk. On this basis Esso considers the risk to be ALARP.

6.11.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-8.

Table 6-8 RA 7: Environmental performance outcomes, standards and measurement criteria – Ballast Water discharge

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
7	Ballast water discharge	Unplanned introduction and transmission of invasive species.	No introduction of non-endemic marine species through ballast water.	Maritime Arrivals Reporting System (MARS)	DAWR clearance is obtained to enter Australian waters through pre-arrival information reported through MARS	Records confirm pre-arrival report submitted to DAWR if vessel is arriving from a foreign port or is under biosecurity control.	MODU OIM/ Vessel Master
				Ballast water management	Ballast water exchange will occur in accordance with the Australian Ballast Water Management Requirements.	Ballast water records show location of ballast water uptake and discharge.	MODU OIM/ Vessel Master
					Vessel is compliant with International Convention for the Control and Management of Ship's Ballast Water and Sediments (BWM Convention), as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member which verifies that the vessel has been surveyed to a standard compliant with the Ballast Water Convention.	MODU OIM/ Vessel Master
				Only discharge low-risk domestic ballast water into Victorian state waters	Vessels only discharge low-risk domestic ballast water into Victorian state waters (on entry to a Victorian port and throughout the survey) in accordance with: • The Victorian Environment Protection (Ships Ballast Water) Regulations 2017 (EPA 2017a). • EPA Protocol for Environmental Management: Domestic Ballast Water Management in Victorian Waters (Publication 949.7, EPA 2017b).	Records confirm that if ballast water is discharged only discharge low-risk domestic ballast water into Victorian state waters	Vessel Master
					DAWR ballast water risk assessment undertaken ("Australian Ballast Water Management Information Tool") and submitted prior to entering Victorian state water.	Records confirm that DAWR Ballast water risk assessment was undertaken and submitted prior to entering Victorian state waters	Vessel Master

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				Report ballast water discharges	All ballast water discharges from the MODU and support vessels will be recorded and reported in accordance with the requirements of the Australian Ballast Water Management Requirements (2017)	Records confirm all ballast water discharges were recorded and reported if required.	MODU OIM/Vessel Master
					Non-compliant discharges of domestic ballast water are reported to the EPA Victoria immediately.		
					Suspected or known introductions of IMS will be reported to the DELWP immediately		
				Maintain a ballast water record system	A ballast water record system will be maintained by the MODU	Review of the ballast water record system confirms it is being maintained.	MODU OIM/Vessel Master

6.12 MODU/Vessel Biosecurity & Hull Biofouling (RA 8)

6.12.1 Hazard

Biological fouling on MODU/vessel hulls has the potential to translocate marine species into areas where they could displace native species or interfere with ecosystem processes in other ways.

International goods also have the potential to introduce non-native species into Australia.

6.12.2 Impact Assessment

In the South-east Marine Region, 115 marine pest species have been introduced and an additional 84 have been identified as possible introductions, or 'cryptogenic' species (NOO 2002). Several introduced species have become pests either by displacing native species, dominating habitats or causing algal blooms.

Marine pests known to occur in South Gippsland, according to ParksVic (2017o) and VEAC (2014) include:

- **Pacific oyster** (*Crassostrea gigas*) – small number of this oyster species are reported to occur in Western Port Bay and at Tidal River in the Wilsons Promontory National Park (DELWP, 2015).
- **Northern pacific seastar** (*Asterias amurensis*) – prefer soft sediment habitat, but also use artificial structures and rocky reefs, living in water depths usually less than 25 m (but up to 200 m water depths). It is thought to have been introduced in 1995 through ballast water from Japan.
- **New Zealand screw shell** (*Maoricolpus roseus*) – lies on or partially buried in sand, mud or gravel in waters up to 130 m deep. It can densely blanket the sea floor with live and dead shells and compete with native scallops and other shellfish for food. This species is present in eastern Bass Strait, forming extensive and dense beds on sandy seabeds (Patil *et al*., 2004). It is known to occur in the Point Hicks Marine National Park.
- **European shore crab** (*Carcinus maenas*) – prefers intertidal areas, bays, estuaries, mudflats and subtidal seagrass beds, but occurs in waters up to 60 m deep. It is presumed to occur on the intertidal reefs of all the marine national parks in Gippsland, except the Ninety Mile Beach MNP (which has no intertidal reef).

Successful Invasive Marine Species (IMS) invasion requires the following three steps:

1. Colonisation and establishment of the marine pest on a vector (e.g., vessel hull) in a donor region (e.g., home port).
2. Survival of the settled marine species on the vector during the voyage from the donor to the recipient region (e.g., project area).
3. Colonisation (e.g., dislodgement or reproduction) of the marine species in the recipient region, followed by successful establishment of a viable new local population.

At this point, the IMS is likely to have little or no natural competition or predation, thus potentially outcompeting native species for food or space, preying on native species or changing the nature of the environment.

Marine pest species can also deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion (AMSA n.d.). For example, the introduction of the Northern Pacific seastar (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries.

There is potential for a localised, but irreversible, impact to benthic communities. However, VIC/P70 exploration drilling operations are in deep water (>350m), and a long distance from the shore (90 - 100 km), so that the potential for irreversible impacts is very unlikely to affect biological diversity and ecological integrity. The two key assumptions underpinning this are:

- Changes in biological condition (including salinity) of source and recipient waters (i.e. coastal or estuarine IMPs) are presumed unlikely to survive in ocean waters, and vice versa.
- The transport of viable released non-indigenous organisms from open-ocean to coastal and estuarine waters, by ocean currents, is considered extremely unlikely.

Research indicates that biofouling has been responsible for more foreign marine introductions than ballast water (DAWR 2015b).

The known and potential impacts of IMS introduction include:

- Reduction in native marine species diversity and abundance;
- Displacement of native marine species;
- Socio-economic impacts on commercial fisheries; and
- Changes to conservation values of protected areas.

Invasive Marine Species 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. Nearshore waters that are within an area extending from the lowest astronomical tide mark out to the 12 nm limit are those waters referred to as 'Territorial Seas' that are the sovereign jurisdiction of a nation or state.

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 the nearshore susceptible environments. For example, the Australian Government Bureau of Resource Sciences (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 (Figure 6-1)

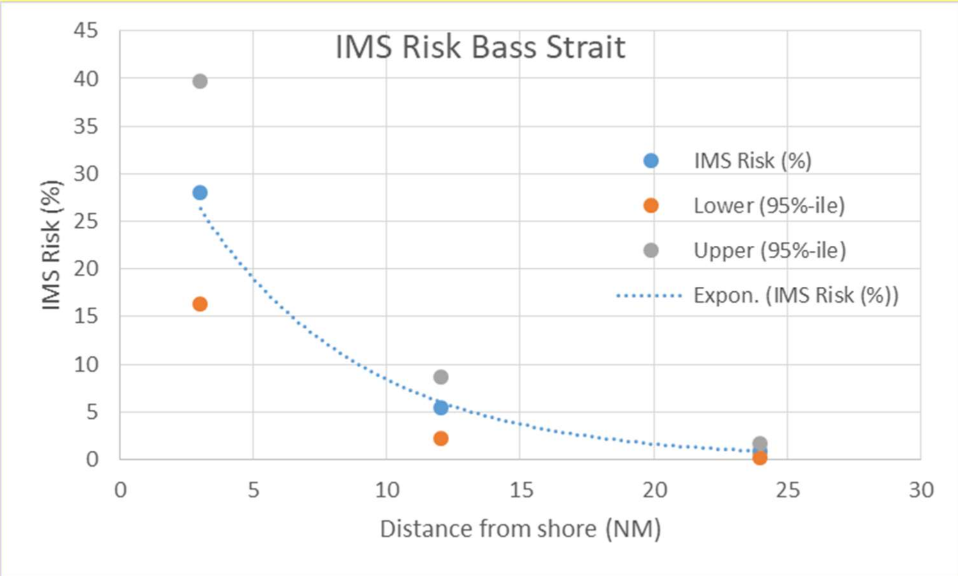


Figure 6-1 IMS Risk as a function of distance from the nearest shore (based on BRS 2007)

Maintenance plans for vessels are in place and include dry-docking, inspection and re-application of anti-fouling systems. This ensures that impacts from biofouling are minimised. The MODU was subjected to a biofouling inspection prior to mobilisation to Australian waters (Singapore, May 2017) and has been continuously operating in Australian Waters since that inspection. Support vessel are also planned to be sourced from those already operating in Australian waters. Nonetheless, all project vessels must undertake an IMS risk assessment, in accordance with the Esso Invasive Marine Species - Risk Assessment Procedure (IMS-RAP). The IMS-RAP evaluates the following parameters, where relevant:

- Transport method (dry verses wet haulage)
- Presence and age of antifouling coating (AFC)
- Evidence of recent dry dock or in-water IMS inspections and cleaning
- Presence and operation of internal seawater treatment systems if applicable
- Duration of stay in overseas or interstate coastal waters
- Location of drilling operations (operational area), timings and durations.

Initial IMS risk assessment is based on the "Vessel Check Risk Assessment Tool", developed by WA Department of Fisheries (DOF 2015). It replaces a range of similar tools (VRASS: Vessel Risk Assessment Score Sheets) that have been in use prior to the development of the Vessel Check tool, and provides a more consistent risk assessment methodology. Although developed specifically for WA, it can be used as a proxy for elsewhere in Australia. If this results in an uncertain or higher risk, the IMS RAP requires a more detailed risk assessment and / or additional controls to be implemented.

As described in Section 2.3 of the IMS RAP, in the situation that activities are completed in areas outside 12 NM and the WA Vessel Check does not apply, a proxy location (Port of Albany) should be used to complete the assessment using the WA Vessel check tool. If the WA vessel check has used a proxy port in WA to enable an assessment of the risk of a facility or vessel only located beyond 12 NM in Bass Strait, the outcomes of the assessment are assumed to be highly conservative. If the risk is "Uncertain" the actual location of the activities will be reviewed with an IMS Expert and/or additional control measures implemented to reduce the risk to "low". Furthermore, for the purposes of completing this Risk Assessment, a result of 'Not Applicable' in the WA Vessel Check tool will be considered as equivalent to 'Uncertain'.

The project aims to use vessels / MODUs that are currently operating in Bass Strait or Commonwealth Waters to reduce the potential for introducing IMS. Additionally, the expectation is that all project vessels, except the supply vessel, will remain in deep water, outside the Australia's territorial sea (>12 NM from shore), where IMS risk is considered to be Low.

The potential risk from hull biofouling is considered to be low, given that support vessels and MODU are operating well outside the Australian Territorial Sea (>12 NM from nearest shore). However, use of international vessels (e.g. during well intervention / source control; Section 7.5), and entry into Australia's territorial sea (<12 NM from shore) cannot be fully eliminated. All project vessels will undergo an IMS risk assessment as part of vessel pre-mobilisation inspection, using the Esso IMS-RAP.

Limiting vessel / MODU selection to use of those currently operating in Bass Strait or Commonwealth Waters could potentially pose a significant risk in terms of time and duration for sourcing a vessel, as well as the ability of those chosen to perform the required tasks. This potential cost is grossly disproportionate to the environmental gain achieved by further reducing the potential likelihood of IMS introduction, and is not reasonably practicable.

6.12.3 Controls

The following control measures will be implemented to minimise the risk of introduction of IMS:

- Prior to field activities, IMS risk is assessed for each vessel (in line with the EAPL IMS-RAP, Rev. 2), and only vessels where the biofouling risk is Low are accepted for use.
- For any vessel that does not have a Vessel Risk Status of Low, the level of risk and any additional mitigation measures required will be determined in consultation with an IMS Expert. The assessment will consider the relevant external context for determining an acceptable level of risk, including the considerations listed in IMS RAP Section 2.4.2.
- Any vessel >400 gross tonnes carries a current International Anti-fouling System (IAFS) Certificate and is complaint with and Marine Order Part 98 (Anti-fouling Systems) [4].
- In-water equipment will be cleaned (e.g. fouling is removed from streamer joints, collar joints, etc.) prior to initial use in the operational area, in accordance with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (AQIS 2009).
- Any international shipments destined for VIC/P70 drilling activities are cleared through Customs prior to mobilisation to MODU or Support vessels, in accordance with the Department of Agriculture and Water Resources requirements under the Biosecurity Act 2015, Export Control Act 1982, and Imported Food Control Act 1992 (http://www.agriculture.gov.au/import/arrival/clearance-inspection).
- All project vessels will comply with the requirements of the Biosecurity Act 2015.

[4] An Antifouling Certificate is a requirement under the Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 for vessels over 400 T. It is issued under the International Convention on the Control of Harmful Anti-fouling Systems on Ships (The Convention) to confirm that it complies with the anti-fouling requirements, unless it is an exempt platform (fixed or floating platform; floating storage unit (FSU); floating production, storage and off-loading unit (FPSO)).

6.12.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.12.5 Demonstration of ALARP

The control measures summarised above are considered sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

There is potential for a localised, but irreversible, impact to benthic communities. However, VIC/P70 drilling operations are in deep water (>350m), and a long distance from the shore (90 – 100 km), so that the potential for irreversible impacts is very unlikely to affect biological diversity and ecological integrity.

Further considerations against the remaining Principles of ESD include that there is little uncertainty associated with this aspect as the activities are well known, the cause pathways are well known, and activities are well regulated and managed. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied.

Other controls and alternatives were considered, in accordance with Section 5.2, including the use of ballast free vessels; however ballast free vessels are not commercially available or viable. No stakeholder concerns have been raised for this risk. On this basis Esso considers the risk to be ALARP.

6.12.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-9.

Table 6-9 RA 8: Environmental performance outcomes, standards and measurement criteria – Biofouling & biosecurity (RA8)

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
8	MODU/Vessel biofouling & biosecurity	Unplanned introduction and transmission of invasive species.	No introduction of non-endemic marine species through hull fouling or quarantine breaches	Anti-fouling certificate	Vessels with AFC will have an antifouling Certificate (AFC) that is current in accordance with AMSA Marine Order Part 98 (Anti-fouling systems) (unless exempted under "Protection of the Sea (Harmful Anti-fouling Systems) Act 2006", Part 3, Section 13(e))	Pre-mobilisation inspection confirms that vessels with AFC have an Anti-fouling Certificate that is valid.	Contract Administrator
				Antifouling coating on OSVs	Support vessels that will be servicing the Ocean Monarch will have effective and integral anti-foul coating.	Documents provided by Vessel Operator demonstrate that anti-foul coating is effective and integral. These documents could include: • Antifouling record book • Paint specification report • UWILD reports • Hull maintenance / cleaning records. This will be verified during the pre-mobilisation inspection. In the instance that AFC is found to not meet the performance standard specified, advice will be sought from an IMS Expert and further mitigation measures implemented as recommended.	Contract Administrator

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				IMS Risk Assessment	MODU/Vessels will undergo IMS risk assessment in accordance with Esso IMS-RAP. For any vessel that does not have a Vessel Risk Status of Low, the level of risk and any additional mitigation measures required will be determined in consultation with an IMS Expert. The assessment will consider the relevant external context for determining an acceptable level of risk, including the considerations listed in IMS RAP Section 2.4.2.	Pre-mobilisation inspection confirms that: • IMS Risk Assessment has been undertaken and; • Relevant mitigating measures have been implemented and their level of performance has been verified and; • IMS RAP outcome is documented	Contract Administrator
				Biofouling records	Biofouling Records are maintained in accordance with the IMO Guidelines (IMO, 2011).	Biofouling records are collected in order to conduct the IMS RAP for each vessel, which confirms they are being kept and maintained.	MODU OIM/Vessel Master
				In-water retrievable equipment cleaning	All submersible retrievable equipment has been cleaned and / or inspected in accordance with *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry* prior to commencement of the activity.	Records verify in-field equipment does not present an IMS risk.	Contract Administrator
			No introduction of non-endemic terrestrial species into Australia	Customs clearing for all international goods	All international goods are cleared through Customs prior to mobilisation to MODU or Support vessels, in accordance with the DAWR requirements	Records confirm that all international goods have been clear through Customs prior to mobilisation to site	Contract Administrator
				Compliance with Biosecurity Act 2015	All vessels that return to port have a Biosecurity Status Determination where required.	Biosecurity Status Determination available for all vessels or vessel released from biosecurity control.	Contract Administrator

6.13 Vessel and helicopter movements - Interaction with fauna (RA 9)

6.13.1 Hazard

The movement of vessels and helicopters within the operational area has the potential to result in collision with marine fauna.

6.13.2 Impact Assessment

Vessel collision with marine fauna can lead to injury or mortality of sensitive marine species. Several whale species are known to transit through Bass Strait on annual migration and may occur within the VIC/P70 Operational area, including those listed as either threatened and/or migratory under the EPBC Act (Section 4.8.16). Dolphins, seals and turtle species may also frequent the VIC/P70 operational area, although seals are not expected to frequently venture as far out as the VIC/P70 Operational area (see Section 4.8.15). Seabirds may also be found around the MODU and support vessels, and have been reported to use these structures as a resting place, and may be attracted by fish which tend to concentrate around offshore facilities.

The VIC/P70 operational area lies in a busy shipping route (Section 4.12). The establishment of temporary fairways around the VIC/P70 operational area (Section 6.25.2.1 and Figure 6-4) reduces the risk of fauna interactions by third party commercial vessels, but does not eliminate this risk for project vessels. As there are no aggregation or feeding areas in the VIC/P70 operational area, the presence of whales is expected to be transient and occasional and therefore the risk of impacts to cetaceans is considered to be low.

Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels and facilities. The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel, while others are curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson *et al*. 1995).

Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs (Dolman *et al*. 2006). Laist *et al.* (2001) identified that larger vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels travelling faster than 14 knots.

The support vessels for exploration drilling in VIC/P70 typically have a high level of manoeuvrability (DP) and would not be moving at these speeds while in the VIC/P70 operational area. The MODU is stationary, except when moving between well locations, when transit speeds are low (typically less than 2 knots).

Fur seals use Esso operational facilities in the Gippsland Basin as a resting place and as a source of food, and this may result in vessel interactions near these facilities.

Peel *et al*. (2016) reviewed vessel strike data for marine species in Australian waters:

- Whales were identified as having interacted with vessels. Of these, interaction with the Humpback Whale and the Southern Right Whale was most frequent.
- Dolphins were also identified as interacting with vessels, with interaction with the Common Bottlenose Dolphin most common.
- No vessel interactions were reported for the Australian or New Zealand Fur Seal, although seal injury by boat propellers has been reported, often resulting from the seal interacting/playing with a boat. The incidence of boat strike for seals is thought to be very low.

All vessels, when in the field and where practicable, adopt proximity / speed restrictions near cetaceans as provided in the EPBC Regulations Part 8: Interacting with cetaceans and whale watching (DoEE 2000). Cetaceans tend to practice avoidance around vessels with high noise signatures and therefore the likelihood of a cetacean strike is considered very unlikely. There have been no reported recent incidents of cetacean strikes across all Bass Strait operational areas.

Esso's helicopter traffic flies at slow speeds near operational areas, for safety reasons, enabling pilots to take avoidance action if seabirds are present on the helideck; however, there have been isolated recent incidents of bird strikes (individuals only) during Esso helicopter operations in Bass Strait. Impacts to seabirds are considered to be low.

The duration of fauna exposure to vessel strike is limited to the duration of VIC/P70 project field operations (expected to be approximately 30 days per well for Baldfish/Hairtail and approximately 75 days for Sculpin). If a fauna strike occurred and resulted in death, it is not expected that it would have a detrimental effect on the overall population.

Consequently, the potential impacts and risks from vessel or helicopter interaction with fauna are considered to be localised and short-term, as this type of event may result in impact to individuals from a species of recognised conservation value but is not expected to affect the population or local ecosystem function. The consequence has been rated as Level IV, with the probability very unlikely (D), resulting in a Category 4 risk.

6.13.3 Controls

- Vessel masters will be briefed on caution and 'no approach zones' and interaction management actions as defined in the EPBC Regulations 2000 – Part 8 Division 8.1
- A vessel master (or delegate) will be on duty at all times
- Where practicable vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 (Part 3(9)):
    - Vessels will travel at less than 5 knots within the caution zone of a cetacean and minimise noise (Caution Zone is 150m radius for dolphins, 300 m for whales and 50m for seals).
    - The vessel must not drift closer than 50 m (dolphins and seals) and 100 m (whale);
    - If whale comes within above limits, the vessel master must disengage gears and let the whale approach or reduce the speed of the vessel and continue on a course away from the whale;
    - The vessel must not restrict the path of a marine mammal.
    - The vessel must not separate any individual from a group of marine mammals or come between a mother whale and calf or a seal and pup;
    - If the vessel is within the caution zone of a marine mammal the vessel must move at a constant speed that does not exceed 5 knots, avoids sudden changes in speed or direction and manoeuvres the vessel to outside the caution zone if the marine mammal shows any sign of disturbance;

    Additionally, if a vessel is within the caution zone of a marine mammal, the vessel shall not approach a marine mammal from head on, from the rear or be in the path ahead of a marine mammal at an angle closer than 30° to its observed direction of travel.
- Where practicable, a helicopter maintains a minimum distance of 500-metre from a marine mammal in accordance EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 Part 3(8). Further it will not:
    - approach a marine mammal from head on;
    - fly directly over or pass the shadow of the aircraft directly over a marine mammal;
    - land on water to observe marine mammals
    - operate a helicopter in the vicinity of a marine mammal if the marine mammal shows signs of disturbance.

    Unless it is necessary for the helicopter to:
    - avoid damage or prevent further damage to person or property; allow take-off or landing
    - comply with an Act or regulations relating to the operation of a helicopter.
- Trained crew members on active duty will report observations of megafauna located within the cautionary zone (as defined in The Australian Guidelines for Whale and Dolphin Watching) to the vessel master (or their delegate), as soon as it is safe to do so.
- All personnel have completed an environmental induction covering the requirements for marine mammal/vessel interaction consistent with EPBC Regulations 2000 (Chapter 8) and Victorian Wildlife (Marine Mammals) Regulations 2009 (Part 2/Part 3) and are familiar with the requirements. This includes a requirement to notify the bridge if marine mammals are sighted in the caution zone.

- Any injury to, or mortality of, an EPBC Act Listed Threatened or Migratory Species (including those from a vessel strike) will be recorded on the National Ship Strike database within 72 hours (https://data.marinemammals.gov.au/report/shipstrike).

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have adopted these procedures to maintain adequate standoff distance from marine mammals (where possible and safe to do so) as they move into and out of the operational area, and employ avoidance measures such as reducing speed (where possible and safe to do so) should listed marine species (such as cetaceans or seals) be sighted.

6.13.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.13.5 Demonstration of ALARP

Compliance with the Environment Protection and Biodiversity Conservation Regulations 2000 and Victorian Wildlife (Marine Mammals) Regulations 2009 (DSE 2009b) are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 7.1.5, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

The risk associated with fauna strike is well managed via legislative control measures that are considered industry best practice. These are well understood and implemented by the industry. During stakeholder consultation, no objections or claims were raised regarding physical presence.

Because the potential impacts from physical presence of the MODU and support vessels is limited and as there is likely to be limited interaction with marine fauna in the defined operational area, ALARP Decision Context A should apply. No further controls or alternatives have been identified. On this basis Esso considers the risk to be ALARP.

The potential impact associated with this aspect is limited to individual fauna mortality, which is not considered as having the potential to affect biological diversity and ecological integrity. The activities are not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.

6.13.6 Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 7.1.6.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-10.

Table 6-10 RA 9: Environmental performance outcomes, standards and measurement criteria – Interaction with Fauna

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
9	Vessel movements	Unplanned collision & interference with marine fauna	No injuries or death of macrofauna resulting from vessel strike within operational area.	Caution and 'no approach zones	Vessel masters will be briefed on caution and 'no approach zones' and interaction management actions as defined in the EPBC Regulations 2000 – Part 8 Division 8.1 A vessel master (or delegate) will be on duty at all times.	Training records confirm that vessel masters have been briefed on caution and 'no approach zones' and interaction management actions as defined in the EPBC Regulations 2000 – Part 8 Division 8.1.	Contract Administrator
					A vessel master (or delegate) will be on duty at all times	Bridge watch records confirm vessel master (or delegate) on duty at all times.	Vessel Master
				Fauna interaction management actions - vessels	Where practicable vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 (Part 3(9)): • Vessels will travel at less than 5 knots within the caution zone of a cetacean and minimise noise (Caution Zone is 150m radius for dolphins, 300 m for whales and 50m for seals). • The vessel must not drift closer than 50 m (dolphins and seals) and 100 m (whale); • If whale comes within above limits, the vessel master must disengage gears and let the whale approach or reduce the speed of the vessel and continue on a course away from the whale; • The vessel must not restrict the path of a marine mammal. • The vessel must not separate any	Daily operations reports note when cetaceans were sighted in the caution zone and if interaction management actions were implemented.	Vessel Master

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					individual from a group of marine mammals or come between a mother whale and calf or a seal and pup; • If the vessel is within the caution zone of a marine mammal the vessel must move at a constant speed that does not exceed 5 knots, avoids sudden changes in speed or direction and manoeuvres the vessel to outside the caution zone if the marine mammal shows any sign of disturbance; Additionally, if a vessel is within the caution zone of a marine mammal, the vessel shall not approach a marine mammal from head on, from the rear or be in the path ahead of a marine mammal at an angle closer than 30° to its observed direction of travel.		
				Fauna interaction management actions - helicopters	Where practicable, a helicopter maintains a minimum distance of 500-metre from a marine mammal in accordance EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 Part 3(8). Further it will not: • approach a marine mammal from head on; • fly directly over or pass the shadow of the aircraft directly over a marine mammal; • land on water to observe marine mammals • operate a helicopter in the vicinity of a marine mammal if the marine mammal shows signs of disturbance.	Helicopter flight records confirm flight path avoids interaction with marine mammals	Helicopter pilot

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					Unless it is necessary for the helicopter to: • avoid damage or prevent further damage to person or property; allow take-off or landing • comply with an Act or regulations relating to the operation of a helicopter.		
				Fauna observation	Trained crew members on active duty will report observations of megafauna located within the cautionary zone (as defined in The Australian Guidelines for Whale and Dolphin Watching) to the vessel master (or their delegate), as soon as it is safe to do so.	Daily vessel reports note when cetaceans were sighted in the caution zone and if interaction management actions were implemented.	Vessel Master
				Environmental Induction	All personnel have completed an environmental induction covering the requirements for marine mammal/vessel interaction consistent with EPBC Regulations 2000 (Chapter 8) and Victorian Wildlife (Marine Mammals) Regulations 2009 (Part 2/Part 3) and are familiar with the requirements. This includes a requirement to notify the bridge if marine mammals are sighted in the caution zone.	Induction records verify that all personnel have completed an environmental induction	Contract Administrator
			Injury or death to listed macrofauna from vessel strike will be reported	Incident reporting	Any injury to, or mortality of, an EPBC Act Listed Threatened or Migratory Species (including those from a vessel strike) will be recorded on the National Ship Strike database within 72 hours (https://data.marinemammals.gov.au/report/shipstrike).	Submission date on the National Ship Strike Database confirm that any injury to, or mortality of, an EPBC Act Listed Threatened or Migratory Species (including those from a vessel strike) is reported within 72 hours of the incident.	Vessel Master

6.14 Emissions to Air from MODU/Vessels (RA 10)

6.14.1 Hazard

Supply vessel fuel combustion equipment usually burns diesel as fuel. Helicopters use aviation gas as fuel for their engines. See Section 0 for details on the MODU operations and Section 3.5 on support vessel activities.

Air emissions may originate from equipment such as generators, turbines, and pumps. CO, NO_x and SO_x as well as greenhouse gases such as CO_2 are emitted to the atmosphere from combustion of diesel fuel and venting of gas from the annulus during drilling activities. Another source of air emissions is venting during bunkering operations.

6.14.2 Impact Assessment

CO, NO_x and SO_x as well as greenhouse gases such as CO_2 will be emitted to atmosphere during all project activities in the field. Due to the highly dispersive offshore environment, these emissions do not contribute to any local air quality issues, but there will be a small contribution of greenhouse gases to the atmosphere.

The quantities of atmospheric emissions generated by fuel consumption, and related impacts, will be similar to other vessels and helicopters operating in the South-east Marine Region for both petroleum and non-petroleum activities. Emissions from engines, generators and deck equipment may be toxic, and will result in a localised, temporary reduction in air quality. Emissions may also create odour or impact on visual amenity.

Modelling was undertaken for nitrogen dioxide (NO_2) emissions from MODU power generation for an offshore project (BP 2013), to quantify the area of which air quality reduction may occur. NO_2 was the focus of the modelling as it is considered the main atmospheric pollutant of concern, with larger predicted emission volumes compared to other pollutants. The modelling results indicated that, on an hourly average, there is the potential for an insignificant increase in ambient NO_2 concentrations within 10 km of the source and an increase of less than 0.1 $\mu g/m^3$ (0.00005 ppm) in ambient NO_2 concentrations more than 40 km away.

The Australian Ambient Air Quality National Environmental Protection (Air Quality) Measures (NEPM) recommends that hourly exposure to NO_2 is <0.12 ppm and annual average exposure is <0.03 ppm. BP modelling indicated that even the highest hourly averages were restricted to a distance ~5 km from the MODU (BP 2013). Since the VIC/P70 operational area is 90 - 100 km from the nearest shore, no social impacts are expected from the VIC/P70 exploration drilling project air emissions.

Any exposure from VIC/P70 drilling operations in the field are expected to be below NEPM standards. Additionally, MARPOL Annex VI (Regulations for the Prevention of Air Pollution from Ships). All vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including:

- Vessels will hold a valid International Air Pollution Prevention (IAPP) certificate and a current international energy efficiency (IEE) certificate.
- All vessels (as appropriate to vessel class) will have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI.
- Vessel engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI.
- Operation of engines, generators and deck equipment in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation.

Potential receptors above the sea surface within 5 km of the activity that may be exposed to reduced air quality include seabirds and marine megafauna that surface for air (e.g. cetaceans and marine turtles). The operational area is within known foraging BIAs for the Pygmy Blue Whale, and some seabird species. Emissions will be small in quantity and will dissipate quickly into the surrounding atmosphere, therefore any reduction in air quality will be localised and impacts would be limited.

The contribution of greenhouse gases from fuel combustion equipment on vessels is insignificant on a global scale. Therefore no further evaluation of this aspect has been undertaken. Consequently, the potential impacts and risks from air emissions are considered to be localised, as this type of event may result in a localised short-term impact to species of recognised conservation value but is not expected to affect the population or local ecosystem function, and have been rated as a Level IV consequence, with the probability of an environmental impact to be somewhat likely (B), resulting in a Category 4 risk.

6.14.3 Controls

- Low sulphur diesel fuel used as fuel source to comply with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI (fuel oil with sulphur content less than 3.50% mass/mass).
- Preventive maintenance programmes in place for fuel combustion equipment and energy usage equipment to maximise efficiency.
- Certified emission standards as per Ship Energy Efficiency Management Plan: Esso undertakes a pre-mobilisation inspection with the MODU/vessel contractor(s) to review their environmental performance (via certification records) and to correct any deficiencies in their systems.
- Vessels with diesel engines>130 kW must be certified to emission standards (e.g. IAPP, EIAPP).
- Vessels >400 gross tonnes and involved in an international voyage implement their Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI.
- Vessel engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessel contractors have certified fuel-combustion equipment and operate in accordance with a current Air Pollution Prevention Certificate, where applicable. This will be verified during a pre-mobilisation inspection and operational inspections (Section 8.6)

6.14.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
B	IV	4

6.14.5 Demonstration of ALARP

Atmospheric emissions, from fuel combustion and venting by vessels and MODU is a common occurrence both nationally and internationally. Emissions will be low in comparison to other marine traffic, and will be reduced to below measurable levels in close proximity to the release location.

Managing the risks from atmospheric emissions is well understood with good practice controls that are understood and generally well implemented by the industry. During stakeholder consultation, no objections or claims regarding atmospheric emissions were made. Given the limited potential impact ALARP Decision Context A should apply.

Compliance with MARPOL Annex VI are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

Other controls and alternatives were considered, in accordance with Section 7.1.5, including alternative sources of energy, such as solar powered generators, however these would require considerable space (which is limited on deck) to meet the operational area power demands and are not considered practicable for most offshore applications due to technical feasibility. In addition, the costs of implementing these measures are grossly disproportionate to the reduction in risk.

As the VIC/P70 exploration drilling project will not include well testing, venting during drilling activities will be minimised.

During bunkering operations, the diesel fuel displaces air in fuel tanks. This air is in equilibrium with fuel in the tanks, so that venting during bunkering will result in the release of volatile gasses to air (VOCs). There are a number of commercially available technologies for treating VOC emissions from ship loading. These include reducing volatility, vapour balancing, thermal oxidation, absorption, adsorption, membrane separation and cryogenic condensation (e.g. Rudd & Hill 2001). Many ports now have vapour recovery systems. However, this requires each vessel to install compatible equipment to enable it to transfer vapour to shore, while this option is not feasible when bunkering offshore.

Methodologies that may be applied offshore include absorption, condensation of VOC using refrigeration, hydrocarbon blanketing and vapour balancing. These systems are designed for crude offloading activities to oil tankers, where the large volumes of VOCs may justify expenditure. Cost-benefit analysis shows that the installation of VOC reduction measures cannot be justified, for the benefits that can be achieved, based on the relatively small volumes of VOCs released and low frequency of offshore bunkering operations.

No stakeholder concerns have been raised for air emissions. The potential impact associated with this aspect is considered localised and temporary, with full recovery to background levels once the activity ceases. Consequently, this aspect is not considered as having the potential to affect biological diversity and ecological integrity. Therefore, no further evaluation against the Principles of ESD is required.

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.14.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. These emissions represent an insignificant contribution to global greenhouse gas emissions and the environmental impact is therefore considered acceptable. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-11.

Table 6-11 RA 10: Environmental performance outcomes, standards and measurement criteria – Air Emissions

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
10	Air emissions during drilling operations in VIC/P70	Impacts from Greenhouse gas (GHG) emissions Chronic effects to sensitive receptors from air emissions	Fuel-combustion equipment operate to MARPOL 73/78 Annex VI (Prevention of Air Pollution from Ships) requirements.	Use of low sulphur diesel	Only low-sulphur (<3.5% m/m) marine-grade diesel will be used in order to minimise SOx emissions.	Manifests for fuel transfers will record that diesel was received; MDO SDS confirms low sulphur.	MODU OIM/Vessel Master
				Equipment Maintenance (PMS)	All combustion equipment on MODU and vessels are maintained in accordance with the MODU/Vessel PMS (or equivalent).	PMS records verify that combustion equipment is maintained to schedule.	MODU OIM/Vessel Master
				Certified emission standards as per Ship Energy Efficiency Management Plan	Vessel operators are operating in accordance with certified emission standards as per Ship Energy Efficiency Management Plan	Pre-mobilisation inspection confirms that vessel operators are operating in accordance with certified emission standards as per Ship Energy Efficiency Management Plan	Contract Administrator
				Vessels with diesel engines>130 kW must be certified to emission standards (e.g. IAPP, EIAPP).	Certification documentation	Certification documentation verified via pre-mobilisation inspection	MODU OIM/Vessel Master
					Vessels >400 gross tonnes and involved in an international voyage implement their Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI.	Records verify energy efficiency records have been adopted.	
					Vessel engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI.	Records verify compliance with Regulation 13 of MARPOL 73/78 Annex VI.	

6.15 Cooling Water and Brine Discharges (RA 11)

6.15.1 Hazard

Concentrated brine is a waste stream created through the vessels' desalination equipment for potable water generation. Potable water is generated through reverse osmosis (RO) or distillation resulting in the discharge of seawater with a slightly elevated salinity (~10-15% higher than seawater), however this is dependent on throughput and plant efficiency. Freshwater produced is then stored in tanks on board.

Seawater is used as a heat exchange medium for cooling machinery engines on vessels. Seawater is drawn up from the ocean, where it is de-oxygenated and sterilised by electrolysis (by release of chlorine from the salt solution) and then circulated as coolant for various equipment through the heat exchangers (in the process transferring heat from the machinery) and is then discharged to the ocean at depth (caisson on MODU) or near the surface. Upon discharge, it will be warmer than the surrounding ambient water and may contain low concentrations of residual biocide if used to control biofouling. Note that some of the Ocean Monarch MODU facilities utilise a closed cooling system, where seawater is not discharged from the MODU as part of the cooling process. Other facilities are cooled using a dual open loop water cooling system with a heat exchanger (e.g. top drive and rotary table).

6.15.2 Impact Assessment

The Ocean Monarch usually obtains its potable water by reverse osmosis (RO) desalination of sea water; however supply vessels may supply potable water, if required. Potable water is used to supply the accommodation module, hot water heaters, eye wash stations and some safety showers. Reject RO water consists of a brine which will rapidly disperse. Should the RO membranes fail, then the system will produce brine with a lower salt concentration. The known and potential environmental impact of brine discharges is a temporary and localised increase in sea surface salinity, potentially causing harm to fauna unable to tolerate higher salinity.

Brine water will sink through the water column where it will be rapidly mixed with receiving waters and dispersed by ocean currents. As such, any potential impacts are expected to be limited to the source of the discharge where concentrations are highest. This is confirmed by studies that indicate effects from increased salinity on planktonic communities in areas of high mixing and dispersion are generally limited to the point of discharge only (Azis *et al*. 2003).

The receptors with the potential to be exposed to an increase in salinity include pelagic fish species and plankton found in surface waters within the operational area. Because of the water depth (>350 m), benthic communities are not affected. Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20% to 30% (Walker and McComb, 1990). However, larval stages, which are crucial transition periods for marine species, are known to be more susceptible to impacts of increased salinity (Neuparth *et al*. 2002). Pelagic species may be subjected to slightly elevated salinity levels (~10-15% higher than seawater) for a very short period which they are expected to be able to tolerate and are able to move away from the plume. As such, transient species are not expected to experience chronic or acute effects.

Cooling water discharges may locally elevate water temperatures, which has the potential to cause localised impact on the marine ecosystem. Seawater cooling flow rates can vary from 0.5 m^3/hr for smaller, diesel-powered ships to flows of greater than 40,000 m^3/hr for aircraft carriers during full-power steaming. Seawater cooling overboard discharge is primarily seawater that contains trace materials from seawater cooling system (copper, iron, aluminium, zinc, nickel, tin, titanium, arsenic, manganese, chromium, lead, and possibly oil and grease). None of the expected constituents is a bioaccumulator (UNEP 1999).

There are no prescriptive legislative controls regarding cooling water and brine discharges from vessels. ANZECC (2000) criteria for cooling water discharges mainly relate to discharge from nearshore industrial activities (power plants, cooling towers, processing industry). It recommends that temperature changes return to within natural range (20 – 80%-ile of background levels) outside the mixing zone, except for aquaculture species, where a threshold of <2.0°C change over 1 hour applies, and for recreational waters (15–35°C for prolonged exposure). Cooling water discharges in open ocean experience high mixing so that ANZECC criteria are easily met, as has been confirmed by modelling studies and verified by field observations. RPS (2017) demonstrated that cooling water discharges from the Barossa FPSO (discharge of 288,000 – 360,567 m^3/d) generally returned to background levels within 3°C of ambient temperature within <5 m from the point of discharge.

The potential for seawater cooling overboard discharge to cause thermal environmental effects was evaluated by modelling the thermal plume generated under conditions tending to produce the greatest temperature rise and then compared to state plume thermal discharge requirements (UNEP 1999). Thermal effects of seawater cooling water overboard discharge were modelled to estimate the plume size and temperature gradients in the receiving water body. The discharge was assumed to occur during winter when the ambient water temperatures are lowest. Thermal plumes from models of ships (except very large aircraft carriers) do not exceed regulatory limits.

The environmental receptors with the potential to be exposed to an increase in temperature are transient marine fauna, including whales, sharks, fish, and reptiles. Marine mammals and fish passing through the area will be able to actively avoid entrainment in any heated plume (Langford 1990), and reptiles and sharks would be expected to behave similarly. 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 duration of fauna exposure to cooling water and RO water discharges is limited to the duration of project activities in VIC/P70 operations (expected to be approximately 30 days per well for Baldfish/Hairtail and approximately 75 days for Sculpin) and localised. The potential impact associated with this aspect is considered localised and temporary, with full recovery to background levels once the activity ceases. Consequently, this aspect is not considered as having the potential to affect biological diversity and ecological integrity. Therefore, no further evaluation against the Principles of ESD is required. No stakeholder concerns have been raised for cooling water and RO discharges Risk has been rated as a Level IV consequence, with the probability of such impacts being very unlikely (D), resulting in a Category 4 risk.

6.15.3 Controls

- RO Units are operating and maintained in accordance with manufacturer specifications.
- Quality of potable water from RO unit monitored.
- Engines and associated equipment that require cooling by water are operating in accordance with manufacturer specifications.

6.15.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.15.5 Demonstration of ALARP

Planned discharges of cooling water and brine by vessels and MODUs is a common occurrence both nationally and internationally. Temperature and salinity changes in the vicinity of the surface discharge will be quick to dissipate. There is potential for chemical discharges (release of chlorine from the salt solution) to result in localised impacts to surface marine fauna. As thermal and RO discharges from vessels in open ocean, and resulting dilution, are well understood not to create unacceptable impacts, it is not considered appropriate to undertake ecological monitoring of the discharge. Instead, operation in accordance with manufacturer specifications is considered adequate.

Managing the risks from planned discharges of cooling water and brine is well understood with good practice controls that are understood and generally well implemented by the industry. Other controls and alternatives were considered, in accordance with Section 5.2, such as limiting vessels and MODU to potable water from tanks, however this would result in multiple supply runs during the VIC/P70 drilling campaign and require additional storage facilities for potable water. This is not considered practicable given the negligible environmental impact of the brine discharge. In addition, the costs of implementing these measures are grossly disproportionate to the reduction in risk.

During stakeholder consultation, no objections or claims regarding planned discharges of cooling water and brine were made. Given the limited potential impact, ALARP Decision Context A should apply, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The potential impact associated with this aspect is considered localised and temporary, with full recovery to background levels once the activity ceases. Consequently, this aspect is not considered as having the potential to affect biological diversity and ecological integrity. Therefore, no further evaluation against the Principles of ESD is required. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.15.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-12

Table 6-12 RA 11: Environmental performance outcomes, standards and measurement criteria – Cooling water and Brine discharges

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Routine Offshore Activities							
11	Brine discharge from RO Units	Impacts to marine environment	RO and brine discharges are within manufacturer operating parameters.	RO Units are operating in accordance with manufacturer specifications	RO units are operating in accordance with manufacturer operating specifications.	Documentation provided during pre-mobilisation inspecting confirms that RO units are operating in accordance manufacturer operating specifications.	Contract Administrator MODU OIM/Vessel Master
				RO Units are maintained in accordance with manufacturer specifications	RO Units will be maintained in accordance with the vessel PMS so that they are operating within manufacturer operating specifications.	PMS Records/Work orders verify that RO units are maintained to schedule.	MODU OIM/Vessel Master
	Cooling water discharges	Impacts to marine environment	Engines and associated equipment that require cooling by water are within manufacturer operating parameters.	Engines and associated equipment that require cooling by water are operating in accordance with manufacturer specifications	Engines and associated equipment that require cooling by water are operating within manufacturer specifications	Documentation provided during pre-mobilisation inspecting confirms that equipment is operating in accordance with manufacturer specifications	Contract Administrator MODU OIM/Vessel Master
				Engines and associated equipment that require cooling by water are maintained in accordance with manufacturer specifications	Engines and associated equipment that require cooling by water will be maintained in accordance with the vessel PMS	PMS records verify that the equipment is maintained to schedule.	MODU OIM/Vessel Master

6.16 Hydraulic fluid discharge during ROV operations (RA 12)

6.16.1 Hazard

Hydraulic fluid may be discharged from some ROV-operated hydraulic tools as part of normal operations (e.g. on tool changeover, estimated release of <2 L) or released on failure of hydraulic hoses or connections. These losses are normally contained onboard the MODU.

There are unplanned events where a hose may leak or a seal may fail. The ROV preventative maintenance system prevents the majority of these events and the ROV has built in safe guards (automatic shut downs) to shut systems down if there is a drop in the levels of the fluid tanks. There are no planned hydraulic releases associated with ROV operations.

The discharge of small amounts of hydraulic fluid could cause localised short term changes to water quality and acute or chronic impacts on marine organisms in the immediate vicinity.

6.16.2 Impact Assessment

The fluid used in ROV operated hydraulic tools and the ROV itself is a low toxicity fluid (Ecoterra Hydraulic Oil). Ecoterra Hydraulic Oil is a high-quality, zinc-free hydraulic oil specifically developed for use in equipment operating in environmentally sensitive areas. It is specially formulated for reduced environmental impact in case of leaks or spills. It is non-toxic to fish and aquatic species as determined by OECD Test Method 203 1-12, and is classified as inherently biodegradable by the OECD Test Method 301B. It passes the visual “no sheen” requirements of the U.S. EPA Static Sheen Test. Acute aquatic toxicity to fish, *Daphnia*, *Veriodaphnia* and algal species are above 1000 mg/L. Results from chronic toxicity tests show that the no observed effect level (NOEC) exceeds 1000 mg/L.

Less than 20 L is typically stored on the ROV unit itself, with a total of about 200 L on board the MODU or vessel winch. It is a closed-loop system, with no planned release to the environment. However, should a spill occur, then an underwater release (maximum 20L) is rapidly diluted and dispersed in the high energy environment with minimal environmental impact. Accidental releases are addressed in RA 27 (Section 6.31). Seabed interactions are covered under RA 22 (Section 6.26).

This risk has no impact on KEF. No stakeholder concerns have been raised on RA12. No further evaluation against the principles of ESD is required.

6.16.3 Controls

- Closed loop system – no planned release to marine environment
- Storage, use and selection of chemicals meets Esso chemical selection procedure (Section 8.9.1).
- Ocean Monarch Management Procedures in accordance with "Technical Services and Maintenance Manual" (SEMS 8) and Computerised Maintenance Management System (CMMS) as per SEMS (Safety and Environmental Management System) (OM-SC-001-02).

6.16.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.16.5 Demonstration of ALARP

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with section 5.2, other controls and alternatives were considered. The use of compressed air or inert gas for ROV movement is not considered feasible for this application and introduces other safety risks for ROV operations.

ROV Contractor maintenance procedures are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.16.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-13.

Table 6-13 RA 12: Environmental performance outcomes, standards and measurement criteria – ROV Operations

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
12	ROV operations	Release of hydraulic fluid to marine environment may cause ecosystem toxicity.	No routine releases of hydraulic fluid to the marine environment	Closed loop system	The ROV and tools system are a closed loop system, designed not to leak	Records confirm that there are no routine hydraulic fluid discharges to the marine environment	ROV Operator
				Equipment maintenance	Equipment maintenance in accordance with manufacturer specifications. Hoses checked and hose register in place. Bunding and containment around maintenance area	Records confirm equipment maintenance in accordance with supplier specifications	ROV Operator

6.17 Hydraulic fluid discharge from BOP operations (RA 13)

6.17.1 Hazard

The BOP includes hydraulically controlled actuators and connections (Section 3.4.10.1). Routine/operational releases of hydraulic fluid occur when the actuator valve changes position. Hydraulic fluid may also be released as a result of the failure of subsea hydraulic connections or damage to umbilicals. Hydraulic fluid could be released due to routine subsea equipment discharges through valve operations. The discharge of hydraulic fluid can cause temporary and localised changes to water quality.

6.17.2 Impact Assessment

A release of hydraulic fluid to the marine environment could cause localised and temporary decrease in water quality and may impact on marine ecosystems, such as soft sediment, infauna communities, and sparse epibiotic communities, as well as transient marine fauna, including whales, sharks, fish, and reptiles. Hydraulic fluid from the BOP are normally discharges close to the seabed of the seabed (the BOP stack is approximately 7 m high). Given the volume and nature of the planned releases described above, exposure to receptors is expected to be temporary in nature.

The BOP hydraulic system is a separate system to the rig's ring line hydraulics. It uses a 4% Houghton STACK-MAGIC ECO-F V2 fluid, mixed with potable water for the BOP and Diverter system functions. It is OCNS rated as non-CHARMable Cat D, reserved for low toxicity chemicals (Aquatic-toxicity >100-1,000 ppm; OCNS Reg. 24101). This fluid meets Esso's chemical selection procedure (Section 8.9.1), which uses the CHARM OCNS ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges.

The fluid is not expected to have a significant impact on the environment. The amount released during normal BOP operations will be rapidly dispersed and assimilated in the high energy marine environment resulting in only minor temporary and localised effects on water quality.

Little to no impact is expected on benthic fauna at the release location given the low toxicity, low bioaccumulation and biodegradability characteristics of the proposed chemical discharges, and the dispersion characteristics of the release. For seabed invertebrates present near the wellhead, it is possible that low-level concentrations of chemical may be present on a short term and episodic basis.

Given the low toxicity of the chemicals, the low frequency and short-term nature of the exposure, the consequence level was assessed at Level IV (Low impact), with risk of an unacceptable impact assessed to be very unlikely (D), resulting in a Level IV Consequence.

A similar risk level was determined for mobile demersal and pelagic species which may be present at the wellheads during the activity, given the localised and short-term nature of the discharge, the low toxicity and low frequency nature of the discharge and the species mobility which limits exposure.

Other seabed discharges from the BOP during drilling activities include the potential release of small quantities of methane and other gasses, and release of metals shavings and grit during the cutting of the wellhead. The release of gas during drilling operations is considered to have a negligible impact, and is comparable to gas releases from natural seeps. The release of metal shavings is considered to be adequately addressed under seabed disturbance (RA 22) and dropped objects (RA 23) and are not further addressed here.

This risk has no impact on KEF. No stakeholder concerns have been raised on RA13. No further evaluation against the principles of ESD is required.

6.17.3 Controls

- The hydraulic fluid used in the BOP is CHARM gold / silver or OCNS E / D rated or equivalent, in accordance with Esso chemical selection procedure (Section 8.9.1).

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU/vessel contractors meet Essos expectation for chemical selection.

6.17.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.17.5 Demonstration of ALARP

Esso chemical selection procedure (Section 8.9.1) and Ocean Monarch operating and maintenance procedures are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 5.2, other controls and alternatives were considered. The use of compressed air or inert gas instead of a liquid to operate the subsea equipment is not considered feasible, as this would require the installation of air/inert gas compressors and other supporting equipment on the host operational areas, for which there is already limited space. Additionally, it introduces an increased risk of the BOP not closing in an emergency. Since the BOP operates at high pressures in order to fulfil its vital role, these hydraulic operations are considered a safety critical element.

Local containment of operational releases of hydraulic fluid is not considered practical, as this would add the safety and environmental risk of the valve being prohibited from venting and therefore not closing when demanded in an emergency isolation scenario. Open loop systems are widely used in the industry, as closed systems would require return loop and supporting control systems, introducing further reliability issues.

The discharge of hydraulic fluids associated with BOP operations are well-practiced activities, both nationally and internationally. Given the small volumes of fluid released, rapid dilution, as well as the absence of sensitive features and sedentary behaviours from marine fauna, the potential impact associated with this discharge is Category 4 (low risk).

No stakeholder objections or claims were raised with regards to this activity. ALARP Decision Context A applies. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.17.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-14.

Table 6-14 RA 13: Environmental performance outcomes, standards and measurement criteria – BOP Operations

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
13	BOP Operations	Release of hydraulic fluid to marine environment may impact on marine communities.	Only approved low impact hydraulic fluid to be used	The hydraulic fluid used is a low environmental impact fluid.	Only CHARM gold / silver or OCNS E / D rated or equivalent hydraulic fluids are approved for use where planned discharge may occur, in accordance with Esso Chemical Selection Procedure.	Hydraulic fluid used for BOP operations will be listed in chemicals database as acceptable for use (CHARM gold/silver or OCNS E/D or equivalent)	Drilling Supervisor

6.18 Planned Discharge - drilling mud and cuttings to seabed (RA 14)

6.18.1 Hazard

Drilling activities will result in planned discharges of drill cuttings and adhered drilling fluids. During riserless drilling, approximately 310 m^3 of drill cuttings will be discharged from the wellbore at Baldfish-1/Hairtail-1, and 80 to 107 m^3 at Sculpin-1 (Section 3.4.8). The larger particles of the drill cuttings will settle in the immediate vicinity of the well, with smaller particles spreading further from the source aided by ocean currents (Section 6.18.2).

Once the riser is installed, approximately 212 m^3 of drill cuttings will be discharged at the sea surface, at Baldfish-1/Hairtail-1, and 49 - 65 m^3 at Sculpin, resulting in dissipation of the cuttings over a larger area. The largest discharge will occur during riserless drilling, which may take up to 3-5 days per well (discontinuous operation). Discharge of drill cuttings directly to the seabed has the potential to smother sessile benthic organisms around the immediate well site.

At Sculpin-1, the lower 100-200 m of the 13 $^3/_8$" casing section may require the use of Dynamic Kill Drilling (DKD) fluid rather than seawater and sweeps. This would result in water-based muds to be deposited at the seabed (riserless drilling). Deeper setting of the 13 $^3/_8$" would result in higher hydrostatic integrity in the following section, thereby allowing higher mud weights to be run to control pore pressure if required.

6.18.2 Impact Assessment

6.18.2.1 Drill cuttings and Muds Dispersion - Seabed Discharges

In order to assess the extent of seabed smothering, RPS was commissioned to carry out a sediment dispersion modelling study that modelled a single event from Hairtail-1 well, to provide preliminary guidance on the seabed exposure from the cuttings and drilling muds discharge (RPS 2017b). Separate estimates for the area of effect were calculated for the near-seabed and near-surface phases of the modelled discharges, before a combined estimate was calculated.

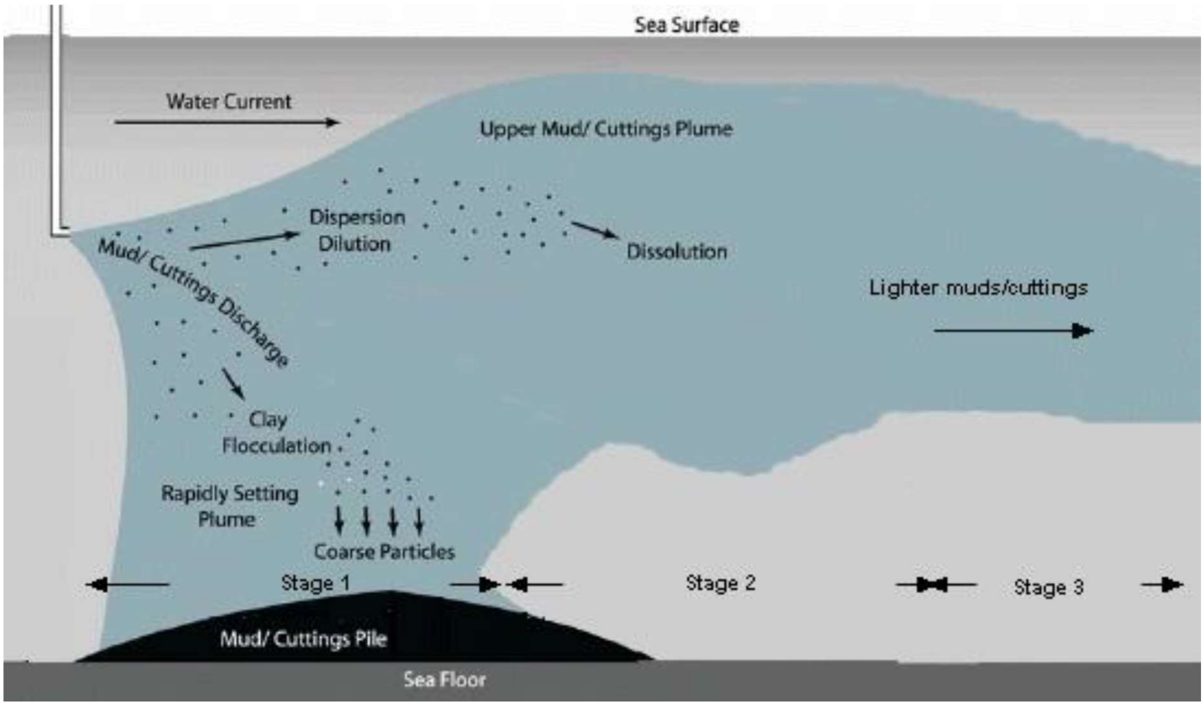


Figure 6-2 Conceptual diagram showing the general behaviour of cuttings and muds following the discharge to the ocean (Neff, 2005) and the idealised representation of the three discharge phases

The modelling results indicate that sediments larger than 0.25 mm diameter, would tend to settle out less than 50 m from the release site, forming a local sediment pile around the well. Currents were calculated to have larger influence on the displacement of smaller sediment particles, resulting in wider dispersal before settling. Deposits exceeding the 1.0 mm minimum thickness were calculated to extend up to 150 m from the release site.

The maximum thickness (or height of mound) calculated for any location was 0.7 m, which occurred within 10 m of the release site. The predicted total area of coverage on the seafloor was 0.0079 km^2. The minimum distance from the Victorian coastline to the 1.0 mm minimum threshold was 88.1 km.

6.18.2.2 Drill cuttings and Muds Dispersion - Combined Seabed and Surface Discharges

The results from the near seabed and sea surface discharges were combined to estimate potential deposition of sediments on the seafloor from the combined discharge.

The maximum thickness (or height of mound) calculated for any location was 0.7 m, which occurred within 10 m of the release site. The predicted total area of coverage on the seafloor was 0.0425 km^2. Additionally, the minimum distance from the Victorian coastline to the 1.0 mm minimum threshold was 88.1 km.

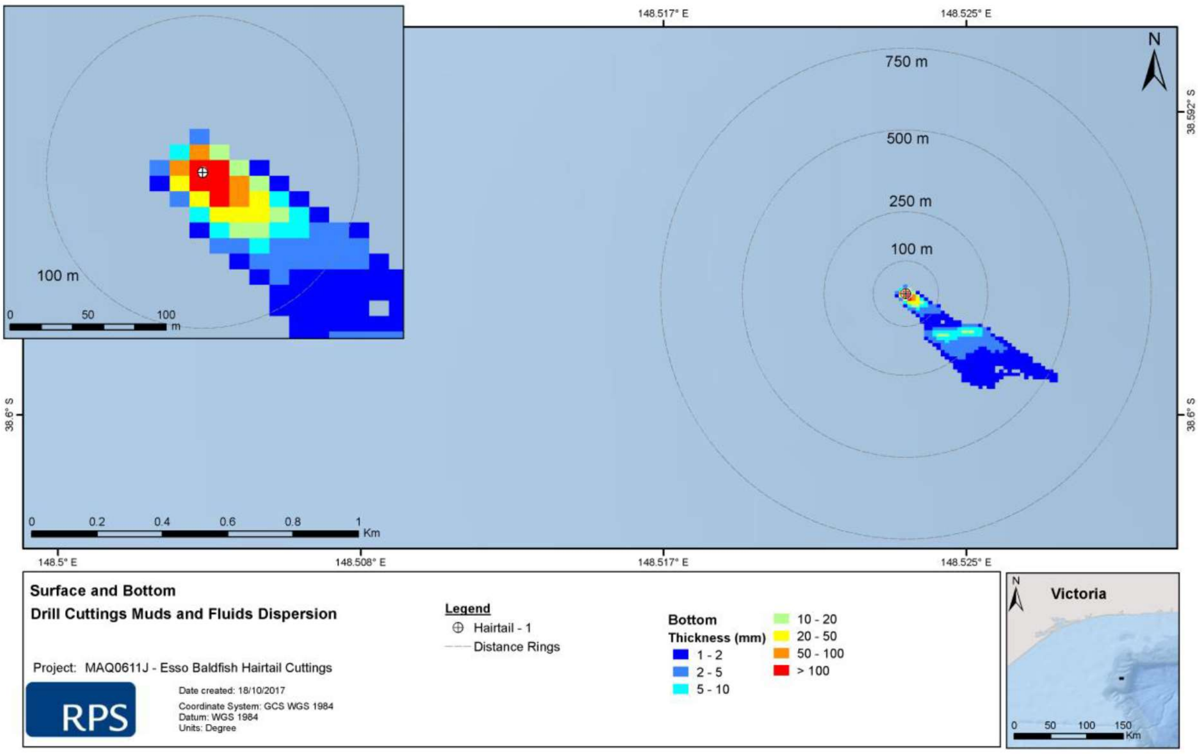


Figure 6-3 Predicted thickness and coverage from drill cuttings and unrecoverable muds on the seafloor assuming that the operation commenced 1st June (2012). Results are based on 13 day combined near-seabed and near-sea surface discharges (APASA 2017b)

The analysis indicates that although the total predicted area of coverage above 1 mm was 42,500 m^2, predicted areas of coverage ranging between 2 – 5 mm and 5 – 10 mm were 11,000 m^2 and 3,800 m^2, respectively, which represents 41.2% and 15.3% of the total area of coverage greater than 1 mm. Additionally, the predicted area of coverage for thicknesses exceeding 10 mm was 2,700 m^2 (6.4% of the total area of coverage greater than 1 mm). The predicted area of coverage with a thickness greater than 50 mm was 900 m^2, confined to within 30 m of the release site and represents 2.1% of the total area of coverage greater than 1 mm.

6.18.2.3 Smothering

The discharge of drill cuttings at the seabed, associated with top-hole drilling, results in potential smothering of soft sediment marine invertebrates and alteration of the seabed (e.g. Hinwood *et al.* 1994). The seabed within the operational area is predominantly sands with shell/rubble patches (Section 4.10).

Top-hole drilling uses seawater and sweeps (Table 6-15). Because of lack of binding forces, drilling with Water Based Mud (WBM) is reported to result in wider dispersion with smaller particle sizes, compared to synthetic based muds (Neff 2005).

Although the presence of drill-fluids in the seabed close to the drilling location (<500 m) can usually be detected chemically (see Section 6.18.2.4 below), the effects on seabed fauna and flora from the discharge of drilling cuttings with WBM are less pronounced (e.g. Cranmer 1988, Neff *et al*. 1989, Hyland *et al*. 1994, Daan & Mulder 1996, Currie & Isaacs 2005, OSPAR 2009, Bakke *et al*. 2013).

Studies (Jones *et al*. 2006, 2012) confirmed that physical smothering effects from WBM cuttings can be detected within 100 m of the well, with fine sediment visible within 250 m from the well. This is consistent with modelling results (Section 6.18.2.1). Jones *et al*. (2012) confirmed that smothering impact is reversible, so that after three years, a significant reduction in cuttings was apparent, particularly beyond 100m, but also the area with complete cuttings cover within the 100 m zone was significantly reduced, with substantial increase in faunal density and return to background conditions.

Coral and sponges on hard substrate is particularly vulnerable to smothering (Hyland *et al*. 1994). However, extensive areas of hard substrate are not expected within the operational area. The hard substrates associated with the Big Horseshoe Canyon KEF are located approximately 80 km from the operational area, and not at risk of exposure.

Research suggests that any smothering impacts within the operational area will be limited to 500 m from the well site, and full recovery is expected. Given the inert nature of the drill cuttings and the limited volume being discharged from riserless drilling, the impacts to benthic habitats are expected to be limited. Consequently, the potential impacts and risks from smothering and alteration of seabed substrate are considered to be Category 4 as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.

6.18.2.4 Chemical toxicity

The environmental receptors which may be impacted by elevated chemical toxicity in the benthos include demersal fish species, plankton, marine invertebrates and soft sediments.

The upper two hole sections (26” & 17$^{1}/_{2}$”), drilled using seawater and viscous sweeps, is conducted without a riser and the returns are taken directly to the seafloor. The primary fluid components are seawater, freshwater/bentonite sweeps, which have low toxicities and are readily miscible. For the bottom-hole section a WBM will be used and circulated through the riser (see RA 15). Additionally, LCM (lost circulation material) will be used to fill in the cavities along the bore formation.

The drilling fluids are recirculated over the shakers (Section 3.4.8) in order to minimise required volumes. However, some fluids will adhere to the drilling cuttings and are discharged to the marine environment. Table 6-15 lists the components of drilling fluids required during top-hole drilling, that may partly adhere to drill cuttings that are discharged at the seabed. LCM is largely retained in the well formation, so that minimum quantities of this will be discharged to the seabed.

Due to the inert / PLONOR nature of its components, WBM have been shown to have little or no toxicity to marine organisms (Jones *et al*. 1996). Barite (a major insoluble component of water-based mud discharges) has been widely shown to accumulate in sediments following drilling (reviewed by Hartley 1996). Barium sulphate is of low bioavailability and toxicity to benthic organisms. Other metals, present mainly as salts, in drilling wastes may originate from formation cuttings, or from impurities in barite and other mud components, however do not contribute to mud toxicity due to their low bioavailability (Schaanning *et al*. 2002).

The Esso chemical selection procedure (Section 8.9.1) defines the process for assessment of the offshore operational use and discharge of chemicals during drilling activities in VIC/P70. All chemicals planned for use and discharge must be assessed prior to use. Where a chemical is initially assessed as PLONOR or OCNS Gold, Silver, E or D ranking, no further assessment is required, and chemicals are approved for use. For any chemicals with a higher ranking, steps for assessment are provided in the process.

Neff (2010) explains that the lack of toxicity and low bioaccumulation potential of the drilling muds means that the effects of the discharges are highly localised and are not expected to spread through the food web.

As described in Section 4.10, the seabed at the drilling locations in VIC/P70 does not support significant benthic communities due to the water depth. Any existing benthic species are sparse and depauperate. The area is also not known to be a feeding ground for any significant species. The cuttings may cause localised smothering of sessile benthic fauna. However, this is largely reversible and not assessed to have an effect at the population level.

The area affected represents an insignificant portion of the overall permit area (VIC/P70) and therefore the impact is not assessed to be significant. Modelling of release of drilling cuttings at the seabed and at the surface (Section 6.18.2.1) has confirmed that release of drill cuttings at the seabed would result in only a localised impact to the seabed. Given the inert nature of the drill cuttings and the limited volume being discharged from riserless drilling, the impacts to benthic habitats are expected to be limited.

The potential impacts and risks from chemical toxicity are considered to be Category 4 as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.

Table 6-15 Mud composition and volumes – top-hole 26"& 17$^1/_2$" (preliminary)

Product*	OCNS Rating	Concentration (ppb)	Estimated Quantity*		Function
			Baldfish-1/ Hairtail-1	Sculpin-1#	
Caustic	E	0.3	0.8 T	2.7 T	Acidity Control Chemical
Soda Ash	E	0.3	0.8 T	1.4 T	Water Based Drilling Fluid Additive
Bentonite	E	25	71 T	170 T	Viscosifier
Barite	E	74	143 T	230 T	Weighting Chemical
Xanthan Gum	Gold	0.5	0.975 T	1.6 T	Viscosifier
Biocide	Silver	0.5	0.13 T	0.7 T	Biocide
PAC	E	2	2.5 T	6.1 T	Fluid Loss Control

* *Mud composition and volumes are preliminary and operational requirements may require changes to chemical election. In these instances, Esso chemical selection procedure (Section 8.9.1) and MOC Procedure will be applied to ensure that these met the commitments within this EP.*

\# *Should drilling of the last 100-200 m of the 17 $^1/_2$ section, for installation of the 13 $^3/_8$ casing, require the use of Dynamic Kill Drilling (DKD) fluid, then this will result in the use of 6,000 -1,2000 bbl/100m (depending on rate of drilling). Composition same as used for 12 ¼ hole section (see Table 6-17), with approximately 2,000 – 4,000 m^3 discharged at the seafloor instead of at the sea surface.*

6.18.3 Controls

- Post-drilling ROV survey around the wellhead area will record the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed (see Section 6.26).
- Use of low toxicity constituents, which meet Esso's chemical selection procedure (Section 8.9.1).
- Solid Control Equipment will be maintained in accordance with Diamond PMS.

6.18.4 Risk Ranking

It is expected that a cuttings pile will be generated at the wellhead during riserless drilling, followed by a plume footprint when riser fluids are discharged at the surface.

Discharged cuttings will be uncontaminated, and formed of similar sediment types to those found on the seabed, so the likelihood of causing localised short-term impacts to species of recognised conservation value is considered unlikely (C), with a consequence level IV.

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.

The activities were evaluated as having the potential to result in a Category 4 risk ranking, not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.

Likelihood	Consequence	Risk Ranking
C	IV	4

6.18.5 Demonstration of ALARP

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 5.2, other controls and alternatives were considered.

The upper sections are drilled without a riser, with cuttings returned to the seabed (Section 3.7). Use of a Riserless Mud Recovery (RMR) system was considered. These systems have recently been applied in sensitive ecosystems, especially where unconsolidated substrate (e.g. coarse sand) increases the risk of collapsing. These systems have largely been applied in relatively shallow waters (<450m), although recent advances also allow the operation of these systems in deep water and ultra-deepwater (Myers 2008). Considering that VIC/P70 is at relatively large depths, with a highly dynamic seabed and low biodiversity, as well as the relatively short project durations, with limited wells, the benefits of operating such systems versus costs was not considered justifiable.

Only after the upper sections have been drilled and casings/BOP are in place, cuttings may be returned through the riser to the MODU, for processing over the mud shakers (Section 3.4.7), before discharge at sea level. Discharge at the sea surface allows for the cuttings to be distributed over a larger area, thereby reduce the smothering risk. Modelling of release of drilling cuttings at the seabed and at the surface (APASA, 2017b) has confirmed that release of drill cuttings at the seabed would result in only a localised impact to the seabed.

The planned release of drill cuttings and adhered fluids offshore is a well understood and practiced activity both nationally and internationally. The potential impacts and risks are well regulated via various treaties and legislation, which specify industry best practice control measures. These are well understood and implemented by the industry. There were no further controls identified.

The use of low toxicity constituents and pre and post drilling ROV surveys, are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

There are no KEF within the affected area. No stakeholder concerns have been raised on RA14. Consequently, no further evaluation against the principles of ESD is required. Consequently, ALARP Decision Context A applies.

6.18.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-16.

Table 6-16 RA 14: Environmental performance outcomes, standards and measurement criteria – Discharge of drilling cuttings & fluids at seabed

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
14	Drilling – Discharge of drilling cuttings & fluids at seabed	Toxicity to marine ecosystem.	Drill mud constituents used in riserless drilling minimise environmental impacts from their discharge.	Low impact chemicals used.	Only CHARM gold / silver or OCNS E / D rated chemicals or equivalent are approved for use where discharge may occur.	List of approved chemicals for discharge available to the onsite drilling supervisor. Any changes in approved chemicals approved in accordance with Esso chemical selection procedure.	Drilling Supervisor

6.19 Planned Discharge - Drilling mud and cuttings at the sea surface (RA 15)

6.19.1 Hazard

Drilling activities will result in planned discharges of drill cuttings and adhered drilling fluids. Once the riser is installed, approximately 212 m^3 of drill cuttings will be discharged at Hairtail-1 and Baldfish-1, and 145 - 157 m^3 at Sculpin-1 (Section 3.4.8), just below the sea surface, resulting in dissipation of the cuttings over a larger area (Section 4.4.2). Although muds are recycled onboard the MODU, approximately 10% of muds will be retained on the drill cuttings. On completion of the project scope, residual muds are flushed from the mud-system and disposed offshore, unless these can be re-used for subsequent activities.

Discharge of cuttings and whole WBM (Water-Based Mud) at the sea surface has the potential to change water quality, causing toxicity to marine species. Additionally, it has the potential to smother organisms by drilling cuttings accumulating at the seabed (Section 6.18).

6.19.2 Impact Assessment

Once the 22" x 13-3/8" top-hole casing and BOP have been installed, the riser can be connected, thereby allowing circulation of drilling fluids, WBM and drill cutting to the MODU (Section 3.4.7). There, cuttings can be separated from WBM, allowing re-use of WBM and minimising discharge to sea. The primary WBM components are freshwater, Potassium Chloride, Polymers and Glycol and Barite (Table 6-17). WBM may contain some trace heavy metal concentrations, but not in a readily bio-available form. WBM is considered by OSPAR to pose little or no risk to the environment (OSPAR, 2004).

The impacts from drilling mud discharges to the seabed are addressed in Section 6.18. Discharge of drilling mud at the sea surface results in dispersion of particles over a large area (Section 6.19.2.1) and will contribute to localized smothering at the seabed. Additionally, surface discharges will result in increased turbidity, as discussed further in Section 6.19.2.2.

Table 6-17 Mud composition and volumes per well – bottom-hole $12^1/_4$" & $8^1/_2$" (preliminary)

Product	OCNS Rating	Concentration (ppb)	Estimated Quantity		Function
			Baldfish-1/ Hairtail-1	Sculpin-1	
KCl	E	26	81 T	95 T	Shale Inhibitor / Encapsulator
Glycol	Gold	10	30 m^3	35 m^3	Shale Inhibitor / Encapsulator
MEG	E	92	-	230 m^3	Hydrate Prevention#
XCD	Gold	1.5	4.6 T	5.8 T	Viscosifier
PAC	E	3	9.3 T	2.7T	Viscosifier
Starch	E	5	15.4 T	22.1 T	Fluid Loss Control Chemical
H_2S Scavenger	Gold	2.5	7.7 T	8.3 T	H_2S Scavenger
Barite	E	74	228 T	100 T	Weighting Chemical
Biocide	Gold	0.1	033 T	1.4 T	Biocide
Caustic	E	0.3	0.93 T	2.0 T	Acidity Control Chemical
Soda Ash	E	0.3	0.93 T	1.0 T	Water Based Drilling Fluid Additive
HP Shale Inhibitor	E	12	39 T	55 T	Weighting Chemical
Sodium Chloride	E	46	140 T	210 T	Shale Inhibitor / Encapsulator
Calcium Carbonate	E	15	141T	140 T	LCM*
DeFoamer	Gold	0.2	-	0.8 MT	De-foaming Chemical
Oxygen Scavenger	Gold	0.3	-	1.0 MT	Oxygen Scavenger
Sodium Bicarbonate	E	0.3	-	0.9 T	Reducing calcium in mud

* *Mud composition and volumes are preliminary and operational requirements may require changes to chemical election. In these instances, Essos chemical selection procedure (Section 8.9.1) and Esso MOC Procedure will be applied to ensure that these meet the commitments within this EP.*

\# *Drilling at greater depth, at Sculpin-1, increases the risk of hydrate formation, so that hydrate prevention may be required.*

WBM have little or no toxicity to marine organisms (Jones *et al*. 1996). Barite (a major WBM Component) is of low bioavailability and toxicity to benthic organisms, although it has been shown to accumulate in sediments following drilling (Hartley 1996). Other components may originate from formation cuttings, or from impurities in barite and other mud components, but do not contribute to mud toxicity due to their low bioavailability (Schaanning *et al*. 2002). WBM additives are generally classified as HQ Band "Gold", with concentrations in released fluids below toxicity levels (PEC/PNEC <1) (OCNS, CEFAS 2017).

The effects of WBM discharges are highly localised due to their low toxicity and bioaccumulation potential (Neff, 2010). Consequently, the potential impacts and risks associated with WBM represent localised short-term impacts, and are not expected to affect local ecosystem functions.

Table 6-18 Mud composition and volumes per well – LCM Products (preliminary)

Product**	OCNS Rating	Estimated Quantity**	Function*
Calcium Carbonate	E	As required	Acid Soluble LCM
Nutshell	E	As required	General purpose LCM
XCD Polymer	E	As required	Viscosifier
Fibre-based products	E	As required	General purpose LCM
BARABLEND 657	E	As required	Engineered LCM
BARASHIELD 663, 664	E	As required	Engineered LCM
BARALOCK 666	E	As required	Engineered LCM
STOPPIT	E	As required	Engineered LCM
KWIK-SEAL (F, M, C)	E	As required	General purpose LCM
STEELSEAL	E	As required	Synthetic graphite LCM

* LCM (Lost circulation material): Solid material intentionally introduced into a mud system to reduce and eventually prevent the flow of drilling fluid into a weak, fractured or vugular formation.

** Mud composition and volumes are preliminary and operational requirements may require changes to chemical selection. In these instances, Essos chemical selection procedure (Section 8.9.1) and Esso MOC Procedure will be applied to ensure that these meet the commitments within this EP.

6.19.2.1 Drill cuttings and Muds Dispersion - Surface Discharges

Modelling results (RPS 2017b) showed that, due to the height of the near-surface discharge, water currents would have a greater effect on dispersing sediments, including those larger than 0.4 mm, which were calculated to typically settle out within 500 m from the well, with settlement displaced in response to the prevailing currents. Finer sediments were calculated to disperse more widely under the influence of the currents due to the decreased setting velocities.

The maximum thickness (or height of mound) calculated for any location was 1.1 cm, which occurred approximately 230 m from the release site. The predicted total area of coverage on the seafloor was 0.017 km^2 (i.e. just over double the area affected by discharge near the substrate, but at a fraction of the height), immediately around the drill location.

6.19.2.2 Increased Turbidity

Neff (2005) states that although the total volumes of muds and cuttings discharged to the ocean during drilling a well are large, the impacts in the water column environment are minimal, because discharges of small amounts of materials are intermittent.

When cuttings are discharged to the ocean, the larger particles, representing about 90% of the mass of the mud solids, form a plume that settles quickly to the bottom (or until the plume entrains enough seawater to reach neutral buoyancy). About 10% of the mass of the mud solids form another plume in the upper water column that drifts with prevailing currents away from the discharge point and is diluted rapidly in the receiving waters (Neff, 2005; 2010).

Environmental receptors with the potential to be exposed and most at risk of impact to an increase in turbidity levels include pelagic fish species and plankton found in the area around the well locations. The operational area is also located within a Pygmy Blue Whale foraging BIA, and seabird foraging BIAs.

Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) also indicated that levels of 100 mg/L may affect the larvae of several marine invertebrate species, and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages.

Assuming that solids control equipment reduces residual on solids to below 10% leaving the material discharged comprising 90% solid cuttings, and based upon dilutions identified by Hinwood *et al*. (1994) and Neff (2005), turbidity in the water column is expected to be reduced to below 10 mg/L (9 ppm) within 100 m of release.

Consequently, any impact to fish larvae would be limited due to the small exposure footprint, high natural mortality of larvae (McGurk, 1986), and dispersive characteristics of the open water in the operational area.

Considering the relatively short-lived nature of the intermittent plumes, and that concentrations of suspended solids rapidly dissipate with the prevailing currents, the potential impacts on fish and their larvae are expected to be minimal.

6.19.2.3 Chemical toxicity

Neff (2005) discusses that, in well-mixed ocean waters, drilling muds and cuttings are diluted by 100-fold within 10 m of the discharge and by 1000-fold after a transport time of about 10 minutes at a distance of about 100 m from discharge. Because of the rapid dilution of the drilling mud and cuttings plume in the water column, "harm to communities of water column plants and animals is unlikely and has never been demonstrated" (Neff, 2005).

The environmental receptors which may be impacted by elevated chemical toxicity in the surface waters include pelagic fish and plankton; and in the lower water column and benthos include demersal fish species, plankton, marine invertebrates and soft sediments.

The Esso chemical selection procedure (Section 8.9.1) defines the process for assessment of the offshore operational use and discharge of chemicals during VIC/P70 exploration drilling activities. All chemicals planned for use and discharge must be assessed prior to use. Where a chemical is initially assessed as PLONOR or OCNS Gold, Silver, E or D ranking, no further assessment is required, and chemicals are approved for use. For any chemicals with a higher ranking, steps for assessment are provided in the process.

Due to the inert / PLONOR nature of its components, WBM have been shown to have little or no toxicity to marine organisms (Jones *et al*. 1996). Barite (a major insoluble component of water-based mud discharges) has been widely shown to accumulate in sediments following drilling (reviewed by Hartley 1996). Barium sulphate is of low bioavailability and toxicity to benthic organisms. Other metals, present mainly as salts, in drilling wastes may originate from formation cuttings, or from impurities in barite and other mud components, however do not contribute to mud toxicity due to their low bioavailability (Schaanning *et al*. 2002).

Neff (2010) explains that the lack of toxicity and low bioaccumulation potential of the drilling muds means that the effects of the discharges are highly localised and are not expected to spread through the food web. Consequently, the potential impacts and risks from chemical toxicity are considered to be Category 4 as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.

6.19.3 Controls

- Use of low toxicity constituents, which meet Esso's chemical selection procedure (Section 8.9.1).
- The LCM-3D/CM-2 Cascade Solid Control Equipment will be maintained in accordance with manufacturer specifications (Brandt). Screens will be monitored for wear and tear, and damaged screens will be repaired or replaced immediately.

6.19.4 Risk Ranking

It is expected that discharge of riser fluids at the surface will result in a plume footprint. Discharged cuttings will be uncontaminated, and formed of similar sediment types to those found on the seabed, and the likelihood of causing localised short-term impacts to species of recognised conservation value is considered Unlikely (C), with a consequence level IV (inconsequential or no adverse effect).

Likelihood	Consequence	Risk Ranking
C	IV	4

6.19.5 Demonstration of ALARP

The planned release of drill cuttings and adhered fluids offshore is a well understood and practiced activity both nationally and internationally. The potential impacts and risks are well regulated via various treaties and legislation, which specify industry best practice control measures. These are well understood and implemented by the industry. There were no further controls identified.

The 12-1/4” hole section is drilled using a riser, allowing recycling of drilling muds, with cuttings to be discharged at sea level. This distributes the cuttings over a larger area and further reduces the effect of a cuttings pile. Therefore, the impact of discharge of drilling cuttings and associated muds can be further reduced.

Collecting the cuttings on board the MODU and shipping them to shore for onshore disposal would require significant space to store accumulated cuttings, coupled with the added risks and costs associated with increased vessel movements to shore and the need to dispose of the cuttings at suitable waste sites. The risks and costs associated with these measures are assessed to be disproportionate to the benefits which may be gained in reducing risk to benthic species.

The use of low toxicity constituents, combined with drilling mud recycling and cutting discharge at sea level to aid dispersion over a wider area, are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.1.5, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

There are no KEF within the affected area. No stakeholder concerns have been raised on RA15. Consequently, no further evaluation against the principles of ESD is required. Consequently, ALARP Decision Context A applies.

6.19.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

Capture, storage and onshore disposal of fluid returns generated during drilling operations is not practicable. Only then can drilling fluids be circulated through the rig. The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-19 .

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

Table 6-19 RA 15: Environmental performance outcomes, standards and measurement criteria – Discharge of mud drilling cuttings & fluids at the surface

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
15	Drilling – Discharge of mud drilling cuttings & fluids at the surface	Toxicity to marine ecosystem.	Use drill fluids that minimise environmental impacts from the discharge of cuttings with adhered drill fluids.	Low impact chemicals used.	Only CHARM gold / silver or OCNS E / D rated chemicals or equivalent are approved for use where discharge may occur, in accordance with Esso Chemical Selection Procedure (Section 8.9.1)	List of approved chemicals for discharge available to the onsite drilling supervisor.	Drilling Supervisor
						Any changes in approved chemicals approved in accordance with Esso Chemical Selection Procedure.	Operations Superintendent
		Smothering, Turbidity	Solid Control Equipment is in good working order.	Diamond Planned Maintenance System	Solid Control Equipment will be maintained in accordance with PMS, as defined by Manufacturer (Brandt).	Records/Work orders show routine completion of maintenance in accordance with PMS.	MODU OIM
				Repair or replacement of damaged shaker screens	Shaker screens are monitored for wear and tear, and damaged screens will be repaired or replaced immediately	Records show screen damage is monitored, and any damaged screen is repaired or replaced immediately.	

6.20 Planned Discharge - Cement discharges at the seabed (RA 16)

A 42" conductor hole will be drilled to ± 50m below the seabed before the conductor casing is run and cemented in place. The surface hole will then be drilled riserless, with all returns released at the seabed.

Down-hole cementing utilises a third party skid mounted cementing unit. Typically, it holds one diesel engine driver and one positive displacement cement pump, together with associated batch mixing, bulk delivery and control and measurement equipment. Ocean Monarch has two 1,730 ft^3 (49 m^3) cement pods on main deck and four 2,750 ft^3 (78 m^3) pods in the sponsons. ROV footage is used to confirm cement flow out of the hole and to the seafloor. To limit unnecessary pumping and discharge of cement, the required cement volumes are calculated and mixed. Once cementing is complete and all mixed cement has been pumped, the equipment needs to be washed and cleaned. Diluted cement wash and/or small volumes of cement slurry (approximately 160 litres from hopper washing) will therefore be discharged. A similar process is followed for cementing the remaining casings. Refer to Section 0 for further details.

Excess cement, created during the cementing of conductor and surface casings, will accumulate around the well location. Some solids from the drill site (e.g. sand) will also be deposited around the well location with excess cement (approx.60 bbl, or 9.6 m^3 per well). Once good cement returns are observed around the wellhead, the mixing of cement will cease, and displacement with well fluids will commence (Section 0).

The release of cement or sand onto the seabed may result in smothering of benthic communities. Additionally, planned discharge of cement will result in increased turbidity, potentially affecting marine fauna, while there are also potential toxicity impacts.

6.20.1 Impact Assessment

The cement and chemical additives in the cement are subjected to detailed assessment prior to use to ensure they are of the lowest environmental impact practicable for the application, in accordance with Esso's chemical selection procedure (Section 8.9.1). Cementing and sand discharge are infrequent activities, and the resultant temporary and localised effect on the seabed is localised. Cement additives are listed in Table 6-20 and meet Esso chemical selection procedure.

Table 6-20 Cement composition and volumes (preliminary)

Product/Function	Supplier	Product Code	OCNS Rating	Estimated Quantity*
Silicate Additive	Schlumberger	D75	E	As required
Cement additive	Schlumberger	D095	E	As required
Cement Retarder	Schlumberger	D110	Gold	As required
Low-Temperature Liquid Dispersant	Schlumberger	D145A	Gold (sub) UK NPL 4	As required
UNIFLAC	Schlumberger	D168	Gold	As required
Antifoam Agent (11958)	Schlumberger	D175A	Gold (sub) UK NPL 4	As required
Antifoam Agent	Schlumberger	D47	Silver	As required
MUDPUSH II Spacer	Schlumberger	S182	Gold (sub) UK NPL 4	As required
Low Temperature Cement Set enhancer	Schlumberger	D186	Gold	As required
Low Temperature Dispersant	Schlumberger	D230	Gold (sub) UK NPL 4	As required
EZEFLOW Surfactant	Schlumberger	F103	Gold (sub) UK NPL 3	As required
Mutual Solvent	Schlumberger	U66	Gold	As required
Cement Class G	-	D907	E	As required
Fluorescein dye	-	Dye	Gold	As required
Liquid retarder	Schlumberger	D81	E	As required

* Cement composition are preliminary and operational requirements may require changes to chemical selection. In these instances, Esso chemical selection procedure (Section 8.9.1) and MOC Procedure will be applied to ensure that these meet the commitments within this EP.

As described in Section. 4.10, the seabed at the VIC/P70 exploration drilling locations does not support significant benthic communities due to the water depth. Any existing benthic species are sparse and depauperate. The area is also not known to be a feeding ground for any significant species. Disposed cement may cause some smothering of sessile benthic fauna, however this will be localised and not assessed to have an effect at the population level. The area affected represents an insignificant portion of the overall permit area (VIC/P70) and therefore the impact is not assessed to be significant.

As described under RA 22 (Section 6.26), a post-drill ROV survey around the wellhead area will record the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed (RA 22, Section 6.26).

6.20.2 Controls

- All planned chemical discharges shall be assessed and deemed acceptable before use, in accordance with Esso's chemical selection procedure (Section 8.9.1)
- Pre-spud ROV survey will confirm that the offshore marine environment around well locations is a soft substrate without sensitive ecosystems (see Section 4.10.2).
- Post-drilling ROV survey (Section 6.26) will record the condition of the seabed around the wellhead area at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed.
- OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures cementing contractors meet Esso's expectations for chemical selection and cement disposal.

6.20.3 Risk Ranking

Likelihood	Consequence	Risk Ranking
C	IV	4

6.20.4 Demonstration of ALARP

Adequate cementing of the casing string is a critical well integrity element, as the performance of the BOP depends on a successful cementing operation. On completion of cementing, the well is subject to pressure testing to ensure well integrity is achieved (Section 3.4.10). In order to meet the required specifications, the pumping of additional (excess) cement is unavoidable and is considered standard practice. To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 5.2, other controls and alternatives were considered.

Ocean Monarch operating procedures and chemical selection in accordance with Esso's chemical selection procedure (Section 8.9.1) are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

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. The activities were evaluated as not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required. There are no KEF within the affected area.

The release of cement slurry is a standard discharge and is not considered unusual in Commonwealth waters. No stakeholder objections or claims were raised with regards to this activity. ALARP Decision Context A applies. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.20.5 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-21.

Table 6-21 RA 16: Environmental performance outcomes, standards and measurement criteria – Discharge of cement at the seabed

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
16	Planned discharge – Cement at the seabed	Impacts to seabed ecosystem	All chemicals listed on MODU inventory will be listed in chemicals database as acceptable for use	Use of low impact cement and cement additives.	Inventory and appropriate SDS of chemicals selected in accordance Esso Chemical Selection Procedure will be used during VIC/P70 exploration drilling activities.	List of approved chemicals for discharge available to the onsite drilling supervisor.	Drilling Supervisor
					Only CHARM gold / silver or OCNS E / D rated chemicals or equivalent are approved for use where discharge may occur.	Any changes in approved chemicals approved in accordance with Esso chemical selection procedure.	Operations Superintendent

6.21 Planned Discharge - Cement at the sea surface (RA 17)

6.21.1 Hazard

When the 36” and 13-3/8” casing shoes are drilled out, small quantities of hardened cement are circulated to surface, and discharged overboard. The cement and chemical additives in the cement are subjected to detailed assessment prior to use to ensure they are of the lowest environmental impact practicable for the application (Section 8.9.1). Discharge of cement may result in a temporary increase in turbidity in the water column and may result in smothering effects.

Washing the cementing head and blending tanks with seawater to prevent curing, will result in a release of cement / water mix (~160 bbl, or 26 m^3 at the seabed and ~20 bbl, or 4 m^3 discharge at the surface per well). A small proportion of dry cement may also be blown overboard during bulk transfer operations from supply vessel to MODU.

6.21.2 Impact Assessment

The discharge of cement fluids will consist of cement and additives including extenders, accelerators, thinners, fluid loss control agents and defoamers. All the components of the cement mix are of low toxicity. The cement pump and piping used during cement operations is flushed with water following cement operations and washings are discharged overboard. In addition, on completion of cementing operations, remaining cement contained within the batch mixer, tanks and spacers are discharged overboard. Cement mix and additives will also be discharged at surface as part of commissioning of the cementing unit. Small quantities of dry cement will discharged to atmosphere during operation of the pneumatic cement delivery system.

The release of cement or sand onto the seabed may result in smothering of benthic communities. Additionally, planned discharge of cement will result in increased turbidity, potentially affecting marine fauna, while there are also potential toxicity impacts.

The cement and chemical additives in the cement are subjected to detailed assessment prior to use to ensure they are of the lowest environmental impact practicable for the application, in accordance with Esso's chemical selection procedure (Section 8.9.1). Cementing and sand discharge are infrequent activities, and the resultant temporary and localised effect on the seabed is localised. Cement additives are listed in Table 6-22 and meet Esso chemical selection procedure.

Table 6-22 Cement composition and volumes (preliminary)

Product/Function		Product Code	OCNS Rating	Estimated Quantity*
Silicate Additive	Schlumberger	D75	E	As required
Cement additive	Schlumberger	D095	E	As required
Cement Retarder	Schlumberger	D110	Gold	As required
Low-Temperature Liquid Dispersant	Schlumberger	D145A	Gold (sub) UK NPL 4	As required
UNIFLAC	Schlumberger	D168	Gold	As required
Antifoam Agent (11958)	Schlumberger	D175A	Gold (sub) UK NPL 4	As required
Antifoam Agent	Schlumberger	D47	Silver	As required
MUDPUSH II Spacer	Schlumberger	S182	Gold (sub) UK NPL 4	As required
Low Temperature Cement Set enhancer	Schlumberger	D186	Gold	As required
Low Temperature Dispersant	Schlumberger	D230	Gold (sub) UK NPL 4	As required
EZEFLOW Surfactant	Schlumberger	F103	Gold (sub) UK NPL 3	As required
Mutual Solvent	Schlumberger	U66	Gold	As required
Cement Class G	-	D907	E	As required
Fluorescein dye	-	Dye	Gold	As required
Liquid retarder	Schlumberger	D81	E	As required

* Cement composition are preliminary and operational requirements may require changes to chemical selection. In these instances, Esso chemical selection procedure (Section 8.9.1) and MOC Procedure will be applied to ensure that these meet the commitments within this EP.

The low quantities of cement that are discharged to sea will cause a temporary and minor reduction of water quality in the area around the well locations. However as all the constituents of the cement have been chosen because they have been rated as having low toxicity, the reduction in the water quality is assessed to be low. In addition, the VIC/P70 operational area does not have any significant sensitive receptors. The impact of changes in water quality due to discharged cement on marine species is assessed to be low.

As described in Section 4.10, the seabed at the VIC/P70 exploration drilling locations do not support significant benthic communities due to the water depth. Any existing benthic species are sparse and depauperate. The area is also not known to be a feeding ground for any significant species. Disposed cement may cause some smothering of sessile benthic fauna, however this will be localised and not assessed to have an effect at the population level. The area affected represents an insignificant portion of the overall permit area (VIC/P70) and therefore the impact is not assessed to be significant.

As described under RA 22 (Section 6.26), a post-drill ROV survey will record the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed (RA 22, Section 6.26).

6.21.3 Controls

- All planned chemical discharges shall be assessed and deemed acceptable before use, in accordance with Esso's chemical selection procedure (Section 8.9.1)

Post-drilling ROV survey (Section 6.26) will record the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures cementing contractors meet Esso's expectations for chemical selection and cement disposal.

6.21.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
C	IV	4

6.21.5 Demonstration of ALARP

Adequate cementing of the casing string is a critical well integrity element, as the performance of the BOP depends on a successful cementing operation. On completion of cementing, the well is subject to pressure testing to ensure well integrity is achieved (Section 3.4.10). In order to meet the required specifications, the pumping of additional (excess) cement is unavoidable and is considered standard practice.

It is good practice to have the last 2-3 casing joints filled with cement after the cementation is complete. This ensures any contaminants collected by the cement plugs is isolated form the annulus cement. Therefore, have excess cement inside the casing is integral to ensure adequacy of cement job. There is no alternative to having small quantities of cement present which will be drilled when set and removed and discharged to sea.

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 5.2, other controls and alternatives were considered.

Ocean Monarch operating procedures and chemical selection in accordance with Esso's chemical selection procedure (Section 8.9.1) are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

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. The activities were evaluated as not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.

The surface discharge of fluids during drilling and well abandonment activities is a well-practised activity, both nationally and internationally. The release of cement slurry is a standard discharge and is not considered unusual in Commonwealth waters. No stakeholder objections or claims were raised with regards to this activity. ALARP Decision Context A applies. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.21.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-23.

Table 6-23 RA 17: Environmental performance outcomes, standards and measurement criteria – Discharge of cement at the sea surface

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
17	Planned discharge – Cement at the sea surface	Impact to the marine environment.	Only approved low toxicity cements and additives used to make up cement mixture	Use of low impact cement and cement additives.	Inventory and appropriate SDS of chemicals selected in accordance Esso Chemical Selection Procedure will be used during VIC/P70 exploration drilling activities.	List of approved chemicals for discharge available to the onsite drilling supervisor.	Drilling Supervisor
					Only CHARM gold / silver or OCNS E / D rated chemicals or equivalent are approved for use where discharge may occur.	Any changes in approved chemicals approved in accordance with Esso chemical selection procedure.	Operations Superintendent

6.22 Drilling Operations - Use and storage of radioactive sources (RA 18)

6.22.1 Hazard

Gamma/neutron radiation is used during LWD (logging while drilling) and wireline logging. Also, it is possible that Gamma radiography maybe used for non-destructive testing (NDT).

Formation evaluation using LWD/wireline logging is a key objective of the drilling operation. The radiography source is contained within a shielded and secure housing, preventing unintentional projection of the source, robustly built to prevent the release of radioactivity from the encapsulated source. The transfer and recovery of the isotope occurs on the rig floor with rigorous procedures in place to ensure no loss to the marine environment. There are no routine discharges associated with these activities during and after application.

Loss of radioactive source to the marine environment may cause acute toxic effects on marine species.

6.22.2 Impact Assessment

The use of radioactive sources for NDT testing and formation evaluation is common industry practice and well regulated. There have been no recorded incidents of loss of a radioactive source to the marine environment as part of Esso operations in Bass Strait. Therefore, the risk of impacts from the loss of a radioactive source to the marine environment is considered to be negligible.

No stakeholder concerns have been raised on RA18. No further evaluation against the principles of ESD is required.

6.22.3 Controls

- Wireline logging is undertaken in accordance with the Ocean Monarch drilling procedures (e.g. Ocean Monarch Safety Case (OM-SC-001-03), Section 3.3).
- MODU procedures for hazardous substances (SEMS OM-SC-001-02, Section 2.3.17) are implemented to reduce the risk of loss of a radioactive source to the marine environment.
- Permit-to-Work System (SEMS OM-SC-001-02, Section 2.3.4) for cold work manages and controls the risks related to the work, including potential loss of the source to the marine environment.

6.22.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
E	IV	4

6.22.5 Demonstration of ALARP

Downhole tools using radioactive sources provide the most accurate estimate of porosity, arguably the most important petrophysical parameter, providing the best available reserve deliverability estimates. Alternatives such as nuclear magnetic resonance (NMR) or acoustic sources may have an error twice to more than four times as great. Replacement of the currently used radioactive sources with other less radioactive or non-radioactive methods is not technically or economically feasible at the present time, due to issues with correlation of the data acquired with the old and new tools and cost and reliability of non-chemical (i.e., electronic) sources (Badruzzaman 2011).

MODU procedures for hazardous substances (SEMS OM-SC-001-02, Section 2.3.17) are implemented to reduce the risk of loss of a radioactive source to the marine environment. Permit-to-Work System (SEMS OM-SC-001-02, Section 2.3.4) for cold work manages and controls the risks related to the work, including potential loss of the source to the marine environment. These procedures are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

It is also not practicable to entirely eliminate the use of radioactive sources as this could compromise operations. On this basis Esso considers the risk to be ALARP. No other controls and alternatives, in accordance with Section 5.2, were identified.

6.22.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-24.

Table 6-24 RA 18: Environmental performance outcomes, standards and measurement criteria – Use and storage of radioactive sources

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
18	Use and storage of radioactive sources	Unplanned loss of radioactive source to the marine environment.	No loss of radioactive sources to the marine environment.	Use of certified sub-contractors.	Approved handling procedures to be implemented which include the requirement to have trained and certified personnel handling the radioactive sources	Checklist shows that current certificates have been sighted for personnel handling radioactive source.	Drilling Supervisor
						Incident records show that there has been no loss of a radioactive source to the marine environment.	MODU OIM
				MODU SEMS procedures for radiography that includes storage and handling requirements to prevent loss to the marine environment.	MODU procedures for hazardous substances (SEMS OM-SC-001-02) are implemented to reduce the risk of loss of a radioactive source to the marine environment. Permit-to-Work System (SEMS OM-SC-001-02) for cold work in place, that manages and controls the risks related to the work, including potential loss of the source to the marine environment.	Incident records show that there has been no radiography that has taken place in a way that is not in accordance with specific work management guidelines.	Drilling Supervisor

6.23 Physical presence - Noise and light (RA 19)

6.23.1 Hazard

Vessel Operations

Offshore production operational areas and supply vessels operate machinery in the form of engines, turbines, and motors etc. as part of normal operational activities. Drilling and check-shot surveys are an additional noise source.

Noise from operational area and support operations has the potential to cause disruption to underwater marine fauna. This can include:

- Behavioural change;
- Hearing impairment and pathological damage;
- Increased stress; and
- Disruption to underwater cues.

Both Ocean Monarch and ATHs are equipped with navigation lights. Ocean Monarch also has crane clearance lights, helipad lights and radio tower lights. The VIC/P70 Operational area is remote from seabird and turtle nesting areas and therefore lighting from associated structures and vessels has a low potential for impacting marine fauna. The presence of operational area lighting does not appear to disrupt or disorient fish or marine mammals such as seals or cetaceans.

Helicopter Operations (4.1.4)

A fleet of aircraft operate out of the Longford base on a scheduled basis. In addition to transporting personnel, the helicopters carry urgent freight and critical spares for the operation of the facilities in Bass Strait. The helicopter base for the VIC/P70 operations is likely to be at Longford. Refer to Section 3.6 for further details.

6.23.2 Impact Assessment

Noise

Major continuous noise generators on the operational area include the diesel generators and drilling activities. Major noise generators are the DP thrusters on the support vessels, as well as the helicopter engines. A noise survey for Ocean Monarch was carried out in 2013, confirming that the facility complies with all regulatory requirements regarding noise management. To ensure that all noise hazards are managed to a level that is ALARP, Diamond Offshore developed a noise management plan (NMP) for the facility, in force prior to commencing operations in Australia. After allowing for the protection offered by hearing protectors, the level of operational noise exposure is less than an LA_{eq},12h of 82 dB(A); or an LC_{peak} of 140 dB(C).

The guideline threshold for the level of noise that may cause interference to cetaceans is 155 to 183 dB (SEL_{cum}; impulsive, for HF and LF respectively), with behavioural disturbance occurring between 120-160 dB_{rms} (for non-impulsive and impulsive noise respectively (NOAA (2016). Noise from check-shot surveys are expected to reach 168 dB re 1 µPa/Hz at 25 m below the source and 160 dB re 1 µPa/Hz within a 20 m horizontal radius (Section 3.8.1). Drilling activities ae expected to generate peak source levels of 154-170dB re 1 µPa @ 1 m in the range of 10 – 4,000 Hz. AHTs generate underwater noise in the range 145 – 171 dB re 1 µPa @ 1 m in the range of 1,000 – 5,000 (URS 2009).

By comparison, noise from large tankers and container ships ranges between 177 – 186 re 1 µPa @ 1 m over a similar bandwidth (URS 2009). Ambient ocean noise as a result of wind and wave activities have been assessed at 90 to 110 dB re 1 µPa (Cato & Bell 1992, Cato & Tavener 1997, McCauley 1998, McCauley *et al*. 2000). Noise levels underwater as a result of drilling operations or supply vessel operations are expected to be below NOAA guideline levels, especially when considering that noise levels drop of rapidly beyond 1 m from the drilling activity.

Although whales are known to migrate through the region during spring and autumn/early winter, the operational area is not a recognised feeding, breeding or resting area for cetaceans. It has been observed that birds habituate well to routine noise (Swan *et al*. 1994) and there are no known rookeries in the operational areas. It is common to see some migratory birds rest on the operational area before continuing on their migratory flight, however, the presence of the operational area does not appear to significantly disrupt or divert their migratory route or disorient the birds.

Recent reports that zooplankton is affected by seismic activity (McCauley *et al*. 2017) are ambiguous and largely not applicable to this activity. While drilling activities, and check-shot surveys may impact on zooplankton, these impacts would be highly localised and of short duration (CSS/VSP would take a day on average; Section 3.8.1).

Potential impacts from offshore activities on planned biannual Fishery Independent Survey (FIS) in August-September 2018 have been discussed with SETFIA (Section 6.24 and Chapter 9). The survey locations are largely away from VIC/P70 exploration drilling activities, with the nearest survey point (Station 107) over 20 km to the NE of the Baldfish drilling location. As noise levels from drilling activities are comparable to that of commercial shipping vessels passing through the TSS (Section 6.25), the planned drilling activity is expected to have negligible impact in the FIS.

Seals have been observed to congregate and rest on the legs of offshore facilities further inshore, and at times on the sea deck of offshore platforms; they appear to be unperturbed or impacted by noise. Whales are also known, and observed, to play and display normal breaching, blowing, lobtailing and diving behaviour around the offshore facilities and vessels, including with calves, before moving on again.

Esso’s helicopter traffic fly at an appropriate altitude for safety reasons and this is not expected and has not been observed to affect whale behaviour to any significant extent in the operational area. Sound levels are generally minimised, where possible, by pilots maintaining a straight flight path and avoiding sharp deviations (which increases rotor blade-vortex interaction noise).

Light studies in the North Sea confirmed that lighting can attract birds from large catchment areas (Weise *et al*. 2001). Although the operational area overlaps several foraging BIAs for seabirds, it is not expected that light emissions acting as an attractant to a small number of individual seabirds would result in any impact to the individual or to the greater population.

Cetaceans predominantly utilise acoustic senses to monitor their environment rather than visual sources (Simmonds *et al*. 2004), so light is not considered to be a significant factor in cetacean behaviour or survival.

Other marine life may also be attracted to the MODU or support vessels (e.g., fish, squid and plankton) that can aggregate directly under downward facing lights. These are prey species to many species of marine fauna and given the nature of the activity, any impacts arising from light emissions will be localised and temporary.

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 flights to sea, a phenomenon known as ‘fallout’ (Birdlife International 2012). Rodriguez *at al*. (2014) investigated the effects of artificial lighting from road lighting on short-tailed shearwater fledglings. The study established by removing the light source from nesting areas, there was a decrease in grounded fledglings and a corresponding reduction in bird fatalities.

Light pollution can be an issue near turtle nesting beaches where emerging hatchlings orient to, and head towards, the low light of the horizon (EA 2003). Given that the operational area is approximately 40 km offshore, impacts to nesting adult turtles is not expected. Consequently, the potential impacts and risks from light emissions are considered to be negligible.

The duration of fauna exposure to vessel strike is limited to the duration of VIC/P70 field operations (expected to be approximately 60 days for Baldfish/Hairtail and approximately 75 days for Sculpin). If a fauna strike occurred and resulted in death, it is not expected that it would have a detrimental effect on the overall population. Given the distance offshore the potential impacts and risks for this activity have been identified as acceptable.

Consequently, the potential impacts and risks from noise and light due to activities in the VIC/P70 operational areas are considered to be localised and short-term, as this type of event may result in a localised short-term impact to species of recognised conservation value but is not expected to affect the population or local ecosystem function, and have been rated as a Level IV consequence, with the probability to be unlikely (C), resulting in a Category 4 risk.

6.23.3 Controls

- Fauna interaction management actions in compliance with EPBC Regulations Part 8, Division 8.1: Interacting with cetaceans and whale watching.
- Victorian Wildlife (Marine Mammals) Regulations 2009, Part 3: General restrictions on activities relating to marine mammals (DSE 2009b).
- CSS and/or VSP in compliance with EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines.
- Lighting limited to that required for safe navigation and work requirements, by minimising light spill to sea.
- Planned Maintenance System to maintain vessel engines and propulsion systems to minimise noise impacts.
- Environmental induction on requirements of EPBC Regulations Part 8 Division 8.1 and EPBC Act Policy Statement 2.1, and whale and dolphin identification.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have adopted these procedures to minimise impacts form noise and light on marine mammals and birds.

6.23.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
C	IV	4

6.23.5 Demonstration of ALARP

Compliance with EPBC Regulations Part 8, Division 8.1: Interacting with cetaceans and whale watching and EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines, as well as the controls described above are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

The risk associated with fauna strike is well managed via legislative control measures that are considered industry best practice. These are well understood and implemented by the industry. During stakeholder consultation, no objections or claims were raised regarding physical presence.

Offshore activities involving drilling are widely undertaken both nationally and internationally. Underwater sound emissions from vessel thrusters and ROVs is unavoidable, however will be intermittent during the activity. Other controls and alternatives were considered, in accordance with Section 5.2, including imposing a minimum flight altitude. This may result in a safety risk, and was therefore rejected.

The potential to use vessels to transport personnel around the offshore facilities instead of helicopters to reduce above-water noise levels has been considered and rejected. This would increase the frequency of vessel visits to the operational areas above existing levels, increasing the risk of potential vessel collision into a producing operational area, and transfer of personnel off the vessel to the operational area (e.g. via a billy pugh) poses a greater safety risk than direct disembarkation from a helicopter onto a deck.

During stakeholder consultation, SETFIA raised concern about any oil and gas related activities within the 6 months prior to the FIS, being February to mid-September 2018 (see RA 20; Section 6.24). Following extensive consultation (Chapter 9), SETFIA has confirmed that they have no further concerns or objections to the proposed activity.

The use of navigational lights and other lights to enable 24-hour operations to be undertaken, are routine activities in the offshore petroleum sector and are required for the safety of the MODU/vessels and the crew. The impacts and risks associated with light emissions are well understood, with most significant impacts generally associated with operating within close proximity of shorelines that support light sensitive species.

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. The activities are not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.

Because the potential impacts associated with underwater noise and light from these activities is limited, ALARP Decision Context A should apply. No further controls or alternatives have been identified. On this basis Esso considers the risk to be ALARP.

6.23.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-25.

Table 6-25 RA 19: Environmental performance outcomes, standards and measurement criteria – Noise and lighting

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
19	Noise from drilling rig / vessels and helicopters during normal operations	Noise and light affecting marine fauna or cetacean behaviour.	All personnel are aware of marine mammal/vessel interaction regulations	Environmental Inductions	All personnel have completed an environmental induction covering the requirements for marine mammal/vessel interaction consistent with EPBC Regulations 2000 (Chapter 8) and Victorian Wildlife (Marine Mammals) Regulations 2009 (Part 2/Part 3) and are familiar with the requirements. This includes a requirement to notify the bridge if marine mammals are sighted in the caution zone.	Induction records verify that all personnel have completed an environmental induction	Contract Administrator
			Reporting of megafauna sighting	Fauna observation	Trained crew members on active duty will report observations of megafauna located within the cautionary zone (as defined in The Australian Guidelines for Whale and Dolphin Watching) to the vessel master (or their delegate), as soon as it is safe to do so.	Daily vessel reports note when cetaceans were sighted in the caution zone and if interaction management actions were implemented.	Vessel Master
			Injury or death to listed macrofauna from vessel strike will be reported	Incident reporting	Any injury to, or mortality of, an EPBC Act Listed Threatened or Migratory Species (including those from a vessel strike) will be recorded on the National Ship Strike database within 72 hours.	Submission date on the National Ship Strike Database confirm that any injury to, or mortality of, an EPBC Act Listed Threatened or Migratory Species (including those from a vessel strike) is reported within 72 hours of the incident.	Vessel Master
			No injuries or death of macrofauna resulting from vessel strike within operational area.	Caution and 'no approach zones	Vessel masters will be briefed on caution and 'no approach zones' and interaction management actions as defined in the EPBC Regulations 2000 – Part 8 Division 8.1 A vessel master (or delegate) will be on duty at all times.	Training records confirm that vessel masters have been briefed on caution and 'no approach zones' and interaction management actions as defined in the EPBC Regulations 2000 –	Contract Administrator

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
						Part 8 Division 8.1.	
					A vessel master (or delegate) will be on duty at all times	Bridge watch records confirm vessel master (or delegate) on duty at all times.	Vessel Master
				Fauna interaction management actions - vessels	Where practicable, vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 (Part 3(9)): • Vessels will travel at less than 5 knots within the caution zone of a cetacean and minimise noise (Caution Zone is 150m radius for dolphins, 300 m for whales and 50 m for seals). • The vessel must not drift closer than 50 m (dolphins and seals) and 100 m (whale); • If whale comes within above limits, the vessel master must disengage gears and let the whale approach or reduce the speed of the vessel and continue on a course away from the whale; • The vessel must not restrict the path of a marine mammal. • The vessel must not separate any individual from a group of marine mammals or come between a mother whale and calf or a seal and pup; • If the vessel is within the caution zone of a marine mammal the vessel must move at a constant speed that does not exceed 5 knots, avoids sudden changes in speed or direction and manoeuvres	Daily operations reports note when cetaceans were sighted in the caution zone and if interaction management actions were implemented.	Vessel Master

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					the vessel to outside the caution zone if the marine mammal shows any sign of disturbance; Additionally, if a vessel is within the caution zone of a marine mammal, the vessel shall not approach a marine mammal from head on, from the rear or be in the path ahead of a marine mammal at an angle closer than 30° to its observed direction of travel.		
			Minimise noise	Diamond Planned Maintenance System	PMS ensures that engines and propulsion systems are maintained in accordance with manufacturer specifications to reduce noise radiated from vessels to as low as possible.	Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system	MODU OIM/Vessel Master
			Helicopter operations in accordance with regulatory requirements	Fauna interaction management actions - helicopters	Where practicable, a helicopter maintains a minimum distance of 500-metre from a marine mammal in accordance EPBC Regulations (Part 8) and Wildlife (Marine Mammals) Regulations 2009 Part 3(8). Further it will not: • approach a marine mammal from head on; • fly directly over or pass the shadow of the aircraft directly over a marine mammal; • operate a helicopter in the vicinity of a marine mammal if the marine mammal shows signs of disturbance. Unless it is necessary for the helicopter to: • avoid damage or prevent further damage to person or property; allow take-off or landing	Helicopter flight records confirm flight path avoids interaction with marine mammals	Helicopter pilot

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					• comply with an Act or regulations relating to the operation of a helicopter.		
	Noise from drilling rig during CSS and/or VSP activities	Impact on marine fauna or cetacean behaviour	CSS and/or VSP in accordance with EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines.	EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines	Adherence to the Cetacean Monitoring Programme for MODU and support vessels during VSP/CSS activities, which incorporates the requirements from the EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines.	Records confirm conformance during VSP/CSS activities with requirements under EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines	Drilling Manager
	Lighting from drilling rig / vessels	Light affecting marine fauna and sea birds	Lighting will be limited to that required for safe navigation and work requirements	Lighting will be limited	Lighting will be limited to that required for safe navigation and work requirements by minimising light spill to sea.	Inspection verifies light spill to sea is minimised, except where required for safe work/navigation.	MODU OIM/Vessel Master

6.24 Physical presence - Interference with Commercial Fishing (RA 20)

6.24.1 Hazard

The presence of the MODU and associated supply vessels at the VIC/P70 operational areas has the potential to disrupt commercial and recreational fisheries. In addition to interference with fishing activities, there is the potential to impact on the Fishery Independent Survey (FIS), planned to take place between August and September 2018.

During consultation with SEFTIA (Section 9), the location of the FIS sites nearest to the Baldfish-1 and Hairtail-1 well locations were identified. Transect 105 is nearest to the well locations (11 NM to Hairtail-1, 12 NM to Baldish -1), followed by Transect 106 (18 NM from the well locations at its nearest point). Because of the distance from the well locations, and timing of drilling activities relative to planned FIS Survey, no major concerns were raised by the fishing community for impact on the FIS survey.

Vessel collision risk is addressed separately under RA 24 (Section 6.28).

6.24.2 Impact Assessment

During the drilling of the VIC/P70 wells the only vessels that will be present in the VIC/P70 operational area (as defined by the PSZ) are:

- the Ocean Monarch, which is on site for the duration of the drilling campaign;
- support/supply vessels (AHTs, Standby/Guard Vessel) to provide mooring, resupply and safety support (at all times).

AMSA, in dialogue with AHS, has established temporary fairways and buffer zones around the Baldfish and Hairtail drill locations (Section 6.25.2.1) in order to minimise the risk of shipping collisions. The establishment of these temporary fairways and buffer zones present no restrictions to commercial fisheries outside the PSZ. Fisheries in Bass Strait are generally focused inshore of the drilling location (Section 4.10). As the duration of the drilling campaign is also of limited duration, the presence of the MODU and support vessels are not expected to have a significant impact on commercial fishing activity.

Once well evaluation has been completed, the wellheads will be removed from the seabed to minimise the risk of marine interactions and entanglement of fishing gear.

The only recreational fishing known to occur in the deep water areas around the VIC/P70 operational area is game-fishing (swordfish, sharks, tuna etc.) and this takes place from a limited number of vessels with the capability to safely fish at this distance offshore. Based on the limited deepwater game-fishing activity and the duration of the drilling campaign the impact is considered insignificant.

This aspect is not applicable to KEF. Stakeholder concerns regarding impact of drilling activities on FIS Survey have been addressed as part of RA20. No further evaluation against the principles of ESD is required.

6.24.3 Controls

- **Ongoing dialogue** with fisheries and provision of information material on importance of 500 m PSZ, role of temporary fairways around Baldfish and Hairtail drilling locations, and a 2 NM buffer zone around well locations (Section 6.25.2.1).
- **SMS alerts**: Esso are also planning to have SMS alerts issued to SETFIA fishing contacts to raise the awareness of the project activities, including when and where they are taking place.
- **Pre-start notifications**:
  - The AHS will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published.
  - AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning
  - Relevant Stakeholders will be notified of activities approximately one month and again one week prior to commencement
- **Temporary fairway**: Establishment of temporary fairways and 2 NM buffer zone through AMSA (Section 6.25.2.1) for Baldfish and Hairtail drilling and Blackback P&A campaign.
- **Wellhead removal:** On completion of well exploration, the well will be plugged and abandoned (P&A), and the wellhead removed to below the mudline

- **Petroleum Safety Zone**: A 500m Petroleum Safety Zone (PSZ) is in place around the MODU and support vessels (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin PSZ to be requested two months before start of drilling activities).
- **NavAids**:
  - Extensive navigation aids and communication systems on MODU and support vessels (Section 3.4.1).
  - Installation of further NavAids in response to MODU Safety Case Revision, and in dialogue with AMSA/AHS (Section 3.4.1).
- MODU Procedures:
  - SEMS 5.5.1.5: Vessel Safety Zone and Floating Trespass Procedure
  - SECE 14: Station keeping system & SECE 16: Emergency communication systems
- **Standby/guard vessel and AHTs** (Section 3.5).

Esso Procedures: OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have trained and qualified Vessel Masters.

6.24.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
C	IV	4

6.24.5 Demonstration of ALARP

Consultation with the commercial fishing industry occurred prior to mobilisation and no issues or concerns were raised. Notices to Mariners will be issued prior to mobilisation, as well as ongoing communication with the fishing community.

The proposed control measures are considered sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). Fisheries has coexisted with petroleum operations in the Gippsland Basin for decades, and the associated risks are well understood by both parties. A tribunal is in place for addressing genuine/validated losses incurred by commercial fisheries impacted by oil and gas equipment not marked on navigational charts and outside the petroleum safety zones. Purchasing of available fishing licences was rejected due to the short duration of the campaign, and this was not practicable or commercially feasible, nor likely to be well received by fisheries stakeholders.

The establishment of temporary fairways, established by AMSA after extensive dialogue as part of stakeholder consultations (Section 6.25.2.1), is not particularly relevant to commercial fisheries. However, commercial fisheries is required to abide by the establishment of PSZ. This is considered a minor inconvenience. Notices to Mariners will be issued prior to mobilisation, as well as ongoing communication with the commercial fishing communities. Under an agreement with SETFIA, fisheries will be notified of project activities through a global SMS message system, which has proven to be effective in the past. Other controls and alternatives were considered, in accordance with Section 5.2, including minimising both duration of the campaign and minimising the safety zone around the MODU. However, no additional practical mitigation measures are available, short of not proceeding with the drilling campaign.

The residual risk resulting from this activity is considered to be low (Category 4), the proposed control measures are considered to be sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, and the activity is a well-established practice.

Because of the location of the VIC/P70 Operational areas, some interference with commercial fishing is possible. This is a Type B ALARP decision. Commercial fishing operations are expected around the operational area, as the VIC/P70 well locations coincide with low level fishing activity. The risk associated with marine user interactions is well managed via legislative control measures that are considered industry best practice. These are well understood and implemented by the industry. Vessel operations are not unusual in this area and the risks impact to other marine users is well understood. The implementation of extensive navigational aids and ongoing communication with fishing communities are considered the key controls to address interactions with commercial fishing. Esso considers the risk to be ALARP on this basis.

6.24.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and stakeholder concerns have been addressed, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-26.

Table 6-26 RA 20: Environmental performance outcomes, standards and measurement criteria – Interference with commercial fishing

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
20	Physical presence – interference with commercial fishing	Disruption to commercial fishing	All relevant marine users will be notified of activities prior to operations	Stakeholder notification	All relevant stakeholders will be notified of activities approximately 4 weeks and 1 week prior to operations commencing	Stakeholder consultation records database confirm that pre-start notices were sent to all relevant stakeholders	Offshore Risk, Environment & Regulatory Supervisor
				Ongoing consultation with fishing and shipping groups.	Consultation with marine users to minimise disruption.	MODU log of events will record interactions with commercial fishing.	Offshore Risk, Environment & Regulatory Supervisor
						Stakeholder consultation records show that relevant commercial fishers have been informed of activities and their concerns addressed	
						SMS alerts issued to SETFIA fishing contacts to raise the awareness of the project activities, including when and where they are taking place	
				Vessel Crew and Navigational Equipment	Vessels will meet the crew competency, navigation equipment, watchkeeping and radar requirements of the AMSA Marine Order Part 3 and Part 30	Training and competency records indicate that vessels meet the crew competency, navigation equipment, and radar requirements of the AMSA Marine Orders	
				Navigational Equipment	Navigational Aids (communication, AIS, Message 21 coding, AtoN) will meet AMSA expectations, and in accordance with IMO Resolution MSC.347 (91)	Stakeholder consultation records indicate that navigational aids onboard MODU and support vessels meet AMSA expectations for safe operations near major shipping route	MODU OIM/Vessel Master

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				Standby/guard vessel and AHTs	Standby/guard vessel and AHTs monitor vessel movements near and within the 2 NM Buffer zone around the MODU, and will intervene when a third party vessel approaches the 2 NM Buffer zone	Records confirm that a Standby or Guard vessel is on standby at all time during drilling operations and actively patrols the 2 NM buffer zone around the MODU	
				Pre-start notifications	The AHS will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published	Stakeholder consultation records confirm a Notice to Mariners was provided to the AHS at least four weeks before operations commenced	Operations Superintendent
					AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning	Stakeholder consultation records confirm that information to distribute an AUSCOAST warning was provided to the JRCC	
					Relevant Stakeholders will be notified of activities approximately one month and again one week prior to commencement	Stakeholder consultation records confirm that information was distributed to relevant stakeholders in required timeframes.	
					AHT will conduct an All Ships "Securite" VHF radio call on Safety Channels prior to the commencement and at regular periods throughout mooring and unmooring phase.	Vessel GMDSS Radio Logbooks record details of radio transmissions from vessel.	Vessel Master
				Petroleum Safety Zone (PSZ)	Establishment of 500 m PSZ around operational facilities in accordance with section 616 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006.	Stakeholder consultation records show that a petroleum safety zone is established at least one month before start of field activities, and confirmed by a notice published in the Gazette as provided for under section 616 of the Offshore Petroleum and Greenhouse Gas Storage	Operations Superintendent

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
						Act 2006.	
				Well head removal	On completion of well exploration, the well will be plugged and abandoned (P&A), and the wellhead removed to below the mudline	Records confirm that on completion of well exploration P&A and wellhead removal to below the mudline was completed	

6.25 Physical presence - Interference with Commercial Shipping (RA 21)

6.25.1 Hazard

The presence of the MODU and associated supply vessels at the VIC/P70 operational areas has the potential to disrupt marine traffic due to the proximity to the Bass Strait Traffic Separation Scheme. (TSS) and implementation of temporary shipping fairways to protect the MODU (Section 6.25.2.1).

Once well evaluation has been completed, the wellheads will be removed from the seabed to minimise the risk of marine interactions. Approved PSZ are in place around the VIC/P70 well locations (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin: PSZ to be established at least one month before start of field activities). Note that interactions with recreational activities have not been considered, due to distance of operational area from shore, the presence of the PSZ, and the water depth.

Vessel collision risk is addressed separately under RA 24 (Section 6.28).

6.25.2 Impact Assessment

During the drilling of the VIC/P70 exploration wells the only vessels that will be present in the VIC/P70 operational areas are:

- The Ocean Monarch, which is on site for the duration of the drilling campaign;
- Support/supply vessels (AHTs, Standby/Guard Vessel) to provide mooring, resupply and safety support.

A Traffic Separation Scheme (TSS) and an 'Area to Be Avoided' exist in Bass Strait (Section 4.12). The TSS operates to control coastal shipping whereby all ships operational in or near the scheme must comply with Rule 10 of the International Regulations for Preventing Collisions at Sea 1972. Other navigation and safety measures will be in place for the duration of the campaign, and are further discussed in Section 3.4.2.

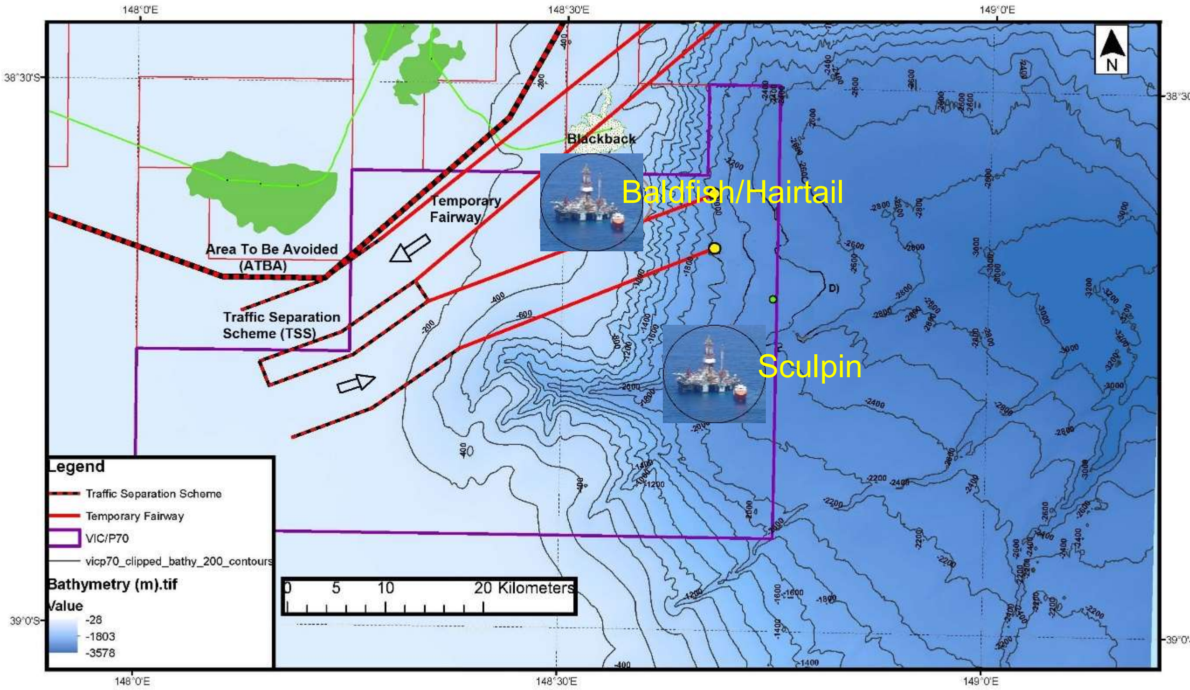


Figure 6-4 **Temporary Fairways around the Baldfish-1, Hairtail-1 and Sculpin-1 wells during exploration drilling activities in VIC/P70 (based on AMSA NTM, Feb 2018)**

Stakeholder concerns regarding RA21 for drilling near the shipping lanes at Baldfish, Hairtail and Blackback have been addressed through the establishment of temporary fairways (Section 6.25.2.1). The presence of these will impact on commercial shipping activities. However, as these fairways provide clarity on safe shipping routes, it is expected that the benefits outweigh these impacts.

6.25.2.1 Gippsland Basin Temporary Fairways

Esso has undertaken extensive communication with the Australian Maritime Safety Authority (AMSA) and the Australian Hydrographic Service (AHS) in order to find a way to manage shipping interactions and minimise the risk of collisions during the VIC/P70 exploration drilling campaign (Section 9), specifically for drilling Baldfish, Hairtail and P&A activities at Blackback. In dialogue with AMSA and AHS it was agreed that AMSA/AHS will establish temporary fairways around these locations, with a 2 NM radius buffer around each location (Figure 6-4, Figure 6-5, Figure 6-6), in order to deviate commercial shipping away from these locations. These temporary fairways were established in February 2018 (NTM 126(T)/2018 of 9 February 2018, and Admiralty NTM 1143-10 published 8 Mach 2018), in order to ensure that commercial shipping is accustomed to these deviations well before the start of drilling activities. Also see Section 4.12 (Commercial Shipping) and Figure 4-18.

In consultation with AMSA, the temporary fairways established to support the management of passing traffic during Baldfish and Hairtail will be removed on completion of the Blackback P&A program.

The removal of the temporary fairways will return commercial traffic to the established TSS routes directing them away from the Sculpin worksite. It will also prevent the location of a convergence zone between northbound traffic using the temporary fairway and Tasmanian bound traffic near Sculpin.

126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards
Australian Maritime Safety Authority

Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows:

Direction	*Coordinates*
Westbound lane	38° 38'.41 S 148° 17'.58 E
	38° 23'.68 S 148° 40'.29 E
	38° 25'.42 S 148° 42'.28 E
	38° 40'.80 S 148° 19'.72 E.
Eastbound lane	38° 42'.02 S 148° 20'.84 E
	38° 35'.93 S 148° 40'.69 E
	38° 38'.92 S 148° 40'.68 E
	38° 44'.51 S 148° 23'.08 E.

Chart temporarily affected - Aus 357 - Aus 487

Figure 6-5 Notice to mariners 126(T)/2018 Australia - Victoria - Ninety Mile Beach - Traffic separation scheme southwestwards (9 Feb 2018)

1143(T)/18 AUSTRALIA - Victoria - Tasman Sea W - Fairways. Traffic separation scheme.

Source: Australian Notice 3/126(T)/18

1. Fairways of the traffic separation scheme (38° 44´·2S., 148° 15´·2E.) have been extended north-eastwards as follows:

Direction	*Position*
Westbound lane	38° 38´·4S., 148° 17´·6E. (limit of westbound traffic lane)
	38° 23´·7S., 148° 40´·3E.
	38° 25´·4S., 148° 42´·3E.
	38° 40´·8S., 148° 19´·7E. (limit of westbound traffic lane)
Eastbound lane	38° 42´·0S., 148° 20´·8E. (limit of eastbound traffic lane)
	38° 35´·9S., 148° 40´·7E.
	38° 38´·9S., 148° 40´·7E.
	38° 44´·5S., 148° 23´·1E. (limit of eastbound traffic lane)

(WGS84 DATUM)

Charts affected - Aus 357 - Aus 487

Figure 6-6 Admiralty Notice to mariners 1143(T)/18 AUSTRALIA - Victoria - Tasman Sea W - Fairways. Traffic separation scheme (8 March 2018)

6.25.3 Controls

- Ongoing consultation with shipping groups and AMSA
- **Pre-start notifications:**

- The AHS will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published.
- AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning
- Relevant Stakeholders will be notified of activities approximately one month and again one week prior to commencement

- **Temporary fairway**: Establishment of temporary fairways and 2 NM buffer zone through AMSA (Section 6.25.2.1) – Note only applicable for Baldfish, Hairtail and Blackback.
- **Safety Zone**: A 500m Petroleum Safety Zone (PSZ) is in place around the MODU and support vessels (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin: PSZ to be established at least one month before start of field activities).
- **NavAids**:
  - Extensive navigation aids and communication systems on MODU and support vessels (Section 3.4.1).
  - Installation of further NavAids in response to MODU Safety Case Revision, and in dialogue with AMSA/AHS (Section 3.4.1).
- MODU Procedures:
  - SEMS 5.5.1.5: Vessel Safety Zone and Floating Trespass Procedure
  - SECE 14: Station keeping system & SECE 16: Emergency communication systems
- Standby/guard vessel and AHTs (Section 3.5).
- Esso Procedures:
  - OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have trained and qualified Vessel Masters.

6.25.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
C	III	3

6.25.5 Demonstration of ALARP

Consultation with AMSA and ports occurred prior to mobilisation and temporary fairways have been installed around the relevant VIC/P70 drilling locations in order to minimise collision risk and manage shipping interactions. Parts of the VIC/P70 drilling location is located close to the Bass Strait TSS (Section 4.12). Commercial shipping pass through this TSS on a daily basis on their way between ports to the west (Melbourne, Geelong and beyond) to eastern locations, including Sydney, Brisbane, New Zealand, Asia and beyond.

The establishment of temporary fairways, established by AMSA after extensive dialogue as part of stakeholder consultations (Section 6.25.2.1), represents a minor inconvenience to commercial shipping. In addition to this, Notices to Mariners will be issued prior to mobilisation, as well as ongoing communication with AMSA, Port of Melbourne and other ports where relevant.

Other controls and alternatives were considered, in accordance with Section 5.2, including minimising both duration of the campaign and minimising the safety zone around the MODU. The option to move the Baldfish, Hairtail drilling locations away from the shipping route has been considered. This would require horizontal directional drilling (HDD) over a long distance, which in turn would be costly, would require the use of NADF (Non-Aqueous Drilling Fluids; resulting in additional risk associated with the use of these drilling fluids), and would also substantially extend the duration of the drilling campaign. The associated risk is adequately managed through extensive measures put in place, including the establishment of temporary fairway and extensive communication and navigation aids. The additional risk and costs associated with HDD Technology is considered grossly disproportionate to the reduction in risk. No other mitigation measures are available, short of not proceeding with the drilling campaign.

Because of the location of the VIC/P70 Operational area, some interference with commercial shipping is possible. However, the consequence is minor and of short duration, so that the risk is assessed as Category 3 (medium). This is a Type B ALARP decision. Offshore commercial vessel operations are widely undertaken both locally, nationally and internationally. Shipping and commercial fishing activity is expected around the operational area, as the VIC/P70 well locations coincide with major shipping routes near the TSS. The risk associated with marine user interactions is well managed via legislative control measures that are considered industry best practice. These are well understood and implemented by the industry. Vessel operations are not unusual in this area and the risks impact to other marine users is well understood. The implementation of temporary fairways and extensive navigational aids are considered the key controls to address operations near a major shipping route.

Although the residual risk resulting from this activity is considered to be medium (Category 3), the proposed control measures are considered to be sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, and the activity is a well-established practice.

6.25.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 3 medium risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-27.

Table 6-27 RA 21: Environmental performance outcomes, standards and measurement criteria – Interference with commercial shipping

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
21	Interference with commercial shipping	Disruption to commercial shipping	No unplanned or negative interactions with commercial shipping	Vessel Crew and Navigational Equipment	Vessels will meet the crew competency, navigation equipment, watchkeeping and radar requirements of the AMSA Marine Order Part 3 and Part 30	Records indicate that vessels meet the crew competency, navigation equipment, and radar requirements of the AMSA Marine Orders	Offshore Risk, Environment & Regulatory Supervisor
				Navigational Equipment	Navigational Aids (communication, AIS, Message 21 coding, AtoN) in accordance with safety case commitments for safe operations near TSS, as agreed with AMSA (Section 3.4.1), and in accordance with IMO Resolution MSC.347 (91)	Records indicate that navigational aids onboard MODU and support vessels are in accordance with safety case commitments for safe operations near TSS, as agreed with AMSA (Section 3.4.1) and in accordance with IMO Resolution MSC.347 (91)	MODU OIM/Vessel Master
				Standby/guard vessel and AHTs	Standby/guard vessel and AHTs monitor vessel movements near and within the 2 NM Buffer zone around the MODU, and will intervene when a third party vessel approaches the 2 NM Buffer zone	Records confirm that a vessel is on standby at all time during drilling operations and actively patrols the 2 NM buffer zone around the MODU	
				Temporary Fairway not relevant for Sculpin and 2NM buffer zone	Establishment of temporary fairways and 2 NM buffer zone around operational area to divert commercial shipping away from Baldfish and Hairtail drilling activities	Records indicate that AMSA/AHS has established temporary fairways and buffer zones at least 3 months before start of Baldfish and Hairtail activities	Operations Superintendent
				Pre-start notifications	The AHS will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published	Email records confirm a Notice to Mariners was provided to the AHS at least four weeks before operations commenced	Operations Superintendent
					AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an	Email records confirm that information to distribute an AUSCOAST warning was	

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					AUSCOAST warning	provided to the JRCC	
					Relevant Stakeholders will be notified of activities approximately one month and again one week prior to commencement	Stakeholder records confirm that information was distributed to relevant stakeholders in required timeframes.	
					AHT will conduct an All Ships “Securite” VHF radio call on Safety Channels prior to the commencement and at regular periods throughout mooring and unmooring phase – Not relevant for Sculpin.	Vessel GMDSS Radio Logbooks record details of radio transmissions from vessel - – Not relevant for Sculpin.	Vessel Master
				Petroleum Safety Zone (PSZ)	Establishment of 500 m PSZ around operational facilities in accordance with section 616 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006.	Records show that a petroleum safety zone is established at least one month before start of field activities, and confirmed by a notice published in the Gazette as provided for under section 616 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006.	Operations Superintendent

6.26 Physical presence – Seabed Disturbance (RA 22)

6.26.1 Hazard

During drilling activities, the MODU will be anchored to the seabed to enable drilling activities to be undertaken. Drilling activities will directly disturb the seabed through presence of the wellbore – each wellhead, assuming a 26” (660 mm) surface hole and 17 $^1/_2$” (445 mm) conductor casing, will occupy an area of <0.5 m^2 for each well, or <1.5 m^2 in total for all VIC/P70 exploration wells.

Seabed disturbance resulting from the discharge of drilling cuttings and cement is addressed in Sections 6.18 (Cuttings to seabed), 6.19 (Cuttings at sea surface), 6.20 (Cement to seabed) and 6.21 (Cement at sea surface) respectively. The physical presence of these assets may result in some seabed disturbance and minor temporary changes to the water quality in the immediate vicinity.

6.26.2 Impact Assessment

Seabed disturbance has the potential to impact on receptors, including benthic habitats and assemblages and demersal fish, through smothering and alteration of benthic habitats and localised and temporary increase in turbidity near the seabed. Any impact will be limited to the immediate vicinity of the well locations, and thus the extent of potential impact is considered to be localised.

The MODU is positioned by the installation of eight anchors (Section 0), attached by anchor chains and anchor cables to winches on-board the MODU. The positioning of the anchors at each of the well locations, and sections of the anchor chain dragging over the seabed, will result in seabed disturbance.

Anchors are positioned by the AHTs on commencement of drilling activities at each of the well locations and will be retrieved by the AHTs on completion of the well activities. AHTs and supply vessels will use dynamic positioning (DP) systems while within the PSZ.

The area of benthic habitat expected to be disturbed by planned activities is approximately 30 m^2 per anchor (8 anchors in total) and 10 m^2 per clump weight (8 in total). Some further scouring is likely to occur from the anchor chain. Nonetheless, the total disturbance area is expected to be relatively small.

The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, supporting infauna communities (Section 4.10.2). The type of damage that could be sustained by smothering may include destruction of habitat. However, due to the similarity of surrounding habitat, and lack of sensitive benthic habitats, it is expected that recovery is likely. There are minimal pressures on this value and the damage would only occur within a small area. It is expected that any localised impacts from anchoring would rapidly recolonise and recover following any disturbance.

Benthic fauna may be disturbed through the temporary increase in turbidity near the seafloor as a result of seabed disturbance during anchoring. The area of increased turbidity is likely to be a very small area localised around the disturbance points where anchors or weights sit on the seabed. Monitoring of large-scale capital dredging programs has shown that turbidity plumes are highly localised and result in only short-term exposures. This disturbance is considered to be substantially less than that resulting from the release of drill cuttings and cement at the sea surface, so that the resulting impact is adequately addressed by these risks (see Sections 6.19 and 6.21). The location of the wells within a homogenous seabed area, and lack of sensitive benthic features, means that turbidity resulting from the described activities is not expected to result in any environmental impacts and hence have not been discussed further.

On completion of the VIC/P70 drilling scope, the well will be plugged in accordance with Esso P&A philosophy (Section 3.4.10), with the casing cut just below the seabed (1.5 to -3 m below the seabed). Based upon previous wellhead removal, the typical time to cut the wellhead is in the order of 3 – 7hrs. The wellhead is then pulled free and recovered to the MODU.

Once the wellhead is removed, an ROV is deployed from the MODU to conduct a post operation survey. This survey records the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed.

This involves a 50 m radius visual check and 100 m sonar inspection from each wellhead location. If subsea equipment is temporarily stored on the seabed, the ROV survey will also record the geographic coordinates of each piece of equipment. Removal of the wellhead and ROV survey may result in further localised seabed disturbance.

There are no KEF within the affected area. No stakeholder concerns have been raised on RA22. No further evaluation against the principles of ESD is required.

6.26.3 Controls

- Post-drilling ROV survey will record the condition of the seabed at the completion of the program to ensure that no dropped objects or subsea equipment intended for removal remain on the seabed.
- Mooring Analysis conducted to confirm adequacy of proposed anchoring system (API RP 2005: Design and Analysis of Station keeping Systems for Floating Structures).
- Mooring line tensions measured, recorded and monitored to prevent anchor drag as per ISO 19901-7:2013.
- Retrieval of anchors, anchor chains and wellhead on completion of well activities

Esso Procedure OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures that adequate mooring analysis has been completed prior to anchoring and that mooring line tension is monitored.

6.26.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	III	4

6.26.5 Demonstration of ALARP

All anchors and moorings will be removed on completion of drilling activities, so that the impact on the seabed is short term and localised. The seabed at the VIC/P70 exploration well locations has low biodiversity, with no unique features. Additionally, the use of otter boards and other fishing gear by demersal fisheries is expected to create substantially more seabed disturbance.

Because of the depth and low fishing activity at the VIC/P70 exploration well locations, leaving wellheads in situ on completion of drilling activities was considered as the risk of entanglement of fishing equipment was assessed to be low. However, the exploration wells serve no further purpose on completion of the VIC/P70 exploration drilling scope. Therefore, the wells will be plugged and abandoned and the wellheads removed on completion of the exploration activities, in accordance with Part 6.1 (Operations), Section 572 (Maintenance and removal of property etc. by titleholder) of the OPGGS Act.

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 7.1.5, other controls and alternatives were considered.

Use of a DP rig is feasible but challenging under Bass Strait Metocean conditions. However, this requires the use of thrusters in order to keep in position. This creates further sources of marine noise, in addition to additional energy demand and further air emissions. The use of an anchor moored MODU is preferred at this location and the Ocean Monarch is available within the timeframe of the project. Mobilising a DP MODU specifically for this campaign would be cost prohibitive.

The residual risk resulting from this activity is considered to be low (Category 4), the proposed control measures are considered to be sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.1.5, as the nature of this risk is well understood, and the activity is a well-established practice. Since the potential impact associated with this aspect is considered localised to marine / benthic communities, which are expected to recover over the longer term, this aspect is not considered as having the potential to affect biological diversity and ecological integrity. Therefore, no further evaluation against the Principles of ESD is required.

Seabed disturbance from offshore activities is a common occurrence both nationally and internationally. The area of disturbance is known, and benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed supporting infauna communities. Managing the risks from anchoring is well understood with good practice controls that are understood and generally well implemented by the industry. During stakeholder consultation, no objections or claims regarding seabed disturbance were made. ALARP Decision Context A applies. On this basis Esso considers the risk to be ALARP.

Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-28.

Table 6-28 RA 22: Environmental performance outcomes, standards and measurement criteria – Seabed Disturbance

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Operational Area Presence and Drilling Operations							
22	Physical presence of drilling rig – anchors, wellheads and subsea equipment	Damage, physical impact and disturbance to seabed	Limit extent of seabed disturbance during anchoring and drilling activities.	Mooring analysis Monitoring line tensions Post-drilling ROV survey Retrieval of anchors, anchor chains and wellhead on completion of well activities	Mooring analysis will be undertaken before anchoring. Anchor slipping / tension monitoring will be undertaken as per ISO 1990 1-7:2013 while the MODU is anchored.	Mooring records confirm anchor slipping / tension was monitored while the MODU was anchored.	MODU OIM
					Post-drilling ROV survey around the wellhead area will record the condition of the seabed at the completion of the program to ensure that no retrievable dropped objects or subsea equipment, intended for removal remain on the seabed.	Post-drilling survey around the wellhead area confirms that equipment has been recovered on completion of well activities	MODU OIM
					Retrieval of anchors, anchor chains and wellhead on completion of well activities	Records confirm that anchors and well heads have been removed on completion of well activities	Drilling Superintendent

6.27 Accidental Release – Dropped Objects (RA 23)

6.27.1 Hazard

Extreme weather events, resulting in wave heights and high winds, can occasionally remove items from offshore facilities. Offshore incidents can also occur, where objects are accidently dropped into the sea causing seabed disturbance. Depending on the nature of the dropped object, it could cause a hazard to marine users, could cause an impact to the seabed or could pose a risk to marine fauna, through entanglement, ingestion or impact. Seabed disturbance is covered under RA 22 (Section 6.26). Spills during chemical and oil storage and handling are addressed under RA 27 (Section 6.31).

6.27.2 Impact Assessment

No dropped objects are planned and all lifting will be conducted using certified lifting equipment, in accordance with approved lifting procedures and checks. A post drilling ROV campaign will confirm that apart from the cement and drill cuttings, unplanned items left on the sea floor are located and removed.

The operational area is located on sandy seabed substrate, with no or few features observed on the seabed surrounding the operational area. In the event of an object being dropped in the operational area, any seabed disturbance will be localised. Rough weather conditions in Bass Strait are the main cause of dropped objects, due to the storm dislodging unrestrained objects on the MODU or vessel.

There are no KEF within the area potentially affected by dropped objects. No stakeholder concerns have been raised on RA23. No further evaluation against the principles of ESD is required.

6.27.3 Controls

- Maintain operational lifting equipment in compliance with the Ocean Monarch Management Procedures and lifting standards in accordance with SEMS (OM-SC-001-02) and Lifting Equipment and Material Handling requirements (OM-SC-001-03, Section 3.4.9)
- Deck loads are adequately secured at all times
- ROV inspection of the seafloor around the wellhead area, post drilling to confirm that no unplanned retrievable equipment has been abandoned on the seabed and if so that they are removed where practicable.
- Securing loose items on deck.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors meet Esso's expectations for lifting equipment maintenance and procedures, and house-keeping procedures.

6.27.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.27.5 Demonstration of ALARP

Dropped objects are a major safety concern and all lifts are strictly controlled and monitored in accordance with the Ocean Monarch safety case. Adherence to approved lifting procedures and house-keeping procedures are considered adequate measures to manage the risk associated with dropped objects to ALARP, in accordance with Section 7.1.5, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

Other controls and alternatives were considered, in accordance with Section 7.1.5. There were no further controls identified for dropped objects, however for dropped oils and chemicals consideration was given to additional containment measures which could reduce the risk of spillage during transfer, including (see RA 27, Section 6.31):

- Secondary containment in shipping containers;
- Use of purpose built water tight shipping containers where possible; and
- Use of purpose built roof-opening shipping containers.

Where possible, these measures will be implemented. However, they are not always practicable due to MODU deck space constraints, increased manual handling risks, and cost implications (i.e., the cost of implementing these measures are grossly disproportionate to the reduction in risk). There were no further controls identified for dropped oils and chemicals. On this basis Esso considers the risk to be ALARP.

Demonstration of Acceptability

For this hazard the residual risk was assessed as a Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-29.

Table 6-29 RA23: Environmental performance outcomes, standards and measurement criteria - Operation and maintenance of MODU & support vessels

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
23	Operation and maintenance of MODU & support vessels	Incidental discharge of dropped objects to the marine environment, causing impact on the marine environment	Prevent dropped objects to marine environment	Approved lifting procedures	The MODU and supply vessels will apply approved lifting procedures	Lift plan is in place for vessel unloading. Lift plan is in place for critical lifts on rig deck.	Deck Supervisor/ Crane Operator
				Tying down of deck material	All materials on deck will be adequately secured to avoid loss overboard during storm, swell or heavy wind conditions	Rig walkarounds confirm that deck loads are adequately secured.	MODU OIM/Vessel Master
				Approved vessel maintenance procedures	Prevent overboard discharge of paint, coating and grit, hazardous liquid spills by undertaking all maintenance in accordance with approved vessel maintenance procedures	Records show routine completion of maintenance in accordance with preventative maintenance system	MODU OIM/Vessel Master
				Prevent accidental release of waste to marine environment	Prevent accidental release of vessel waste by implementing vessel/MODU waste management procedures (including use of containment barriers where appropriate) and by storing hydrocarbons and hazardous liquids within secondary containment or purpose-built bulk tanks aboard the MODU	Records show personnel have completed induction which includes waste management processes. Rig walkarounds confirm that waste management procedures are being followed	MODU OIM/Vessel Master
				Remove dropped objects at completion of drilling	ROV inspection of the seafloor around the well post drilling to confirm that no unplanned equipment has been abandoned on the seabed and if so that they are removed where practicable.	Records confirm that a post-campaign ROV survey around the well was completed and that any identified dropped objects are removed where practicable	MODU OIM/Vessel Master

6.28 Accidental Release - Loss of containment (LOC) from vessel collision (RA 24)

6.28.1 Hazard

A vessel to vessel or vessel to MODU collision could result in a release of diesel or other hazardous chemicals (in storage in the hull) to the marine environment, which can lead to changes in the water column biochemistry, causing acute or chronic impacts or mortality in seabirds, marine mammals and reptiles, fish and other marine organisms. It could also impact on shoreline and intertidal communities along the mainland or nearby islands.

The VIC/P70 operational areas lies to the east of the Bass Strait TSS (Section 4.12) and near a busy shipping route. This increases the risk of vessel collisions. However, 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.

Due to the location of the main diesel storage tanks on Ocean Monarch (Section 3.4.4) damage to one of these tanks, resulting in the release of the full inventory (530 m^3) is not considered to be a credible scenario. Release of MDO from one tank as a result from a vessel to vessel collision is considered credible. The AHTs can store a volume of up to 998 m^3 of MDO, distributed over several tanks (Section 3.5).

6.28.2 Modelling Methodology and Thresholds

A vessel collision with another vessel or with the MODU, resulting in a rupture of the hull and the loss of a fuel tank (280,000 L of diesel) over 6 hours was modelled. A conservative diesel volume for one of the main tanks of a support vessel was applied (280 m^3), similar to the volume previously applied for Esso activities in Bass Strait (e.g. see Central Fields EP, Document Number: AUGO-PO-EMP-034).

The following parameters were applied for MDO modelling:

- **Density**: 829 kg/m3 @ 15˚C
- **API**: 37.6
- **Dynamic viscosity**: 4.0 cP @ 25°C
- **Pour Point**: -14 ºC
- **Oil Property Category**: Group II (Light-persistent oil)

6.28.2.1 Stochastic modelling

Esso commissioned RPS APASA (APASA) to undertake OSTM using a three-dimensional oil spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program) (APASA, 2018). SIMAP was run multiple times to simulate the defined spill scenarios, using different samples of current and wind data, based on randomly selected historic time-series of wind and current data (5 years duration), representative of the study area as follows:

- 100 simulations were completed.
- The model ran 100 single spill trajectories, using the same spill information (i.e. spill volume, duration and oil type) but with varying start times, and in turn, prevailing wind and current conditions.
- The probability of exposure to the sea surface, in-water and shoreline contacts for the hypothetical spill scenario over a 5-year period was quantified.
- For the diesel spill scenario, the spill was tracked for 20 days
- The stochastic model output does not represent the extent of any one single spill trajectory (which would be significantly smaller) but rather provides a composite outlook of all trajectories run for the scenario.

Results from the simulations were combined and statistically analysed to produce maps or tabulated results at sensitive locations, showing multiple parameters, including the probability of exposure above nominated shoreline, sea-surface and water column thresholds, and minimum time before sea-surface contact, presented on an annualised basis.

One objective of the stochastic spill modelling is to establish a Zone of Potential Impact (Operational ZPI) that may be exposed to surface or in-water hydrocarbons, resulting from a marine hydrocarbon spill. Delineation of the Operational ZPI is based on the furthest feasible extent from the release location (lowest exposure zone) of all modelled scenarios where hydrocarbon thresholds, including surface, entrained and dissolved aromatic hydrocarbons could be exceeded.

The potential for sensitive receptors to be exposed to surface, entrained and dissolved hydrocarbons has been assessed by the application of assessment thresholds. Assessment thresholds for hydrocarbon exposure (sea surface, shoreline, and water column dissolved aromatics and entrained hydrocarbons) are described below.

6.28.2.2 Deterministic modelling

The number of deterministic analyses undertaken is dependent on the stochastic results for each scenario. There are several metrics that are used to select the single spill trajectories for analysis. Where no shoreline contact is predicted by stochastic modelling, only deterministic modelling that results in the largest swept area of actionable sea surface oil is undertaken.

Extensive shoreline contact:

- Largest swept area at or above 10 g/m^2 (actionable sea surface oil),
- Minimum time to shore for visible sea surface oil (0.05 g/m^2),
- Largest volume of oil ashore, and
- Longest length of shoreline contacted at or above 100 g/m^2 (actionable shoreline oil).

Minimal shoreline contact:

- Largest volume of oil ashore, and
- Largest swept area at or above 10 g/m^2 (actionable sea surface oil).

No shoreline contact:

- Largest swept area at or above 10 g/m^2 (actionable sea surface oil).

6.28.2.3 Spill Scenario Identification

Based upon the proposed activities, an assessment of all potential unplanned hydrocarbon release scenarios which could occur was identified at the Environmental Risk Assessment (ERA). These scenarios included:

- Loss of containment from a vessel to vessel collision or vessel to rig collision (RA 24).
- Spills during bunkering (RA 25).
- Spills during chemical and oil storage and handling (RA 27).
- Loss of well integrity (RA 28).

Of the above scenarios, the extended duration loss of well control (LOWC) from well integrity failure (loss of containment of a Group I (non-persistent) condensate oil at seabed, RA 28) presented the worst credible discharge scenario (WCDS) and was taken forward to modelling, and is addressed in Section 6.32.

Modelling was also undertaken for the unplanned release scenario resulting from a vessel collision (RA 24). Scenario RA 25 (bunk transfers and bunkering) and RA 27 (spills during chemical and oil storage and handling), have been determined to result in a release volume less than the WCDS and are considered to result in a smaller Operational ZPI, and are therefore considered adequately addressed by RA 24.

Modelling was undertaken for VIC/P70 (at Hairtail-1, the closest well to the shoreline) and also considered other fluids that are transported in vessel hulls (e.g. possibly brine or drilling mud). It was determined that the release of these fluids would have a similar or reduced impact to a diesel spill.

The outcomes of the Oil Spill Trajectory Modelling (OSTM) for the selected diesel spill scenario is presented below. It focuses on defining the likelihood of oil contact (surface, entrained and dissolved) with specific sensitive locations above the lowest threshold and shows the furthest possible extent from the release location that oil could reach, at the lowest threshold, if the spill scenario occurred.

6.28.2.4 Thresholds

Surface Hydrocarbon Thresholds

A surface hydrocarbon level of 0.5 g/m^2 equates approximately to an average thickness of ~0.5 µm (Table 6-30). Oil of this thickness is described as a silvery to rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (Bonn Agreement, 2009) is considered the practical limit of observing oil in the marine environment (AMSA 2012). This threshold is considered below levels which would cause environmental harm and it is more indicative of the areas perceived to be affected due to its visibility on the sea surface and potential to trigger temporary closures of areas (i.e. fishing grounds) as a precautionary measure. Hence, the 0.5 g/m^2 threshold has been selected to define the zone of potential low exposure on the sea surface (Table 6-31).

Table 6-30 The Bonn Agreement Oil Appearance Code

Code	Description Appearance	Layer Thickness Interval (g/m^2 or µm)	Litres per km^2
1	*Sheen (silvery/grey)*	0.04 – 0.30	40 – 300
2	*Rainbow*	0.30 – 5.0	300 – 5,000
3	*Metallic*	5.0 – 50	5,000 – 50,000
4	*Discontinuous True Oil Colour*	50 – 200	50,000 – 200,000
5	*Continuous True Oil Colour*	200 –>	200,000 –>

Table 6-31 Hydrocarbon exposure thresholds in surface waters

Threshold	Range	Basis	Receptors*
Low Impact	0.5 – 10 g/m^2	Socio-economic impact. 0.5g/m^2 considered the practical limit of observing oil in the marine environment (AMSA 2012) (French-McCay (2016) concluded 1g/m^2 was an appropriate threshold for sub-lethal effects on water birds, marine mammals and turtles.)	**Social** • Coastal Settlements • Recreation and Tourism • Heritage
Moderate Impact	10 – 25 g/m^2	Lethal threshold for water birds, marine mammals and turtles. 10g/m^2 derived by French-McCay (2016) based on observations made by the Deep Water Horizon Trustees (2015).	**Ecological** • Seabirds and Shorebirds • Marine Reptiles • Marine Mammals **Social** • Commonwealth Areas, Parks and Reserves • State Parks and Reserves
High Impact	>25 g/m^2	Scholten *et al*. (1996) and Koops *et al*. (2004) indicated that a concentration of surface oil equal to 25 g/m^2 or greater would be harmful for all birds that contact the slick.	

* *Based on available information, concentration thresholds for use in the impact assessment have been defined for the different exposure types (surface, in-water, shoreline). These impact thresholds and exposure pathways are then applied at a receptor level for use in the consequence evaluations.*

Shoreline Exposure Thresholds

There are many different types of shorelines, ranging from cliffs, rocky beaches, sandy beaches, mud flats and mangroves, and each of these influence the volume of oil that can remain stranded ashore and its thickness before the shoreline saturation point occurs. For instance, a sandy beach may allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. A sandy beach shoreline was assumed as the default shoreline type for the modelling herein, as it allows for the highest carrying capacity of oil (of the available open/exposed shoreline types). Hence the results contained herein would be indicative of a worst case scenario, where the highest volume of oil may be stranded on the shoreline (when compared to other shoreline types, such as exposed rocky shores). The thresholds for shoreline impacts are summarised in Table 6-32.

Table 6-32 Hydrocarbon exposure thresholds used to classify the zones of shoreline contact

Threshold	Range	Basis	Receptors*
Low Impact	10-100 g/m^2	French-McCay *et al.* (2005a, 2005b) 10g/m^2 used to define regions of socio-economic impact (e.g. temporary closure of fisheries, need to clean up man-made structures or amenity beaches)	
Moderate Impact	100 – 1000 g/m^2	AMSA's Foreshore Assessment Guide (2012) defines 100g/m^2 as the minimum thickness that does not inhibit recovery and is best remediated by natural processes alone. Sub-lethal and lethal impacts for shorebirds and wildlife (French *et al.* 1996).	**Ecological** • Shoreline (e.g. sandy, rock etc.) • Soft Sediment • Marine Invertebrates • Seabirds and Shorebirds • Marine Reptiles • Marine Mammals **Social** • Commonwealth Areas, Parks and Reserves • State Parks and Reserves • Coastal Settlements • Recreation and Tourism • Heritage
High Impact	>1000g/m^2	Significant impact on marsh plants (Lin & Mendelssohn, 1996) and mangroves (Grant *et al.* 1993; Suprayogi & Murray, 1999).	**Ecological** • Mangroves • Saltmarshes **Social** • Wetlands

* *Based on available information, concentration thresholds for use in the impact assessment have been defined for the different exposure types (surface, in-water, shoreline). These impact thresholds and exposure pathways are then applied at a receptor level for use in the consequence evaluations.*

Water Column Exposure Thresholds

Dispersed oil are small, discrete insoluble dispersed oil droplets, suspended in the water column. In essence the oil has been partitioned (naturally separated) from gas/oil/water mixture by solubility (water washing) and vapour pressure (evaporation) based on the individual hydrocarbon chemical properties.

While dissolved aromatics are the largest contributor to the toxicity of solutions generated by mixing hydrocarbons into water, it is still important to model the fate of entrained hydrocarbons because they are the mechanism of delivering soluble aromatics to the water column.

Dissolved Aromatic Hydrocarbons

The threshold value for species toxicity in the water column is based on global data from French *et al.* (1999) and French-McCay (2002, 2003), which showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure >4 days (96-hour LC_{50}) under different environmental conditions varied from 6 to 400 ppb, with an average of 50 ppb. This range covered 95% of aquatic organisms tested, which included species during sensitive life stages (eggs and larvae). Thresholds for dissolved hydrocarbons, and their rationale are summarised in Table 6-33.

Entrained Hydrocarbons

There has been a considerable amount of dialogue among scientists on what entrained hydrocarbon levels represent realistic thresholds. The selected thresholds for entrained hydrocarbons are summarised in Table 6-34.

Exposure thresholds used to assess entrained hydrocarbon exposure were based on OSPAR guidelines. OSPAR has published a predicted no effect concentration (PNEC) for produced formation water (PFW), which accounts for the dispersed fractions of oil that is more representative of entrained oil droplets.

There are practical limitations to OSTM as a tool to assess spill risk, and thresholds, no matter how carefully chosen, are a simplification of the actual situation because:

- Thresholds do not distinguish between the various marine species. Instead, a conservative scientifically defensible value is selected, allowing for the generally agreed species protection levels (NOEC is based on to 95% protection of species).
- Thresholds do not distinguish between life stages (eggs, larvae, juveniles, adults).

- Thresholds do not distinguish between the wide range of chemicals that may comprise released hydrocarbons.
- Thresholds do not take into further account the various levels of exposure times, but instead choose between acute (96 hrs) or chronic exposure levels (168 hrs).

Table 6-33 Hydrocarbon exposure thresholds for dissolved aromatic exposure

Exposure level	Threshold	Basis	Receptors
Low Exposure (99% species protection)	6 ppb for 96 hours (576 ppb.hrs)	LC_{50} from French-McCay (2002, 2003), using lower limit of sensitivity range (6 ppb). Exposure of 96 hours chosen as conservative for acute effects (acute studies generally observe toxicity over 48-96 hours).	
Moderate Exposure (95% species protection)	50 ppb for 96 hours (4,800 ppb.hrs)	LC_{50} from French-McCay (2002, 2003), using average of reported sensitivity values (50 ppb). Species sensitivity (fish and invertebrates) to dissolved aromatics exposure >4 days (96-hour LC_{50}) under different environmental conditions varied from 6 to 400 µg/l (ppb), with an average of 50 ppb. An average 96 hr LC50 of 50 ppb could serve as an acute lethal threshold to 5% of biota.	**Ecological** • Seagrass • Algae • Coral • Plankton • Marine Invertebrates • Fish & Sharks • Marine Mammals **Social** • Commonwealth Areas, Parks and Reserves • State Parks and Reserves • Commercial and Recreational Fisheries • Recreation and Tourism
High Exposure (50% species protection)	400 ppb for 96 hours (38,400 ppb.hrs)	LC_{50} from French-McCay (2002, 2003), using upper limit of sensitivity range (400 ppb). An average 96 hr LC_{50} of 400 ppb could serve as an acute lethal threshold to 50% of biota.	

* *Based on available information, concentration thresholds for use in the impact assessment have been defined for the different exposure types (surface, in-water, shoreline). These impact thresholds and exposure pathways are then applied at a receptor level for use in the consequence evaluations.*

Additionally, there are limitations on the model itself (e.g. McKay *et al*., 1999, French-McCay 2004):

- Available temperature, wind, wave and current data,
- Grid resolution and bathymetry simplification,
- Tidal forcing,
- Assumptions made around weathering and fate,
- Limitations to the number of computations which restricts the number of particles that are traced during each run, and which in turn limits the lowest concentrations that can be reliably traced.

A further complication is that modelled volumes and composition of hydrocarbons are conservatively chosen based on theoretical values and the available reservoir data. Released volumes and actual duration of the release is likely to be substantially less.

In order to take above considerations into account, model assumptions and selection of thresholds are conservative. Nonetheless, low level impacts may extend beyond the lowest thresholds. The geographical extent of such impacts was determined by applying the ANZECC criteria for TPH to entrained hydrocarbons.

Table 6-34 Hydrocarbon exposure thresholds for entrained hydrocarbon exposure

Exposure level	Threshold	Basis	Receptors
ANZECC reference criteria	7 ppb for 96 hrs (672 ppb.hrs)	ANZECC (2000) derived a final chronic value of 7 µg/L total petroleum hydrocarbons (TPH), based on Tsvetnenko (1998), who used the USEPA methods (Stephan *et al*. 1985, USEPA 1994d). The threshold is applied for acute exposure (i.e. 96 hrs). This threshold is applied to provide a geographical limit to low level impacts, below the 95%-ile NOEC threshold.	Possible sub-lethal effects to the most sensitive organisms Below limit of detection using standard laboratory techniques
95%-ile No effects concentration (NOEC)	70 ppb 168 hours* (11,760 ppb.hrs) Sculpin: 96 hrs* (23,040 ppb.hrs) ** For Sculpin LOWC modelling, a more sensitive threshold was applied, for consistency across all thresholds*	The OSPAR PNEC is 70 ppb (median estimate at 50% confidence and at 5% of the hazardous concentration (HC5)) and is based on biomarker and whole organism testing to total hydrocarbons (THC). The functioning of any ecosystem in which that species exists is protected provided that the ecological structure is not distorted. The working but arbitrary hypothesis is that protection of the most sensitive species with a 95% confidence limit should protect ecosystem structure and hence function (WHO 1999). This NOEC represents an acceptable long-term (i.e., chronic, >7 days) exposure concentration from continuous point source discharges in the North Sea, which is one of the most concentrated areas in the world for oil and gas production. The 70 ppb is regarded as the maximum allowable exposure level and thus is considered to be the 'low exposure threshold' in this study. The whole organism responses range from oxidative stress and DNA damage to impacts on growth, reproduction and survival. The low exposure level for entrained hydrocarbons is based on an exposure duration of 7 days (168 hours), representative of chronic exposure, compared to the acute 96-hour exposure periods used to classify moderate and high exposures.	**Ecological** • Seagrass • Algae • Coral • Plankton • Marine Invertebrates • Fish & Sharks • Marine Mammals **Social** • Commonwealth Areas, Parks and Reserves • State Parks and Reserves • Commercial and Recreational Fisheries • Recreation and Tourism
Fish Tainting	240 ppb for 96 hours (23,040 ppb.hrs)	Davis *et al* (2002) studied the effect of the exposure of fish to petroleum products, and resulting tainting (oily taste) and rate of depuration (return to normal flavour when returned to clean water). Davis *et al.* (2002) showed that acute exposure to oil in seawater is detectable at between 100 – 330 ppb, and that a lower level of exposure to medium fuel at 240 ppb is an acceptable lower limit for finfish. Tainting thresholds for trout varied from 0.10 mg/L for crude and 0.33 mg/L for medium fuel oil, to 0.25 mg/L for diesel exposure (98 – 331 ppb), and that the rate of update and rate of depuration depended on the petroleum product. Diesel-derived taint persisted for over 10 weeks, much longer than both the medium fuel oil (47 days) and the crude oil (35 – 45 days for finfish) derived taints. However, fish tainting is temporary, and fish returns to natural flavour after 1-2 months in uncontaminated seawater. The lower level concentration for exposure to medium fuel (0.241 mg/L - 241 ppb) formed the basis for this threshold.	**Social** • Commercial and Recreational Fisheries
Low Impact (99% species protection)	700 ppb for 96 hours (67,200 ppb.hrs)	LC_{50} for 99% of species. Exposure thresholds used to assess entrained hydrocarbon exposure were based on OSPAR guidelines. OSPAR has published a PNEC for PFW, which accounts for the dispersed fractions of oil that is more representative of entrained oil droplets. For this study, moderate and high thresholds have been set at 700 ppb and 7,050 ppb, respectively. Exposure of 96 hours chosen as conservative for acute effects (acute studies generally observe toxicity over 48-96 hours).	
Moderate Impact (95% species protection)	7,050 ppb for 96 hours (676,800 ppb.hrs)	LC_{50} for 95% of species protection. Exposure thresholds used to assess entrained hydrocarbon exposure were based on OSPAR guidelines. OSPAR has published a PNEC for PFW, which accounts for the dispersed fractions of oil that is more representative of entrained oil droplets. For this study, moderate and high thresholds have been set at 700 ppb and 7,050 ppb, respectively. Exposure of 96 hours chosen as conservative for acute effects (acute studies generally observe toxicity over 48-96 hours).	
High Impact (50% species protection)	80,400 ppb for 96 hrs (7,718,400 ppb.hrs)	LC_{50} for 50% of species protection. See above.	

6.28.2.5 MDO Weathering and Fate

The weathering and fates volume balance for the spill trajectory (Figure 6-7) indicated rapid evaporation (37% of total spill volume) over the release duration (6 hours). The inverse correlation between entrained oil and sea surface oil can be seen at 2.25 days after the spill, as a strong wind event forced the sea surface oil into the water column. At the end of the simulation 56% of the oil had evaporated, 29% remained entrained in the water column, 16% had decayed and <1% persisted on the sea surface.

Visible oil (low 0.5 g/m^2) did not persist on the sea surface beyond 3 days and actionable oil (moderate 10 g/m^2) was not predicted on the sea surface beyond 2 days.

Maximum extent of the surface plume at low exposure is reached within 2-3 days, with rapid evaporation (37% of total spill volume) over the release duration (6 hours). No actionable sea surface oil remains after 2 days (i.e. >10 g/m^2; Section 6.28.2.4). After 20 days, <1% persisted on the sea surface, while 56% of the oil had evaporated, 29% remained entrained in the water column and 16% had decayed.

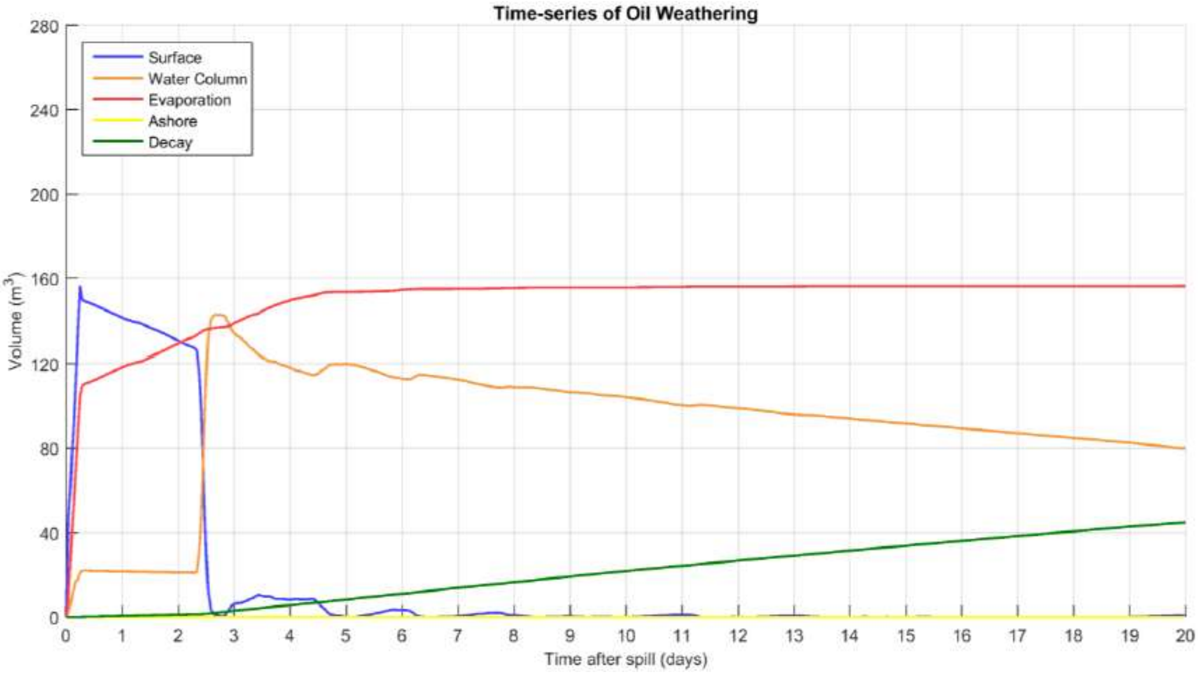


Figure 6-7 **Predicted weathering and fates volume balance for a worst case spill trajectory, resulting from a hypothetical 280 m³ surface release of MDO at Hairtail-1 over 6 hours (tracked for 20 days) commencing 2 am 26th May 2008 (APASA 2018)**

6.28.2.6 MDO Surface Hydrocarbon Exposure

Modelling results have indicated that low (0.5 to 10 g/m^2), moderate (10 to 25 g/m^2) and high (> 25 g/m^2) zones of sea-surface exposure are not predicted to contact the Victorian coastline or any of the offshore Bass Strait Islands. Low sea-surface exposure levels stretched a maximum distance of 131 km east-northeast from the release site (77 km at 99th percentile), whilst moderate and high sea-surface exposure zones remained within 25 km south-southwest and 8 km south from the release site, respectively (at 99th percentile).

The surface diesel release has been modelled using assumptions presented in Section 6.28.2.1. In the event that this scenario was to occur, the trajectory of the spill will depend on prevailing wind and current conditions at the time.

The deterministic spill trajectory starting on 26th May 2008 at 2 am was identified to have the largest sea surface swept area at the moderate (≥ 10 g/m^2) threshold. Table 6-35 summarises the predicted maximum extent of the surface plume at low threshold (0.5 – 10 g/m^2), and represents the zone with minimum sea-surface oil thickness visible to the naked eye (Section 6.28.2.4).

At low threshold, the probability of the contour extending beyond the immediate vicinity of the VIC/P70 operational areas is less than 10%.

The deterministic spill trajectory starting on 26th May 2008 at 2 am was identified to have the largest sea surface swept area at the moderate (≥ 10 g/m^2) threshold, extending approximately 20 km south-east from the release site.

6.28.2.7 MDO In-water Hydrocarbon Exposure - Dissolved Aromatic Hydrocarbon

No dissolved aromatic exposure, above the low dissolved aromatic threshold (576 ppb.hrs), was predicted for the modelled 280 m^3 surface release of MDO over 6 hours.

The potential zone of dissolved aromatic hydrocarbon exposure in the top layer (0 to 10 m) of the water column from a 280 m^3 diesel spill at the VIC/P70 operational area is restricted to the Operational areas at moderate exposure (50-400 ppb over 96 hrs).

6.28.2.8 MDO In-water Hydrocarbon Exposure - Entrained Hydrocarbon

The potential zones of entrained exposure at the NOEC (≥ 11,760 ppb.hrs) and tainting (≥ 23,040 ppb.hrs) thresholds is summarised in Table 6-35. Low (≥ 67,200 ppb.hrs), moderate (≥ 676,800 ppb.hrs) and high (≥ 7,718,400 ppb.hrs) exposure is predicted to be restricted to an area immediately around the operational area for this scenario. The predicted entrained exposure at the NOEC threshold occurred up to 10 km from the Hairtail-1 release site.

Figure 6-8 represents the geographical extent of impacts from entrained hydrocarbons beyond the 95%-ile NOEC, based on ANZECC criteria (Section 6.28.2.8). At this highly conservative threshold, entrained hydrocarbons may reach into NSW, and also touch the shoreline between Marlo and Mallacoota, as well as the Kent Group Islands and the northern tip of Flinders Island. However, it is unlikely that entrained hydrocarbons are measureable in the water column at these levels with standard laboratory methodology, while impacts on even the most sensitive biota and ecosystems would most likely not be detectable with conventional scientific methods.

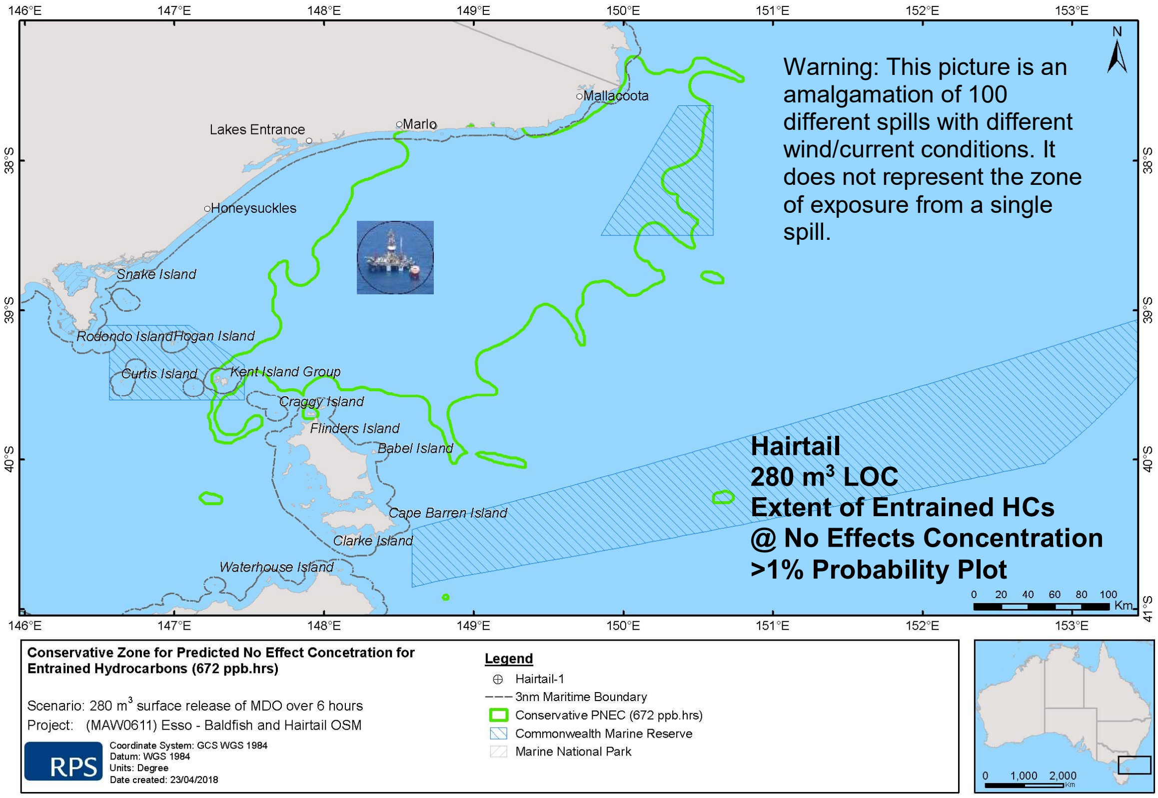


Figure 6-8 Geographic extend of potential impacts from entrained hydrocarbons at ANZECC reference level (7 ppb, 96 hrs) resulting from a 280 m^3 diesel spill at Hairtail-1 within VIC/P70 (APASA 2018)

Table 6-35 MDO LOC Scenario - Summary of predicted spill impacts

Partition	VIC/P70 Operational area	Commonwealth waters	Victoria State Waters	Shoreline impact	Biologically Important Areas (BIAs) (APASA 2018)	Key Ecological Features (KEF) (APASA 2018)
240 m^3 Diesel Spill at Hairtail-1						
Surface hydrocarbons	Distance from release site				Probability of hydrocarbon exposure	
Surface Hydrocarbons	8 km S (high threshold; 99%-ile)	25 km SSW (moderate threshold; 99%-ile)	NC	NC	Probability (at high threshold): whales, sea birds: (43%)	Probability (at low threshold): Upwelling East of Eden: 14% (NE at moderate threshold)
>50% probability of surface oil exposure at low threshold	Immediately around release site only (99%-ile)		-	-		
1-10% probability of surface oil exposure at low threshold	Up to 77 km from release site (99%-ile)		<1%	<1%		
Time to reach outer limit for low sea surface threshold	<6 hours	2-5 days	-	-		
Dissolved Hydrocarbons						
Vertical distribution	No impact predicted 0-10 m layer only		NC	NC	NC	NC
Entrained Hydrocarbons						
Vertical distribution	Low impacts immediately around release site 0-10 m layer	NOEC & tainting impacts <10 km from release site	At ANZEC reference threshold (7 ppb @ 96 hrs) residual entrained hydrocarbons may reach the Victorian, NSW and Tasmania shoreline, including BIA for whales and seabirds, as well as KEF (including Upwelling East of Eden, Big Horseshoe canyon)			
Other parameters						
Deterministic modelling (worst case)	Moderate exposure <20 km SE from release site	Low exposure up to 50 km SE from release site	-	-	-	-
Duration of visible sea surface film	<3 days after release	<3 days after release	-	-	-	-
Actionable sea surface oil	< 2 days after release	< 2 days after release	-	-	-	-

NE=No exposure; NC= No contact; - = not applicable

6.28.2.9 MDO Shoreline contact

No shoreline contact, above the low shoreline contact threshold (10 g/m^2), was predicted for the modelled 280 m^3 surface release of MDO over 6 hours, except at the ANZECC reference threshold for entrained hydrocarbons.

6.28.3 Impact Assessment

A release of diesel or other hazardous chemicals to the marine environment may result in acute or chronic impacts, or mortality, of marine organisms. A vessel collision event also has the potential to impact on social receptors, resulting from surface; and in water exposure (entrained only).

The potential impacts include direct impacts (potential toxicity effects / physical oiling; potential for reduction in intrinsic values / visual aesthetics) and indirect impacts (potential damage to commercial businesses). Based on the impact thresholds identified in Section 6.28.2, the potential risks are summarised below.

6.28.3.1 MDO Surface Hydrocarbon Exposure

Surface hydrocarbon exposures will only impact those receptors that are exposed to the sea surface. Only those predicted to be exposed to hydrocarbon levels above the threshold value for that receptor (Table 6-31) are evaluated further below. The ecological and social receptors with the potential to be exposed to surface hydrocarbon are evaluated in Table 6-36. There is a 14% probability that surface hydrocarbons will reach the Upwelling East of Eden at low threshold, but not at moderate thresholds (Table 6-35). In addition, whales, seabirds, seals and turtles may be affected by surface hydrocarbon exposure at variable levels.

6.28.3.2 MDO In-water Hydrocarbon Exposure

In-water hydrocarbon exposures (from dissolved and entrained hydrocarbons) will impact those receptors that are exposed to the water column. The ecological and social receptors with the potential to be exposed to in-water hydrocarbons are evaluated in Table 6-36. Only those predicted to be exposed to hydrocarbon levels above the threshold value for that receptor are evaluated further below.

Exposure above the in-water (entrained) NOEC impact threshold (Table 6-34) was predicted to extend up to 10 km around the release site, and is restricted to the surface (0-10 m) layer. The water depth in the area predicted to be exposed above the impact threshold is more than 350 m deep, which generally precludes the more sensitive benthic flora and fauna. No Commonwealth Marine Parks, State marine protected areas, or KEFs were predicted to be exposed to entrained oil above the impact threshold.

Table 6-36 MDO Loss of Containment - Consequence evaluation for Hydrocarbon Exposure

Environment	Type	Exposure Evaluation	Consequence Evaluation
Surface water			
Ecological	Marine turtles	Marine turtles (Section 4.8.13) may occur in the area exposed to moderate surface thresholds (Section 6.28.2.6). However, this area is not identified as critical habitat and there are no spatially defined aggregations, or BIA.	Marine turtles are vulnerable to the effects of oil at all life stages. Marine turtles can be exposed to surface oil while swimming through a slick or by ingesting oil. Ingested oil can harm internal organs and digestive function. Oil on their bodies can cause skin irritation and affect breathing. The number of marine turtles that may be exposed is expected to be low due to the location, and relative short duration in the case of an MDO LOC event. The potential impact would be limited to individuals, with no population impacts anticipated. The potential impacts and risk to marine turtles are Category 4 (low) risk for an MDO LOC (Section 5).
	Seabirds and shorebirds	Several threatened, migratory and/or listed marine species (Section 0) may occur in the area exposed to moderate surface thresholds (Section 6.28.2.6). There are foraging BIA's for some species of petrels and albatrosses throughout the area. However, there are no breeding BIAs within this area, as the majority of known breeding habitats are within coastal habitats and islands of Bass Strait.	Individual birds may suffer impacts as a result of a spill, especially nearest to the source of the spill, when toxicity is highest due to the presence of volatile compounds. However, it is unlikely that a large number of birds will be affected. Seabirds that are resting, rafting, diving or feeding at sea have the potential to come into contact with surface sheen and may experience lethal surface thresholds. The area of contact is localised and temporary, especially in the case of an MDO LOC event. Contact with areas of high hydrocarbon exposure is unlikely because of the distance from shore. Acute or chronic toxicity impacts to a small number of birds is possible, especially in the case of an extended LOWC event. However, impacts ae unlikely to be significant at a population level. The potential impacts and risk to seabirds are Category 4 (low) risk for an MDO LOC (Section 5).
	Seals (Pinnipeds)	Seals are likely to occur (Section 4.8.15) within the area exposed to moderate surface thresholds (Section 6.28.2.6). However, these areas are not identified as critical habitat, and there are no spatially defined aggregations (i.e. no BIAs for seals)	Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Fur seals are particularly vulnerable to hypothermia rom oiling of their fur. Since MDO is a light oil, such impact is unlikely. Seal exposure is expected to be low, with impacts restricted to individuals rather than colonies. Due to the rapid

Environment	Type	Exposure Evaluation	Consequence Evaluation
			weathering of MDO, the potential exposure time is limited, especially as a result from an MDO spill. The potential impacts and risks associated with LOC is considered Category 4 (Low) as they could be expected to result in Level III Consequence and very unlikely probability for MDO Spills (Section 5).
	Whales & Dolphins (Cetaceans)	Several threatened, migratory and/or listed species have the potential to be migrating, resting or foraging (Section 4.8.16) within an area exposed to moderate surface thresholds (Section 6.28.2.6). The area overlap BIAs for whales (Section 4.8.2).	Physical impact by individual whales to MDO exposure is unlikely to lead to any long-term impacts (Section HOLD). Given the mobility of whales, only a small proportion of the migrating population would surface in the affected area, resulting in a Category 4 (low) risk for an MDO LOC (Section 5).
Social	Recreation and tourism	Marine pollution can result in impacts to marine-based tourism from reduced visual aesthetic. The modelling predicts no shoreline impact at low level sheen (1 g/m^3), with visible sheen (low impact: <0.50 g/m^2) extending to commonwealth waters only (Section 6.28.2.6).	Visible sheen has the potential to reduce visual amenity (Section 6.28.2.4). However, because of distance from shore, impact is ranked as Category 4 (low) (Section 7).
	Heritage	No shoreline impact predicted at low level sheen (1 g/m^3), with visible sheen (low impact: <0.50 g/m^2) extending to commonwealth waters only (Section 6.28.2.6), well away from coastal towns or shorelines.	Visible sheen has the potential to reduce the visual amenity of known heritage sites (Section6.28.2.4). However, because of distance from shore, impact is ranked as Category 4 (low) (Section 5).
Subsurface			
Ecological	Macroalgae	No dissolved aromatic exposure, above the low dissolved hydrocarbon threshold (576 ppb.hrs), was predicted (Section 6.28.2.7). The potential zones of entrained exposure at the NOEC (≥ 11,760 ppb.hrs) and tainting (≥ 23,040 ppb.hrs) thresholds may occur within 10 km from the VIC/P70 operational area (Section 6.28.2.8). Since the operational area is too deep for macroalgae, no impacts on macroalgae from a LOC event are predicted.	Given the lack of dominant macroalgae habitat within the area affected above the NOEC threshold, the potential impacts to macroalgae is considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Seagrass	Seagrass may be present in shallower water (Section 4.9.4). They are largely restricted to <35 m, but abundance rapidly declines below 10m depth,	Because much of seagrass biomass is in the rhizomes below the substrate (Zieman *et al*.1984), exposure is more likely to result in sub-lethal impacts, rather than lethal impacts.

Environment	Type	Exposure Evaluation	Consequence Evaluation
		especially in high turbulence areas, where light penetration is limited (Cambridge and Kuo 1979). Since the operational area is too deep for seagrasses, no impacts from a LOC event are predicted.	The potential impacts to seagrass are considered to be less than a Category 4 (low) risk for an MDO LOC and Category 3 (Medium) for an extended LOWC (Section 5).
	Temperate corals, ascidians, bryozoans and sponges	Soft corals may be present on hard substrate, such as intertidal rocky shores or exposed rocky headlands (Section 4.9.3, 4.9.9). They may also be found on hard substrate in deeper waters further offshore, including Big Horseshoe Canyon and Beagle Marine Reserve (Section 4.8) where adequate food is available in the water column, but their presence near the operational area is unlikely due to the lack of hard substrate, and low levels of suspended organic matter in the water column (Butler *et al*.2002). Six sponge beds were reported in Bass Strait, in an arc along the 65-75 m contour near Tasmania. Ascidians and bryozoans occupy a similar habitat (Butler *et al.* 2002). Sponges and ascidians are also found on soft-bottom substrate (see below). However, most barnacle and ascidian species inhabit hard substrates and are generally infrequent in soft bottoms (e.g. Yakovis *et al*. 2005).	Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects (Shigenaka 2001). This may lead to reduced growth rates, tissue decomposition and localised mortality (NOOA, 2001). Because of the depth at the VIC/P70 exploration well locations, and entrained hydrocarbons restricted to surface waters, impacts on temperate reefs are unlikely. Therefore, the potential impacts to hard substrate communities are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Plankton	Plankton is likely to be exposed to entrained hydrocarbons above the NOEC threshold in an area within 10 km from the operational area (Section 4.9.4). Although surface hydrocarbons are expected to extend to the Upwelling East of Eden (Table 6-40), no impacts in-water exposure to any KEFs are predicted for an MDO spill at the NOEC threshold (Section 6.28.2; Table 6-35).	Relatively low concentrations of hydrocarbons are toxic to plankton (including zooplankton, fish eggs and larvae) through ingestion, contact and inhalation. Plankton is widespread and abundant, and form the basis for the marine food web. A spill is unlikely to have long-lasting impacts on plankton populations at a regional level. Plankton recovers within weeks to months after water quality has returned to normal (ITOPF 2011) Therefore, the potential impacts to plankton communities are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Soft-bottom invertebrates	Soft bottom communities occur throughout the Operational ZPI, including deepwater waters around the operational area (Section 4.9) and much of the Gippsland coastline. As vertical impact resulting from a LOC is largely restricted to the top 20 m of the water column, and no shoreline impact is predicted below the lowest thresholds, direct impact to soft-bottom benthic communities is not expected. Invertebrates include squid, crustaceans (rock lobster and crabs) and molluscs (scallops and abalone), as well as filter feeding benthic invertebrates such as sponges bryozoans abalone and hydroids. Sponges attach to hard bottom using a basal disc or anchoring spicules, or to soft sediment by means of root-like structures. Several soft-bottom invertebrates are target to commercial fisheries, including squid, abalone, rock lobster and crabs.	Acute or chronic exposure through contact and/or digestion can result in toxicological risks. The hard shell of many invertebrates protects them from absorption. Since impacts from a LOC are restricted to the water surface or the top 20 m of the water column (Section 6.28.2; Table 6-35), impact from a MDO spill on soft-bottom benthic communities is unlikely. Therefore, the potential impacts to plankton communities is considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Fish, sharks, rays	Entrained hydrocarbon droplets can physically affect fish exposed for an extended duration (weeks to months). Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon levels are highest. Many target fish species are demersal, in deeper waters away from the water surface. Therefore, any impacts are expected to be highly localised. The known distribution and foraging BIA for the Great white shark overlaps the area potentially affected by NOEC entrained thresholds.	Pelagic free0swiming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in the water column are predicted to be below lethal thresholds, except near the operational area (Section 6.28.2; Table 6-35). Although localised tainting may be expected, these effects are reported to be short-term and reversible (Section 6.28.2.4). Juvenile fish, including larva and zooplankton are more susceptible to hydrocarbons in the water column (see above under "plankton"), although impacts are not expected to cause population levels impacts. Impacts in eggs and larvae are not expected to be significant given the relatively short duration) and the limited extent of the spill. As eggs and larvae are widely distributed in the upper water column it is expected that nearby populations will rapidly drift into affected parts of the water column. Therefore, the potential impacts to fish communities are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Seals	Fur seals may also occur in low numbers within the operational area (Section 4.8.15). Localised areas of	Exposure to low levels of hydrocarbons in the water column or consumption of affected prey may cause sub-lethal impacts. However,

Environment	Type	Exposure Evaluation	Consequence Evaluation
		the foraging range for New Zealand Fur Seals and Australian fur-seals may be temporary exposed to low concentrations of hydrocarbons within an area predicted to be above the NOEC entrained threshold. Low levels of entrained hydrocarbons may be experienced immediately around the operational area, with NOEC thresholds limited to an area <10 km from the spill location for MDO LOC event. No dissolved hydrocarbon exposure is predicted for an MDO spill.	given the temporary and localised nature of a spill, the wide distribution of seals, the low level of exposure zones, except for dissolved hydrocarbons in the upper water column in the case of a LOWC, and rapid loss of o the volatile components following a spill, impacts at a population levels are considered unlikely. The potential impacts to seals are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Whales and dolphins	Several threatened, migratory and/or listed marine species have the potential to be migrating, resting or foraging within an area predicted to be above the NOEC entrained thresholds (Section 4.8.16). Known BIAs are present for foraging Pygmy Blue whale; and distribution for the Southern Right whale (Section 4.8.2). Southern Right Whale and Humpback Whale migration overlap with VIC/P70 field activities (Table 4-16). Low levels of entrained hydrocarbons may be experienced immediately around the operational area, with NOEC thresholds limited to an area <10 km from the spill location for MDO LOC event. No dissolved hydrocarbon exposure is predicted for an MDO spill. Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Table 6-47). Such impacts are most likely near the release location. The risk of impacts declines further from the spill location due to weathering, and loss of the volatile toxic components.	In the case 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 to a large number of individuals. However, such exposure is not anticipated to result in long term population viability effects. A proportion of the migrating population of whales could be affected during a single migration event, which could result in temporary and localised consequences. Migration of the southern right whale occurs mid-May to September (Section 4.8.16). The humpback whale northern migration occurs from June to August and southern from September to November (Section 4.8.16). Blue whales are most likely to be present during November and December (Section 4.8.16). The VIC/P70 activities at Sculpin-1 are planned to commence in late Q3 / early Q4 2019 and carry through until Q1 2020. However, the nearest BIA for southern right whales is largely restricted to Victorian state waters, outside of the affected zone. The nearest BIA for humpback whales, along the NSW coastline, lies outside of the Operational ZPI. The BIA for the pygmy blue whale overlaps with the affected zone and straddles the VIC/P70 operational areas (Section 4.8.2). The potential impacts to seals are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
Social	Commercial and recreational fisheries	In-water exposure to entrained MDO may result in a reduction in commercially targeted marine species,	Any acute impacts resulting from entrained hydrocarbon exposure above NOEC threshold is expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected

Environment	Type	Exposure Evaluation	Consequence Evaluation
		resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets, which can have economic impacts to the industry. Several commercial fisheries may operate in the affected area and overlap the spatial extent of the water column hydrocarbon predictions.	to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. Any exclusion zone established around a spill location would be limited to the immediate vicinity of the release point, and due to the rapid weathering of MDO would only be in place 1-2 days after release, therefore physical displacement to vessels is unlikely to be a significant impact. Tainting occurs at much higher exposure levels, further limiting exposure risk, while fish tainting is largely reversible (Section 6.28.2.4) Also see above: fish & sharks, and invertebrates. The potential impacts to seals are considered to be less than a Category 4 (low) risk for an MDO LOC (Section 5).
	Recreation and tourism	Tourism and recreation is also linked to the presence of marine fauna (e.g. whales), to a number of nature areas that are frequented by tourists, and to recreational fishing.	Any impact to receptors that are of interest to nature-based tourism (e.g. whales, recreational fishing, natural parks and reserves) may cause a subsequent negative impact to recreation and tourism activities. The potential impacts to whales, recreational fisheries and impacts to nature are described above and were assessed to be less than a Category 4 (low) risk for an MDO LOC (Section 5).

6.28.4 Controls

- **Temporary fairway**: Establishment of temporary fairways and 2 NM buffer zone through AMSA (Section 6.25.2.1)
- **Petroleum Safety Zone**: A 500m Petroleum Safety Zone (PSZ) is in place around the MODU and support vessels (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin-1: PSZ to be established at least one month before start of field activities).
- **NavAids**:
  - Extensive navigation aids and communication systems on MODU and support vessels (Section 3.4.1).
  - Installation of further NavAids in response to MODU Safety Case Revision and in dialogue with AMSA/AHS (Section 3.4.1).
- **MODU Procedures:**
  - Vessel Safety Zone and Floating Trespass Procedure (SEMS 5.5.1.5).
  - Station keeping system & SECE 16: Emergency communication systems (SECE 14).
  - Any vessel that enters the 500m PSZ will be required to complete a checklist, before contacting the Ballast Control Operator over the radio and ask for permission to enter the 500m exclusion zone. Once they enter the 500m PSZ the entry is logged.
  - The MODU AIS system will register an unauthorised entry into the 500m PSZ, as will AHT/guard vessel radar, which will intercept any unauthorised vessels breaching PSZ. Any such incidences are logged in MODU log book. A MODU Unidentified Approaching Vessel Plan is in place and made available to all support vessels.
- **Standby/guard vessel and AHTs** (Section 3.5) monitor vessel movements near and within the 2 NM Buffer zone around the MODU, established as part of the temporary fairways (Section 6.25), and will intervene when an Errant Passing Marine Vessel (commercial/fishing) approaches the 2 NM Buffer zone.
- **OPEP & ERP**: Project specific Oil Pollution Emergency Plans and Emergency Response Plans have been developed, in addition to vessel SOPEP requirements under MARPOL.
- **OSMP**: The OSMP details the arrangements and capability in place for operational monitoring (to inform response activities) and scientific monitoring (of environmental impacts of the spill and response activities). Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required.
- **Esso Procedures**:
  - OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures MODU and vessel contractors have trained and qualified Vessel Masters.
  - OIMS System 10-2 (Emergency Preparedness and Response) ensures effective emergency preparedness and response plans are in place, which provide for well-maintained equipment and trained personnel.

6.28.5 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	III	4

6.28.6 Demonstration of ALARP

Adequate procedures and plans (a vessel SOPEP) are in place on the vessel to respond to a spill. Esso also maintains spill response capability for responding in the event of a spill, which is outlined in the OPEP, and considers timeframes to mobilise and stage a response. In accordance with OIMS System 10-2, emergency response procedures are activated when required, which includes bringing the vessel or MODU back into a safe state where possible.

A PSZ of 500 m has been gazetted around the VIC/P70 wells to exclude the approach of any vessel not involved in VIC/P70 exploration drilling activities around the MODU (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin-1: PSZ to be established at least one month before start of field activities). The 500 m exclusion zone aims to prevent collision with the MODU while in operation. Although the VIC/P70 well locations are near the Bass Strait TSS (Section 4.12), extensive safety measures have been put in place to minimise the risk of vessel collisions (Sections 0, 3.5, 6.25).

Any vessel that enters the 500m PSZ will be required to complete a checklist, before contacting the Ballast Control Operator over the radio and ask for permission to enter the 500m exclusion zone. Once they enter the 500m PSZ the entry is logged.

The MODU AIS system will register an unauthorised entry into the 500m PSZ, as will AHT/guard vessel radar, which will intercept any unauthorised vessels breaching PSZ. Any such incidences are logged in MODU log book. A MODU Unidentified Approaching Vessel Plan is in place and made available to all support vessels.

Further measures include: the establishment of temporary fairways around the Baldfish and Hairtail VIC/P70 well locations, a 2NM radius buffer zone around each well location (Section 6.25.2.1); support from a guard vessel (Section 3.5) and navigational aids (Section 3.4.2; also RA 21 Section 6.25); and the ability for the MODU to disconnect and move when required (Section 3.4.10.3). Therefore the residual risk of interference with shipping is considered low.

The VIC/P70 OPEP contains information on proposed response actions to a Level 1, 2 or 3 spill event from any of these scenarios.

Esso's OIMS Framework, as described in Section 8.1, establishes expectations for addressing risks inherent in the business and ensuring hazards are safely controlled. OIMS Systems 8-1 (Evaluating, Selecting and Monitoring Third Parties) and 10-2 (Emergency Preparedness and Response) contribute to the control of this risk.

There are no KEF within affected area. Stakeholder (AMSA) concerns regarding RA24 have been addressed through the establishment of temporary fairways (Section 6.25.2.1) and installation of further NavAids. No further evaluation against the principles of ESD is required.

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 7.1.5, other controls and alternatives were considered, including minimising both duration of the campaign and minimising the safety zone around the MODU. The option to move the VIC/P70 well locations away from the shipping route has been considered. This would require horizontal directional drilling (HDD) over a long distance, which in turn would be costly, would require the use of NADF (Non-Aqueous Drilling Fluids; resulting in additional risk associated with the use of these drilling fluids), and would also substantially extend the duration of the drilling campaign. Considering that the residual risk is low, with extensive measures put in place to minimise the risk of collision, the additional risk and costs associated with HDD Technology is considered grossly disproportionate to the reduction in risk.

Alternatives to vessels for supply runs (e.g. increased use of helicopters) to eliminate the potential for diesel spills from vessel collisions is not considered practicable for the quantities of material that is required to be transported (i.e., diesel, chemicals and equipment, spare operational area equipment etc.).

The control measures described above are considered sufficient to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 7.1.5, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4).

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. On this basis Esso considers the risk to be ALARP.

6.28.7 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-37.

Table 6-37 RA 24: Environmental performance outcomes, standards and measurement criteria– Loss of containment

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
24	Vessel Movements – Collision Risk	Collision risk with commercial /recreational fishing or shipping activities near Gippsland Basin Traffic Separation Scheme.	No release of diesel or other chemicals to the marine environment as a result from a vessel collision.	Project vessel Crew and Navigational Equipment	Project vessels will meet the crew competency, navigation equipment, watchkeeping and radar requirements of the AMSA Marine Order Part 3 and Part 30	Records indicate that project vessels meet the crew competency, navigation equipment, and radar requirements of the AMSA Marine Orders	MODU OIM/Vessel Master
				MODU Station keeping and Mooring system	MODU Station keeping (SCE-14) and Mooring system (SCE-28) procedures are implemented	Daily reports confirm that station keeping and mooring systems have maintained planned locations	
				Standby/guard vessel and AHTs	Standby/guard vessel and AHTs monitor vessel movements near and within the 2 NM Buffer zone around the MODU, and will intervene when a third party vessel approaches the 2 NM Buffer zone	Daily report confirms that a vessel is on standby at all times during drilling operations and actively patrols the 2 NM buffer zone around the MODU	
				Attending Support Vessel Systems Failure	Attending Support Vessel Systems are maintained and tested in accordance with PMS	PMS records confirm that Attending Support Vessel Systems are maintained and tested in accordance with PMS	Vessel Master
				Navigational Equipment	Navigational Aids (communication, AIS, Message 21 coding, AtoN) will meet AMSA expectations (Section 3.4.1), and in accordance with IMO Resolution MSC.347 (91)	Pre-mobilisation inspection confirms that navigational aids meet AMSA expectations	Contract Manager
						Daily report confirms that navigational aids onboard MODU and support vessels are operational	Vessel master /MODU OIM
				Temporary Fairway and 2NM buffer zone	Establishment of temporary fairways and 2 NM buffer zone around operational area to divert commercial shipping away from drilling activities	Records indicate that AMSA/AHS has established temporary fairways and buffer zones at least 3 months before start of field activities – not relevant to Sculpin	Operations Superintendent

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				Pre-start notifications	The AHS will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published	Stakeholder consultation log confirms a Notice to Mariners was provided to the AHS at least four weeks before operations commenced	
					AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning	Stakeholder consultation log confirms that information to distribute an AUSCOAST warning was provided to the JRCC	
					Relevant Stakeholders will be notified of activities approximately one month and again one week prior to commencement	Stakeholder consultation log confirms that information was distributed to relevant stakeholders in required timeframes.	
				Petroleum Safety Zone (PSZ)	Establishment of 500 m PSZ around operational facilities in accordance with section 616 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006.	Records show that a petroleum safety zone is established at least one month before start of field activities, and confirmed by a notice published in the Gazette as provided for under section 616 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006.	Operations superintendent
					Any vessel that enters the PSZ will be required to complete a checklist, before requesting MODU permission to enter the PSZ. All PSZ entries are logged.	MODU bridge log confirms authorised entries into PSZ.	Vessel master /MODU OIM
					The MODU AIS system will register an unauthorised entry into the PSZ, and will also register on AHT/guard vessel radar, which will intercept any unauthorised vessels breaching PSZ, in accordance with Unidentified Approaching Vessel Plan. Any such incidences are logged in MODU log book.	Support vessels have access to Unidentified Approaching Vessel Plan. MODU log book confirms any unauthorised PSZ entries	Vessel master /MODU OIM

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
			Minimise the impact on the environment as a result from a LOC	Emergency Response Preparedness	Emergency response capability will be maintained in accordance with EP, OPEP and related documentation.	Outcomes of internal audits and exercises demonstrate preparedness.	Operations superintendent
				SOPEP (or equivalent)	Emergency response activities will be implemented in accordance with the vessel SOPEP	Records confirm that emergency response activities have been implemented in accordance with the vessel SOPEP	MODU OIM/Vessel Master
				OPEP	Under the OPGGSE Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOWC, the OPEP will be implemented.	An approved OPEP is in place before the start of field activities.	Operations superintendent
						Records confirm that emergency response activities have been implemented in accordance with the OPEP	Offshore Risk, Environment & Regulatory Supervisor
					The OPEP shall be tested in accordance with the OPGGSE Regulations.	Records indicate tests undertaken in accordance with the exercises according to the schedule given in the approved EP (Section 8.8).	Emergency Management Team (EMT) Incident Controller (IC)
					Esso shall maintain a full time emergency response capability for the duration of the drilling activities	IMT roster. Training records current in relation to oil spill response.	IMT

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					In the event that initiation criteria for MES activities are triggered, MES shall be undertaken within the timeframes specified in Table 7-7. MES activities shall continue until termination criteria are met.	Pre-drill oil spill response audit confirms that minimum performance standards (Table 7-7) are achievable. Pre-mobilisation audit and ongoing audits confirm that measures identified in Section 10: Emergency Response Planning are met for the duration of the campaign. In the event of an incident, Daily logs of response activities prepared by IMT show that minimum time frames for response are met.	IMT
				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	Emergency Management Team (EMT) Incident Controller (IC)

6.29 Accidental Release - Spills during Bulk transfer via bunkering hose (RA 25)

6.29.1 Hazard

Oils and chemicals are used as part of the daily operation of the MODU (e.g., cleaning decks, fuelling crane, includes paints and solvents etc.). Oils, including diesel, and chemicals are transferred via crane and stored as either packaged goods, in drums or in intermediate bulk containers (IBCs) or transferred via hose into a tank. Packaged goods are addressed under RA 23 (Dropped Objects) and not further addressed here.

Bulk transfer of freshwater, bentonite, barite, cement, brine and diesel fuel from vessel to MODU is conducted using flexible hoses. Accidental release may occur with hose failure. The release of any of these materials, but primarily diesel, into the marine environment can cause changes in the water quality.

6.29.2 Impact Assessment

A spill from a transfer incident is based on the loss of a volume equivalent to the volume in the hose plus the pumped amount before a shutdown is initiated. Due to the small volumes potentially released and dispersion in the high energy environment, the impacts on water quality are expected to be low. Since volumes are substantially less than that modelled for a loss of containment from a support vessel (RA 24), associated impacts are well within the parameters defined for that scenario (RA 24). A loss of 50 m^3 of diesel or chemicals upon release would be expected to result in changes to water quality in both surface waters and the pelagic environment.

As evaluated in Section 6.28 (RA 24), the potential impacts associated with a larger loss of diesel fuel, resulting from a vessel collision, were determined to be a Category 4 risk. Impacts resulting from a spill during bunkering is expected to be less and therefore adequately covered by the impact assessment under RA 24.

Regulation 37 of MARPOL Annex I requires that oil tankers of 150 gross tonnage and above and all ships of 400 gross tonnage and above carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP). Article 3 of the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990, also requires such a plan for certain ships.

Regulation 17 of MARPOL Annex II makes similar stipulations that all ships of 150 gross tonnage and above carrying noxious liquid substances in bulk carry an approved shipboard marine pollution emergency plan for noxious liquid substances.

There are no KEF within the affected area. No stakeholder concerns have been raised on RA25. No further evaluation against the principles of ESD is required.

6.29.3 Controls

- Bulk fluid transfer procedures will be in place before commencing operations ("Fuel Oil and Drilling / Completion Fluid Transfers from Dynamically Positioned Supply Boats Procedure"). The process will include:
    - MODU to vessel communication protocols
    - Transfer hose pressure testing
    - Continuous visual monitoring
    - Tank volume monitoring
- Transfer hoses equipped with sufficient floating devices and self-sealing weak-link couplings in the mid-section of the hose string, in accordance with Guidelines for Offshore Marine Operations G-OMO 0611- 1401
- Bulk fluid transfer hoses will be maintained in accordance with the requirements of the MODU Planned Maintenance System.
- OPEP & ERP: Project specific Oil Pollution Emergency Plans and Emergency Response Plans have been developed, in addition to vessel SOPEP requirements under MARPOL.
- OSMP: The OSMP details the arrangements and capability in place for operational monitoring (to inform response activities) and scientific monitoring (of environmental impacts of the spill and response activities). Operational monitoring will allow adequate information to be provided

to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have a SOPEP in place.

OIMS System 10-2 (Emergency Preparedness and Response) ensures effective emergency preparedness and response plans are in place, which provide for well-maintained equipment and trained personnel, and oil spill equipment is appropriately maintained.

6.29.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.29.5 Demonstration of ALARP

The bunkering procedures, hose maintenance and emergency response plans described above are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The performance of vessel and MODU specific procedures are appropriate for managing the day to day risk of the activity.

Other controls and alternatives were considered, in accordance with Section 7.1.5. Instead of hose transfer, transfer using bulk containers was considered. This was not considered to provide any significant benefits and would actually increase the safety related level of risk and as such was rejected.

Alternative energy sources were considered instead of using diesel to eliminate the need for diesel bunkering, however powering equipment via solar or wind generation is not considered practical due to limited space on the deck and grossly disproportionate cost to install enough generation and battery storage to enable reliable 24 hr operations. There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.29.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-38.

Table 6-38 RA 25: Environmental performance outcomes, standards and measurement criteria – Bunkering

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
25	Bulk transfer from vessel to MODU via hose	Unplanned release of diesel or other chemicals to the marine environment during bulk transfer may cause localised short term impact on water quality.	No unplanned release of diesel or other chemicals into the marine environment during bulk transfer.	Bulk fluid transfer procedures	MODU has bulk fluid transfer procedures in place before commencing operations. The process will include: • MODU to vessel communication protocols • Transfer hose pressure testing • Continuous visual monitoring • Tank volume monitoring • Secondary containment (bunding) around hose connections, air breathers etc.	Pre-mobilisation inspection confirms that approved bunkering procedures ("Fuel Oil and Drilling / Completion Fluid Transfers from Dynamically Positioned Supply Boats Procedure") are in place	Contract manager
						Records confirm that approved bunkering procedures are implemented	MODU OIM
				Hoses and connections	Transfer hoses shall comprise sufficient floating devices and self-sealing weak-link couplings in the mid-section of the hose string, in accordance with GOMO 0611- 1401[5].	Pre-mobilisation inspection confirms records demonstrate transfer hoses meet GOMO 0611-1401 requirements	MODU OIM
				Diamond Planned Maintenance System (PMS)	Prevent transfer spills by maintaining bulk fluid transfer hoses, in accordance with the MODU maintenance system	Pre-mobilisation inspection confirms PMS records show bulk fluid transfer hoses have been maintained in accordance with the MODU maintenance system	Contract manager
						Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system	MODU OIM
			Mitigate impact on the environment from a spill during	Emergency Response Preparedness	Emergency response capability will be maintained in accordance with EP, OPEP and related documentation.	Outcomes of internal audits and exercises demonstrate preparedness.	Operations superintendent

[5] *Guidelines for Offshore Marine Operations. Revision: 0611-1401. 06/11/2013. www.g-omo.info/wp-content/uploads/2016/06/201311-GOMOfinal.pdf.*

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
			bulk transfer.	SOPEP (or equivalent)	An approved vessel emergency response plan is in place, in accordance with Regulation 37 of MARPOL Annex I to mitigate against spills	Records confirm that an approved vessel emergency response plan is in place	MODU OIM/Vessel Master
						Records confirm oil spill training exercises were undertaken in accordance with the MODU Operator's emergency response exercise program	
				OPEP	Under the OPGGSE Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOWC, the OPEP will be implemented.	An approved OPEP is in place before the start of field activities.	Operations superintendent
						Records confirm that emergency response activities have been implemented in accordance with the OPEP	Offshore Risk, Environment & Regulatory Supervisor
					The OPEP shall be tested in accordance with the OPGGSE Regulations.	Records indicate tests undertaken in accordance with the exercises according to the schedule given in the approved EP (Section 8.8).	Drilling Manager
					Esso shall maintain a full time emergency response capability for the duration of the drilling activities	IMT roster. Training records current in relation to oil spill response.	IMT
					In the event that initiation criteria for MES activities are triggered, MES shall be undertaken within the timeframes specified in Table 7-7. MES activities shall continue until termination criteria are met.	Pre-drill oil spill response audit confirms that minimum performance standards (Table 7-7) are achievable. Pre-mobilisation audit and ongoing audits confirm that measures identified in Section 10: Emergency Response Planning are met for the duration of the campaign. In the event of an incident,	IMT

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
						Daily logs of response activities prepared by IMT show that minimum time frames for response are met.	
				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	Emergency Management Team (EMT) Incident Controller (IC)

6.30 Accidental Release - Foam Deluge System (RA 26)

6.30.1 Hazard

An aqueous film forming foam (AFFF) foam fire-fighting system services the following areas of the MODU:

• Helifuel storage area

• Helifuel pump skid

• Helideck foam deluge system

• Helideck foam firefighting monitors

• Main diesel engine coamings.

AFFFs are water-based firefighting foam products used to suppress flammable liquid fires by cooling the fire and coating the fuel, preventing its contact with oxygen.

AFFFs contain some PFAS (per- and poly-fluoroalkyl substances) – based products (FFFC 2017). PFAS are a class of stable man-made chemical substances containing carbon and fluorine in chemically combined form. These fluorosurfactants are the key ingredient that provide AFFF with the required low surface tension and positive spreading coefficient that enables aqueous film formation, and the foam's effectiveness against Class B flammable liquid fires.

Some PFAS-based products are considered persistent (i.e. do not break down), bioaccumulative and toxic (PBT) are therefore being phased out. In the past PFAS-based products have been used in a range of common household products and specialty applications, including in the manufacture of non-stick cookware; fabric, furniture and carpet stain protection applications; and food packaging (DOD 2017).

Ocean Monarch utilises Fomtec AFFF 3% which;

- does not contain or break down into PFOS (perfluoro-octane sulfonate) or homologues of PFOS such as PFHxS (perfluorohexane sulfonate).
- does not contain or break down into any chemicals that are currently listed as persistent organic pollutants (POPs) under the Stockholm Convention.
- is not made with PFOA (perfluoro-octanoic acid) or any PFOA-based products.
- is not made with any chemicals that are currently considered to be PBT.

Operation of the foam deluge system occurs either:

- As part of testing of the system. This allows verification of the system functionality, and tests the ability of the system to aspirate a concentrated fire-fighting foam solution and deliver it to the correct dilution and flow rate at the foam application areas. During testing and activation of the foam system AFFF foam may be discharged overboard via the drainage system;
- As demanded during an actual fire event.

6.30.2 Impact Assessment

The AFFF foam selected for use on the MODU is Fomtec AFFF 3% which contains no PFOS or PFOA. It is a C6-based (i.e. short chain flourosurfactant - based) fluorinated foam which has low aquatic toxicity (Environ 2016) and will disperse rapidly in the high energy environment. Consequently in the unlikely event of an unplanned release of foam solution negligible impacts on the marine environment are expected.

There are no KEF within the affected area. No stakeholder concerns have been raised on RA26. No further evaluation against the principles of ESD is required.

6.30.3 Controls

- No testing of the foam fire-fighting system involving release of AFFF to the marine environment.

6.30.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	IV	4

6.30.5 Demonstration of ALARP

To demonstrate that the impacts and risk associated with this hazard have been reduced to ALARP in accordance with Section 5.2, other controls and alternatives were considered.

The MODU utilises a C6-based fluorinated foam which does not contain PFOS or PFOA. To further minimise the potential environmental impact of a single large release of fire-fighting foam during an incident, its use has been limited to situations which present a significant flammable liquid hazard i.e. the helideck, helifuel storage and main diesel engines. The drill floor is protected by the water deluge system and the well test area by a water monitor. The accommodation, galley, engine room and auxiliary machinery pit, emergency generator room, paint locker and cementing unit are protected by a high pressure water mist system. The use of fluorine free foam is possible but is not considered to provide substantial benefit during the short drilling campaign.

To prevent the potential impacts of smaller releases foam fire-fighting systems may be tested without charging the system with AFFF (seawater only), or using a surrogate foam with similar physicochemical properties. However, this does not provide assurance that the aspiration system used will therefore perform (in terms of concentration delivered and rate of delivery) with the exact foam that would be used in an emergency and such substitution must be approved by the appropriate authority to ensure the adequacy of this testing method. During the drilling campaign there will be no testing of the system which may result in the release of AFFF to the marine environment.

Collection of foam solution from testing, or firewater from an actual event, with subsequent onshore disposal is not considered feasible as:

- This would require edge bunding of every area on the MODU that utilises foam, reducing personnel accessibility to these areas and introducing tripping hazards at stair entrances, compromising escape / evacuation routes.
- Piping would need to be retrospectively fitted to allow collection of the foam from the drain system, in addition to requiring large areas for temporary storage of collected foam on generally space constrained units. This can compromise escape / evacuation routes.
- Additional lifting operations and additional vessel visits would be required, with associated dropped object risks, increased potential for vessel collision and increased consumption of diesel with associated atmospheric emissions.

Testing of the fire fighting system which may result in the release of AFFF to the marine environment will not be undertaken. In case of an emergency, such as a significant flammable fuel fire, safety considerations are the overriding factor. In such a situation the release of firewater directly to the marine environment may be unavoidable, however as the foam is PFOS and PFOA free and a low aquatic toxicity foam Esso considers the risk to be ALARP.

6.30.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-39.

Table 6-39 RA 26: Environmental performance outcomes, standards and measurement criteria – Foam Deluge System

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
26	Foam deluge system	Release of foam into the marine environment may have toxic impacts.	No release of fire-fighting foam to the marine environment.	No testing of foam deluge system resulting in release of foam to the marine environment.	No release of fire fighting foam to the marine environment.	Daily report to confirm no release of fire fighting foam to the marine environment.	MODU OIM/Vessel Master

6.31 Accidental Release - Spills during chemical and oils storage and handling (RA 27)

6.31.1 Hazard

Some hydrocarbons or chemicals in equipment (e.g., coolers, diesel engines and fire pumps, hydraulic equipment) are required to be changed out or topped-up and the excess or replaced fluids disposed. Where possible, these chemicals are collected for onshore disposal (e.g. using waste containers such as IBCs). No offshore chemical disposal is acceptable, unless discharge to sea is approved in accordance with Esso's chemical selection procedure (Section 8.9.1). Examples where these exceptions apply include chemicals that are used in sewage treatment systems (Section 6.5), deck drainage (Section 6.9), bilge water discharges (Section 6.10) and brine discharges (Section 6.15) (planned discharges). Packaged goods are addressed under RA 23 (Dropped Objects) and not further addressed here.

A spill of water-soluble chemicals on the MODU or support vessel to the drain could result in release to the marine environment causing a reduction of water quality or toxic impacts to marine species. A spill of chemicals or oils that overcomes secondary containment may also result in similar impacts to the environment.

6.31.2 Impact Assessment

Spills due to failure of primary containment may be either fully contained within a bund (or other secondary containment) or discharged into the drain system (such as from chemical tanks, chemical store, IBC or topsides equipment). Hydrocarbons spilled to the drain are recovered back, while water-soluble chemicals may be released to the marine environment (RA 5, Section 6.9).

A potential spill to the sea is likely to be of a small to moderate volume, which would disperse and dilute rapidly in the open ocean environment. Any change in water quality would be temporary and is assessed to have a small impact.'

As evaluated in Section 6.28 (RA 24), the potential impacts associated with a larger loss of diesel fuel, resulting from a vessel collision, were determined to be a Category 4 risk. Impacts resulting from a spill during bunkering is covered under RA 25 (Section 6.29). The management of hazardous waste is addressed under RA 4 (Section 6.8). Impacts resulting from a spill during chemical and oils storage and handling is considered adequately covered under these risks.

There are no KEF within the affected area. No stakeholder concerns have been raised on RA27. No further evaluation against the principles of ESD is required.

6.31.3 Controls

- Storage of chemicals in bunds and handling and storage of hazardous waste in accordance with approved rig/vessel waste management procedures
- Project specific Oil Pollution Emergency Plans and Emergency Response Plans have been developed, in addition to vessel SOPEP requirements under MARPOL.
- Bulk fluid transfer procedures will be in place before commencing operations. The process will include:
    - MODU to vessel communication protocols
    - Transfer hose pressure testing
    - Continuous visual monitoring
    - Tank volume monitoring
- OPEP & ERP: Project specific Oil Pollution Emergency Plans and Emergency Response Plans have been developed, in addition to vessel SOPEP requirements under MARPOL.
- OSMP: The OSMP details the arrangements and capability in place for operational monitoring (to inform response activities) and scientific monitoring (of environmental impacts of the spill and response activities). Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required.

OIMS System 8-1 (Evaluating, Selecting and Monitoring Third Parties) ensures vessel contractors have a SOPEP in place.

OIMS System 10-2 (Emergency Preparedness and Response) ensures effective emergency preparedness and response plans are in place, which provide for well-maintained equipment and trained personnel, and oil spill equipment is appropriately maintained.

6.31.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
D	III	4

6.31.5 Demonstration of ALARP

Project chemical selection, handling and waste management procedures, as well as emergency response procedures, are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2, as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be low (Category 4). The vessel and MODU specific procedures are appropriate for managing the day to day operations.

Other controls and alternatives were considered, in accordance with Section 7.1.5. Disposal to sea is minimised, and restricted to chemicals which are low toxicity. However, use of chemicals is unavoidable (e.g. cleaning chemicals) in order to maintain a safe environment, free from contaminants. Oily decks represent a slip risk, so that occasional deck cleaning is a requirement.

There were no further controls identified. On this basis Esso considers the risk to be ALARP.

6.31.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 5.2.2.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-40.

Table 6-40 RA 27: Environmental performance outcomes, standards and measurement criteria - Unplanned Events – Oil & Chemical Spills

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
27	Chemical and oils storage and handling	Unplanned release of chemicals or oils into the marine environment.	No unplanned release of oils or non-approved chemicals into the marine environment.	Bulk fluid transfer	MODU has bulk fluid transfer procedures in place before commencing operations. The process will include: • MODU to vessel communication protocols • Continuous visual monitoring • All lifting is undertaken in accordance with approved lifting procedures	Pre-mobilisation inspection confirms that approved bunkering procedures - as per SEMS requirements – are in place	Contract manager
						Records confirm that approved bunkering and lifting procedures are implemented	MODU OIM
				Oil and chemical store bunds are appropriately maintained.	Approved MODU and vessel procedures for handling and storage of chemicals is followed • Oil and chemical store bunds are maintained in accordance with the equipment strategy, which defines criticality of the equipment, and the corrective and preventative maintenance program. • For stores, as a minimum this requires that oil and chemical stores are located within a deck bund, and water-soluble chemicals not approved for discharge are stored in a bund that is isolated from drain/pile. • The corrective and preventative maintenance program is loaded into a computer-based maintenance system • Storage of waste oils and chemicals is in accordance with approved waste management procedure.	Inspections confirm hydrocarbons and hazardous liquids are stored within secondary containment or purpose built bulk tanks	MODU OIM/Vessel Master
						Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system	Drilling Superintendent

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				Planned Maintenance System	Prevent transfer spills by maintaining lifting equipment, slings and containers in accordance with the MODU maintenance system	Pre-mobilisation inspection confirms PMS records show bulk fluid transfer hoses have been maintained in accordance with the MODU maintenance system	Contract manager
						Records show routine completion of maintenance in accordance with manufacturer specifications or preventative maintenance system	MODU OIM
			Mitigate impact on the environment from a spill during bulk transfer.	Emergency Response Preparedness	Emergency response capability will be maintained in accordance with EP, OPEP and related documentation.	Outcomes of internal audits and exercises demonstrate preparedness.	Operations superintendent
				SOPEP (or equivalent)	An approved vessel emergency response plan is in place, in accordance with Regulation 37 of MARPOL Annex I to mitigate against spills	Records confirm that an approved vessel emergency response plan is in place	MODU OIM/Vessel Master
						Records confirm oil spill training exercises were undertaken in accordance with the MODU Operator's emergency response exercise program	
				OPEP	Under the OPGGSE Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOWC, the OPEP will be implemented.	An approved OPEP is in place before the start of field activities.	Operations superintendent
						Records confirm that emergency response activities have been implemented in accordance with the OPEP	Offshore Risk, Environment & Regulatory Supervisor
					The OPEP shall be tested in accordance with the OPGGSE Regulations.	Records indicate tests undertaken in accordance with the exercises according to the schedule given in the approved EP (Section 8.8).	Operations superintendent

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					Esso shall maintain a full time emergency response capability for the duration of the drilling activities	IMT roster. Training records current in relation to oil spill response.	IMT
					In the event that initiation criteria for MES activities are triggered, MES shall be undertaken within the timeframes specified in Table 7-7. MES activities shall continue until termination criteria are met.	Pre-drill oil spill response audit confirms that minimum performance standards (Table 7-7) are achievable. Pre-mobilisation audit and ongoing audits confirm that measures identified in Section 10: Emergency Response Planning are met for the duration of the campaign. In the event of an incident, Daily logs of response activities prepared by IMT show that minimum time frames for response are met.	IMT
				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	Emergency Management Team (EMT) Incident Controller (IC)

6.32 Accidental Release - Loss of well integrity (RA 28)

6.32.1 Hazard

During drilling operations there is a risk of a loss of well control (LOWC) event. Uncontrolled hydrocarbon fluids released into the marine environment could lead to changes in the water column biochemistry and could impact seabirds, marine mammals and reptiles, fish and other marine organisms through surface fouling, ingestion or inhalation. It could also result in impacts on shoreline and intertidal communities along the mainland or nearby islands.

6.32.2 Modelling Methodology and Thresholds

6.32.2.1 Spill Scenario Identification

The extended duration loss of well control (LOWC) from well integrity failure (loss of containment of a Group I (non-persistent) condensate oil at seabed, RA 28) presented the worst credible discharge scenario (WCDS) and was taken forward to modelling.

The outcome of the Oil Spill Trajectory Modelling (OSTM) for the selected worst case credible spill scenario is presented below. It focuses on defining the likelihood of oil contact (surface, entrained and dissolved) with specific sensitive locations above the lowest threshold and shows the furthest possible extent from the release location that oil could reach, at the lowest threshold, if the spill scenario occurred.

6.32.2.2 Stochastic and Deterministic modelling

See Section 6.28.2.1 and 6.28.2.2 for background on stochastic and deterministic modelling. The LOWC scenario for Hairtail-1 was tracked over a period of 108 days (i.e. 10 days after well control is established, based on modelled LOWC duration of 98 days). For Sculpin-1, a LOWC duration of 119 days duration was modelled, and was tracked for 149 days (i.e. a month after well control).

The potential for sensitive receptors to be exposed to surface, entrained and dissolved hydrocarbons has been assessed by the application of assessment thresholds. Assessment thresholds for hydrocarbon exposure (sea surface, shoreline, and water column dissolved aromatics and entrained hydrocarbons) are described in Section 6.28.2.4.

The VIC/P70 reservoir is a gas reservoir. However, as gas transitions from reservoir to the wellhead, liquid dropout is predicted as a result of the pressure drop. The resulting liquid component is a light condensate. The area affected by a LOWC gas release is likely to be localised around the wellhead (across all depths of the water column). The maximum LOWC rate for Baldfish is approximately 1,760 kL/d (11,051 bbl/d) of condensate, at a modelled Gas-Oil Ratio (GOR) of 45,545 scf/bbl, and ~3,657 kL/d (22,689 bbl/d) at a GOR of 15,873 scf/bbl for Sculpin-1 (see Table 6-41 for modelled reservoir parameters).

Based upon the RPS/APASA study undertaken for Hairtail-1, a gas/condensate plume of approximately 500 MMScf in 362 m of water rises to the surface in approximately 222 seconds. By comparison, at the Sculpin location the model indicates that it would take about 56 hrs to travel to the water surface. Travel in the water column can be separated in two components:

- **Zone 1, immediately above the release point**: This zone covers the jet like behaviour that governs the condition of the released oil and gas as it begins its transit through the rest of the water column.
- **Zone 2, Subsea dispersion**: Analysis of subsea gas dispersion to determine if any flammable gas reaches the sea surface and could impact relief well and vessel operation. For Sculpin-1, the transition from Zone 1 to Zone 2 is at about 500m above the wellhead, where nearfield drivers have dissipated.

The liquid volume fraction at the release location is less than 1% of the overall release mixture, reducing further as the gas expands as it rises to the surface, where it is less than 0.1%

The near surface plume for Hairtail-1 was predicted to be circular with a diameter of 50 m under zero current conditions and was predicted to produce sea surface concentrations which exceeded the LEL for natural gas most of the time within the core of the plume, then fall below this threshold when the currents were strong (WWC 2017a). Mass in excess of 40% was observed to dissolve in sea water as the plume rises up the water column. Upon reaching the surface, the gas would predominantly disperse to the atmosphere and the entrained water would form a mound at the water's surface.

The WCDS for the loss of hydrocarbon is a subsea release of condensate as a result from a loss of well control (LOWC).The assumptions for the LOWC scenarios are summarised in Table 6-41.

Table 6-41 Worst Credible Discharge Scenario (WCDS) – LOWC assumptions

Parameter	Details: Baldfish-1	Details: Sculpin-1
EP Reference	RA 28: Loss of Well Integrity (Section 6.32)	
EP Scenario	Loss of well control (LOWC). Loss of well control (subsea release) can eventuate from a LOWC while drilling, coinciding with partial closure of BOP shear rams. Release would be from the annulus between casing and drill pipe.	
WCDS Assumptions	• Based on the ExxonMobil WCDS Process Guide. • An open-hole LOWC while drilling, • A sea-floor release, occurring at the BOP, • Partially closed BOP shear rams. • Requiring a capping stack to be installed and a relief well to be drilled	
Modelled location of release	Hairtail-1*: A **subsea** loss of well control event at Hairtail-1, resulting in a subsea release of condensate over 98 days.	A **subsea** loss of well control event at Sculpin-1 exploration well, resulting in a seabed release of condensate over 119 days.
Modelled release depth	Subsea release at 462 m water depth (Hairtail-1) was modelled, based on **preliminary** well location. Final well location was re-located about 1.75 km further offshore, at a revised depth of 359 m. APASA nearfield modelling confirmed that modelling outcome remains valid for revised well location and well depth*. A subsea loss of well control event at the Baldfish-1 mudline (665 m water depth) is considered to result in a similar release volume, but a slightly smaller Operational ZPI than the modelled scenario, due to a higher water pressure, resulting in finer entrained condensate droplets, in turn resulting in a slightly smaller Operational ZPI. Nearfield simulations have confirmed that a 100 m decrease in water depth results in a 3% reduction in the oil droplet diameters. Therefore, a subsea condensate release at Baldfish-1 has been covered by the modelled scenario for Hairtail-1.	Subsea release at 2,275 m water depth (Sculpin-1) was modelled, based on **preliminary** well location.
Modelled Reservoir parameters	• Reservoir temperature is based on nearby wells including (Dory-1, Baldfish-1). • Reservoir pressure is based on expected un-depleted aquifer and maximum expected gas water contact depth. • No wellbore collapse or bridging. • Permeability is based on the mobility testing results from the Dory-1 well which are consistent with analogue porosity-permeability data. • Reservoir productivity is based on predicted permeability and net pay zone thickness, • A Prosper model was used to estimate the inflow & outflow performance to determine the LOWC release rate.	
Modelled wellbore configuration	• $6^{5}/_{8}$" drillpipe inside 13 $^{3}/_{3}$" casing and in $12^{1}/_{4}$" open hole; pipe below target sands at time of well control event. • Appropriate friction factors applied to open hole and cased hole sections.	• 5" drillpipe inside 9-$^{5}/_{8}$" casing and in 8-1/2" open hole; pipe below target sands at time of well control event. • Appropriate friction factors applied to open hole and cased hole sections.
Product	• Condensate (Group I: Non-persistent) • A density of 770.6 kg/m3 and a dynamic viscosity of 1.4 cP @ 25°C, • A gas to oil ratio of 45,545 scf/bbl, • 80% volatiles, 12% semi-volatiles, 6.5% low volatiles and 1.5% persistent compounds.	• Condensate (Group I: Non-persistent) • A density of 773.6 kg/m^3 and a dynamic viscosity of 1.2 cP @ 25°C, • A gas to oil ratio of 15,873 scf/bbl, • 72.5% volatiles, 13% semi-volatiles, 14% low volatiles and 0.5% persistent compounds.

Scenario basis	Two scenarios were reviewed: 1) 1 day release from surface (rig location) through the riser, followed by 97 days subsurface release following rig disconnect. 2) 49 day (7 weeks) release at seabed due to early intervention and installation of a capping stack. This option would result in halving of total release volume, from 172,200 kL to 86,100 kL	Two scenarios were reviewed: 1) 119 days subsurface release at the subsea BOP which is located just above the mudline. 2) 49 day (7 weeks) release at seabed due to early intervention and installation of a capping stack. This option would result in a 59% reduction in total release volume, from 429,266 kL to 176,476 kL.
Modelled LOWC duration – relief well	14 weeks (98 days), based on initial estimates for relief well completion and well kill. Actual release duration estimated to be substantially less (88 days for wet-tow scenario; 70 days for HLV transport; See Section 7.5 for further details.	17 weeks (119 days), based on initial estimates for relief well completion and well kill. See Section 7.5 for further details.
	This conservative early estimate was calculated based on the time to mobilise a rig from Australia or South East Asia, drill and intersect the well and complete the well kill activities. Subsequent review indicates that well kill can be achieved more quickly, thereby further reducing the released hydrocarbon volume.	
Modelled LOWC duration – capping stack	Early estimates of 49 day (7 weeks) release at seabed due to early intervention and installation of a capping stack. This option would result in halving of total release volume, from 172,200 kL to 86,100 kL. Subsequent review confirms that capping stack installation can be achieved in 38 days, thereby further reducing the release volume (Section 7.5)	Estimates of 49 day (7 weeks) release at seabed due to early intervention and installation of a capping stack. This option would result in 59% reduction in total release volume, from 429,266 kL to 176,476 kL. Review confirms that capping stack installation can be achieved within 45 days, thereby further reducing the release volume (Section 7.5)
Modelled release volume	• 1,760 kL/d or 11.05 kbd: 172,200 kL over 98 days • Modelled at the total drilling depth, • Annular flow: A 6 $^{5}/_{8}$” drill pipe in drill-hole and 12 ¼" wellbore, • No hydrate blockage or choke effects (hydrate formation, however, is highly likely, substantially reducing release rates).	• 3,607 kL/d or 23 kbd: 429,266 kL over 119 days • Modelled at the total drilling depth, • Annular flow: A 5" drill pipe in 8 ½" wellbore and 8 ½", • No flow within the drillpipe. • Water bearing sands above the gas release zone will be exposed and concurrent water production would reduce the release rate. However aquifer support is expected to be weak at Sculpin and therefore an assumption of no water influx has been made, in line with a worst credible discharge scenario. • No other restrictions to annular flow (such as choking effect at BOP leak point or sand production).
	• Due to the expectation of strong aquifer support, discharge rates are expected to remain constant until a relief well is drilled. This aligns with a worst credible scenario as the potential for lower pressure support would result in reduced discharge rates. It is also assumed that in a worst credible scenario, no water coning would occur.	

* *RPS reassessed the near-field (LOWC) modelling for Baldfish-1 to compare the initial behaviour of the oil. In both cases the oil/gas/water plume ruptured the surface, while the oil droplet sizes were approximately 3% smaller, due to the decreased hydrostatic pressure acting on the release point. The decrease in hydrostatic pressure results in the gas escaping from the well occupying more space, which in turn results in a faster exit velocity. The increased exit velocity means there is more turbulence during the jet release phase, which causes the oil to tear apart in to smaller droplets.*

This minor change in droplet sizes would not have any perceivable impacts on the stochastic modelling completed for Hairtail-1. The same can be said for the change in location. Moving the well slightly south would not cause the volumes of oil ashore, or the timings to change by a meaningful amount (APASA 2017a).

6.32.2.3 Defining a Zone of Potential Impact

One objective of the stochastic spill modelling is to establish a Zone of Potential Impact that may be exposed to surface or in-water hydrocarbons, resulting from a marine hydrocarbon spill. Delineation of the Operational ZPI is based on the furthest feasible extent from the release location (lowest exposure zone) of all modelled scenarios where hydrocarbon thresholds, including surface, entrained and dissolved aromatic hydrocarbons could be exceeded.

In the unlikely event of a worst case credible spill event (i.e. subsea LOWC scenario), the Operational ZPI could include sensitive marine environments, although shoreline impact is only predicted below the thresholds defined in Section 6.28.2.4. The Operational ZPI is largely defined by the surface hydrocarbon spread (Table 6-45 & Table 6-46) and is summarised in Figure 4-1 and Figure 4-2 in Section 4.2.

Only at levels below the adopted 95%-ile NOEC (Table 6-34), entrained hydrocarbons are predicted to extend beyond this Operational ZPI (See Figure 4-3 and Figure 4-4 in Chapter 4). Impacts resulting from these exposures, based on ANZECC criteria (Section 6.28.2.8), would be sub-lethal and minor (e.g. water quality impacts). This area is defined as the Environmental Monitoring ZPI. At this highly conservative threshold, it is unlikely that entrained hydrocarbons are measureable in the water column with standard laboratory methodology, while impacts on even the most sensitive biota and ecosystems would most likely not be detectible with conventional scientific methods.

The potential impacts to offshore (potentially occurring within the VIC/P70 operational areas) and nearshore (potentially occurring within the Operational ZPIs) environments and the Key Ecological Features (KEF) within the Operational ZPI that may be contacted are summarised in Table 6-48.

The key environmental sensitivities within and immediately outside the Operational ZPI are described in Section 4.8.

Operational and scientific monitoring will utilise hydrocarbon thresholds (as defined in the OSMP Operational Monitoring Modules and Scientific Monitoring Modules) to determine the termination point for operational and scientific monitoring.

6.32.2.4 LOWC scenario - Weathering and fate

The weathering and fates volume balance of the deterministic spill trajectory for Hairtail-1 indicated very little oil would persist on the sea surface as it rapidly evaporated over the 98 days release. Decay steadily increased over 108 day simulation, as the oil entrained in the water column underwent natural biodegradation processes (Figure 6-9, Figure 6-10).

At Hairtail-1, visible oil (low 0.5 g/m^2) did not persist on the sea surface beyond 3 days following well intervention (101 days) and actionable oil (moderate 10 g/m^2) was not predicted on the sea surface following successful well intervention (98 days) (APASA 2018).

At Sculpin-1, decay largely occurs within the water column, before the condensate reaches the water surface. The volume of condensate in the water column largely remains constant over time, and dissipates upon well control over the next 30 days. The condensate that reaches the water surface rapidly evaporates. (Figure 6-11). Relatively little condensate reaches the water surface, where it rapidly evaporates. On completion of well intervention (modelled to occur at 119 days), remaining hydrocarbons gradually decay in the water column, while hydrocarbons that reach the water surface are subject to evaporation.

Note that review of timing for Hairtail-1 well intervention indicates that this can be achieved within 70 days when an HLV is used and within 88 days for the wet tow scenario. For sculpin-1, a relief well can be drilled within 102 days, and would take about 11 days longer for the wet tow scenario, due to longer transit time to the well location (Section 7.5). The longer duration for Sculpin-1 is due to larger depth, which increases time to lower BOP at the end of the increased number of riser sections. Additionally, an additional casing is required for Sculpin-1, when passing through the Lakes Entrance strata (Figure 3-6).

The installation of a capping stack (after 49 days) was modelled for both Hairtail-1 and Sculpin-1, although revised timing indicates that this may be achieved within 38 days at both Hairtail-1 and Sculpin-1 (Section 7.5). In this scenario, visible oil (low 0.5 g/m^2) did not persist on the sea surface beyond 51 days and actionable oil (moderate 10 g/m^2) was not predicted on the sea surface beyond 50 days at Hairtail-1 (Figure 6-10). At Sculpin-1, weathering following the installation of the capping stack (after 49 days) would follow a similar trajectory as that after completion of the relief well.

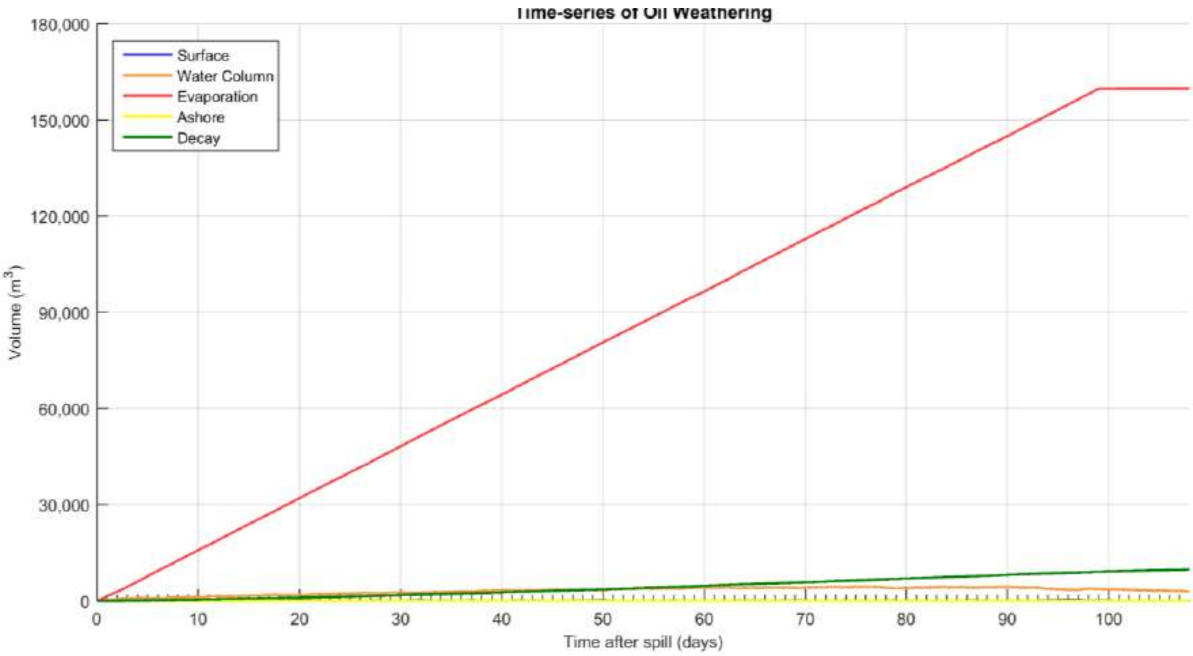


Figure 6-9 Hairtail-1: Well Intervention: Predicted weathering and fates volume balance for a single spill trajectory, based on a LOWC (12 am, 11 Feb. 2010) over 98 days at (tracked for 108 days) (APASA 2018)

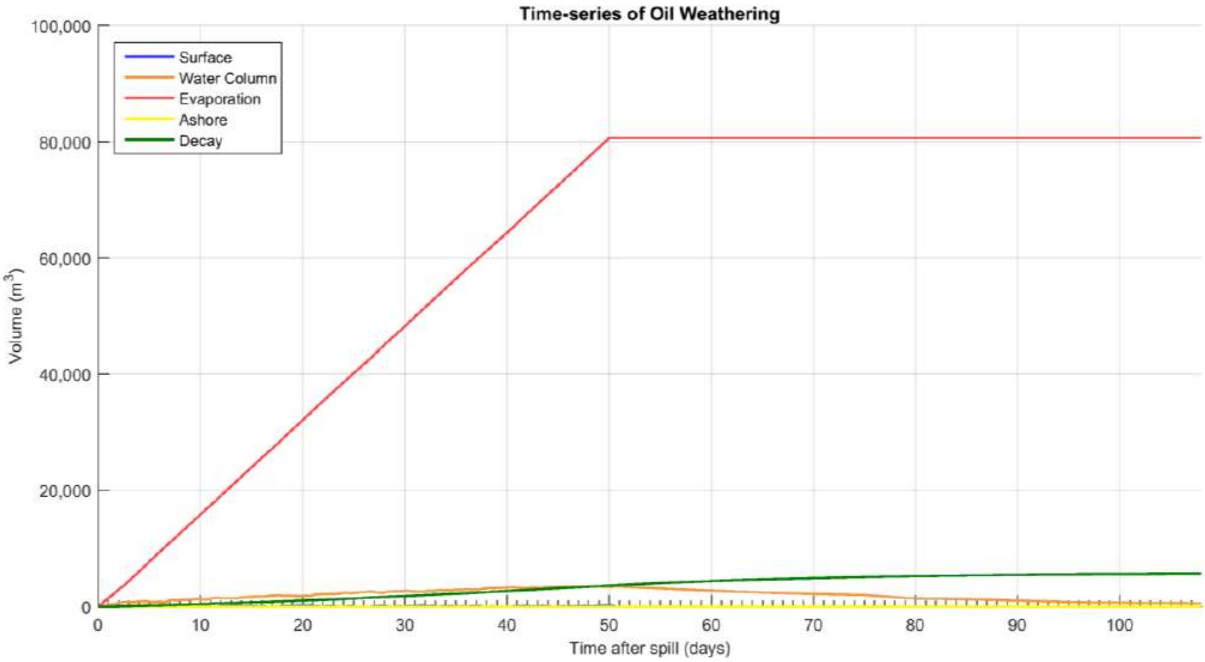


Figure 6-10 Hairtail-1: Capping Stack Installation: Predicted weathering and fates volume balance for a single spill trajectory, based on a LOWC (12 am, 11 Feb. 2010) over 49 days (tracked for 108 days) (APASA 2018)

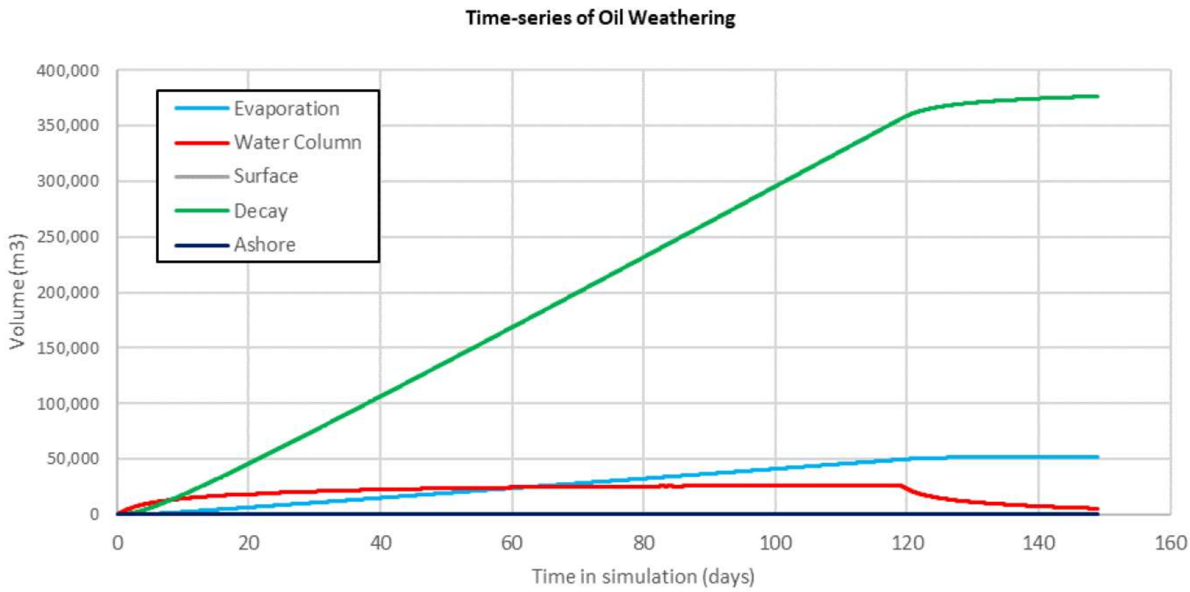


Figure 6-11 Sculpin-1: Well Intervention: Predicted weathering and fates volume balance for a single spill trajectory, based on a LOWC (1 am, 31 May 2012) over 119 days (tracked for 149 days) (APASA 2019)

6.32.2.5 Hairtail-1 LOWC scenario - Surface Hydrocarbon

Sea-surface exposure levels stretched a maximum distance of 96 km east-northeast from the release site at 99th percentile (max: 195 km above 99%-ile likelihood), whilst moderate and high sea-surface exposure zones remained within 13 km east-northeast and 4 km east from the release site, respectively (Table 6-42).

Modelling results have indicated that sea-surface exposure is not predicted to contact the Victorian coastline or any of the offshore Bass Strait Islands at low (0.5 to 10 g/m^2, used to define the Operational ZPI), moderate (10 to 25 g/m^2) or high (> 25 g/m^2) thresholds.

No surface hydrocarbon exposure is predicted to the upwelling east of Eden, or Big Horseshoe Canyon at moderate or high thresholds, although potential surface exposure at low threshold is predicted at the upwelling east of Eden (100% probability; after 52 hrs) and Big Horseshoe Canyon (11% probability; after 250 hrs) (Table 6-43).

Table 6-42 Surface Exposure Zones – Relief Well Scenarios (RPS 2018, 2019)

Distance and direction	Zones of potential sea surface exposure					
	(0.5–10 g/m^2)		(10–25 g/m^2)		(>25 g/m^2)	
Wells (B=Baldfish-1, S= Sculpin-1)	B	S	B	S	B	S
Max. distance from release site (km)	195	330	13	19	4	-
Max. distance from release site (km) (99th percentile)	96	262	13	18	4	-
Direction	ENE	SSE	ENE	S	E	-

The total released volume of condensate after a 49 days LOWC period (49 days was the initial estimated duration for capping stack installation) is halved due to installation of a capping stack (86,091 m^3, compared with 172, 183 m^3 over 98 days of LOWC), the extent of the surface exposure remains largely the same due to the rapid weathering of the condensate following release.

The deterministic spill trajectory starting on 11th February 2010 at 12 am was identified to have the largest sea surface swept area at the moderate (≥ 10 g/m^2) threshold. Low oil exposure was observed a maximum distance of 84 km northeast of the release site, while moderate oil exposure (≥ 10 g/m^2) on the sea surface was limited to within 13 km of the release site.

Table 6-43 Receptor Surface Exposure – Relief Well Scenarios (RPS 2018, 2019)

Receptor	Probability of oil exposure on the sea surface (%)						Minimum time before oil exposure on the sea surface (hours)					
	(0.5–10 g/m²)		(10–25 g/m²)		(>25 g/m²)		(0.5–10 g/m²)		(10–25 g/m²)		(>25 g/m²)	
Wells (B=Baldfish-1, S=Sculpin-1)	**B**	**S**	**B**	**S**	**B**	**S**	**B**	**S**	**B**	**S**	**B**	**S**
Cape Howe MNP	-	6	No exposure predicted				-	832	No exposure predicted			
East Gippsland AMP	-	65					-	173				
Flinders AMP	-	40					-	273				
Upwelling East of Eden KEF	100	100					52	78				
Big Horseshoe Canyon KEF	11	86					250	112				
Victoria State Waters	-	6					-	832				
New South Wales	-	6					-	403				
BIAS												
Antipodean Albatross (Foraging)	100	100	100	97	100	No exposure predicted	1	54	1	101	1	No exposure predicted
Black-browed Albatross (Foraging)	100	100	100	97	100		1	54	1	101	1	
Bullers Albatross (Foraging)	100	100	100	97	100		1	54	1	101	1	
Campbell Albatross (Foraging)	100	100	100	97	100		1	54	1	101	1	
Grey Nurse Shark (Migration)	-	11	-				-	870	-			
Indo-Pacific/Spotted Bottlenose Dolphin (Breeding)		6						403				
Indian Yellow-nosed Albatross – (Foraging)	100	100	100	97	100		1	54	1	101	1	
Little Penguin (Foraging)	-	8	-				-	832	-			
Sooty Shearwater (Foraging)		10						440				
Short-tailed Shearwater (Foraging)	100	100	-	5	-		10	54	-	326	-	
Shy Albatross (Foraging)	100	100	100	97	100		1	54	1	101	1	
Wedge-tailed Shearwater (Foraging)	1	35	-				1,724	247	-	-	-	
Wandering Albatross (Foraging)	100	100	100	97	100		1	54	1	101	1	
White Shark (Foraging)	-	11	-				-	405	-			
White Shark (Distribution)		100	-	97	-			54	-	101	-	
White-faced Storm-petrel – (Breeding)		5	-					1036	-			
White-faced Storm-petrel – (Foraging)		100						67				
Common Diving-petrel (Foraging)	100	100	100	97	100		1	54	1	101	1	
Pygmy Blue Whale (Foraging)	100	100	100	-	100		1	65	1	-	1	
Humpback Whale (Foraging)	-	29	-				-	247	-			
Southern Right Whale (Migration)	100	100					17	113				
Pygmy Blue Whale (Distribution)	100	100	57	-			4	81	23	-		

6.32.2.6 Sculpin-1 LOWC scenario - Surface Hydrocarbon

Sea-surface exposure levels stretched a maximum distance of 262 km east-northeast from the release site at 99th percentile (max: 330 km above 99%-ile likelihood), whilst moderate sea-surface exposure zones remained within 19 km east-northeast from the release site (Table 6-42).

Modelling results have indicated that sea-surface exposure is not predicted to contact the Victorian coastline or any of the offshore Bass Strait Islands at low (0.5 to 10 g/m², used to define the Operational ZPI), moderate (10 to 25 g/m²) or high (> 25 g/m²) thresholds.

No surface hydrocarbon exposure is predicted to Victorian or NSW state waters, the upwelling east of Eden, or Big Horseshoe Canyon at moderate or high thresholds, although potential surface exposure at low threshold (<10 g/m²) is predicted within Victorian and NSW State waters (2% and 3% probability;

after 2-4 weeks), at the upwelling east of Eden (95% probability; after 78 hrs) and Big Horseshoe Canyon (52% probability; after 112 hrs) (Table 6-43).

The total released volume of condensate after a 49 days LOWC period (49 days was the initial estimated duration for capping stack installation) is halved due to installation of a capping stack (176,476 m^2, compared with 429,266 m^3 over 112 days of LOWC), the extent of the surface exposure remains largely the same due to the rapid weathering of the condensate following release.

BIAs for several albatross and other marine bird species, sharks and whales are likely to be impacted as a result from a major LOWC at low and moderate surface exposure levels, with minimum time before exposure exceeding 4 days (Table 6-43). No BIA exposure is predicted at high surface thresholds, as a result from weathering within the watercolumn before the plume reaches the water surface.

The deterministic spill trajectory starting on 11 pm 28th of December 2008 at 11pm was identified to have the largest sea surface swept area at the moderate threshold (≥ 10 g/m^2; actionable oil). Low oil exposure was observed a maximum distance of 119 km northeast of the release site, while moderate oil exposure (≥ 10 g/m^2) on the sea surface was limited to the immediate area around the release location.

Maximum area of coverage of visible oil on the on the sea surface at any given time throughout the scenario was predicted to occur within 20 days and covered approximately 100 km^2 in area.

6.32.2.7 Hairtail-1 LOWC scenario In-water Hydrocarbon Exposure - Dissolved Aromatic Hydrocarbon

Low dissolved aromatic exposure (576-4,800 ppb.hrs) in the 0-10 m depth layer was observed up to 167 km from the Hairtail-1 release site while moderate exposure (4,800 -38,400 ppb.hrs) was limited to within 5 km of the release site.

No dissolved aromatic hydrocarbon exposure is predicted to the upwelling east of Eden, or Big Horseshoe Canyon at moderate or high thresholds, although two KEFs were predicted to be impacted in the 0-10 m depth layer at low threshold: Upwelling East of Eden (41% at low dissolved thresholds) and Big Horseshoe Canyon (2% at low dissolved thresholds) (Table 6-44).

Several Biologically Important Areas (BIAs; whales and foraging sea birds) were predicted to have a 100% probably of low dissolved aromatic exposure (576-4,800 ppb.hrs) in the 0-10 m depth layer.

The potential zones of low (576-4,800 ppb.hrs) and moderate (4,800-38,400 ppb.hrs) exposure from dissolved aromatics in the 0-10 m, 10-20m and 20-40 m depth layers is summarised in Table 6-45. No high exposure (> 38,400 ppb.hrs) was predicted for this scenario.

No dissolved aromatic hydrocarbon exposure to the shoreline or nearshore waters is predicted at the lowest threshold for dissolved hydrocarbons.

6.32.2.8 Sculpin-1 LOWC scenario In-water Hydrocarbon Exposure - Dissolved Aromatic Hydrocarbon

Low dissolved aromatic exposure (576-4,800 ppb.hrs) in the 0-20 m depth layers, and below 30 m depth, down to 1,000m was observed up to about 35 km from the Sculpin-1 release site, while moderate exposure (4,800 -38,400 ppb.hrs) was limited to the immediate area around the release site while within the 20-30 m depth layer, dissolved hydrocarbons are predicted to extend to about 110 km (Table 6-46).

No dissolved aromatic hydrocarbon exposure is predicted to the upwelling east of Eden, or Big Horseshoe Canyon at moderate or high thresholds, although these two KEFs were predicted to be impacted at low threshold (Table 6-44): Upwelling East of Eden (2-6 % probability at low dissolved thresholds in depth layers between 0-50 m water depth) and Big Horseshoe Canyon (2% at 20-30 m water depth and at low dissolved thresholds).

Table 6-44 Dissolved Exposure KEFs – LOWC Scenarios

Receptor	Maximum exposure to dissolved aromatics (ppb.hrs)		Probability of exposure to dissolved aromatics (ppb.hrs)					
			Low (>576)		Moderate (>4,800)		High (>38,400)	
Wells (B=Baldfish-1, S=Sculpin-1)	B	S	B	S	B	S	B	S
Relief Well Scenario								
Upwelling East of Eden (KEF)								
0-10 m Depth	2,398	619	41	2	No exposure			
10-20 m Depth	1,995	2,314	11	6				
20-30 m Depth	-	1,950	-	6				
30-50 m Depth	-	853	-	2				
Big Horseshoe Canyon (KEF)								
0-10 m Depth	961	-	2	-	No exposure			
10-20 m Depth	896	-	2	-				
20-30 m Depth	-	715	-	2				
Capping Stack Scenario								
Upwelling East of Eden (KEF)								
0-10 m Depth	1,975	715	23	1.6	No exposure			
10-20 m Depth	1,785	1,926	6	5				
20-30 m Depth	-	2,078	-	3				
30-50 m Depth	-	608	-	1.6				
Big Horseshoe Canyon (KEF)								
0-10 m Depth	1975	-	2	-	No exposure			
10-20 m Depth	-	-	2	-				
20-30 m Depth	-	-	-					
No exposure predicted at deeper layers								

Several Biologically Important Areas (BIAs; whales and foraging sea birds) are likely to be exposed to low levels of low dissolved aromatic exposure (576-4,800 ppb.hrs) in the area immediately around the point of release. Moderate dissolved aromatic exposure is predicted to be restricted to an area immediately around the point of release, with limited vertical spread of the plume.

No exposure to high levels of aromatics exposure is predicted between the water surface and down to 2 km water depth.

6.32.2.9 Hairtail-1 LOWC scenario In-water Hydrocarbon Exposure - Entrained Hydrocarbon

The predicted entrained exposure was minimal and occurred within 2 km of the Hairtail-1 release site, while sub-lethal effects may extend up to 15 km from the release site.

Figure 4-3 represents the geographical extent of water quality impacts from entrained hydrocarbons beyond the 95%-ile NOEC for Hairtail-1, based on ANZECC criteria (Section 6.28.2.8). At this conservative threshold, entrained hydrocarbons may reach as far north as Ulladulla in NSW, westwards past Mornington Peninsula and southwards along the Tasmanian islands and the northern shore of Tasmania. However, it is unlikely that entrained hydrocarbons are measureable in the water column at these levels with standard laboratory methodology, while impacts on even the most sensitive biota and ecosystems would most likely not be detectable with conventional scientific methods.

6.32.2.10 Sculpin-1 LOWC scenario In-water Hydrocarbon Exposure - Entrained Hydrocarbon

The predicted entrained exposure was minimal and occurred immediately around the Sculpin-1 release site, while sub-lethal effects may extend up to 10 km from the release site.

Figure 4-4 represents the geographical extent of water quality impacts from entrained hydrocarbons beyond the 95%-ile NOEC for Sculpin-1, based on ANZECC criteria (Section 6.28.2.8). At this conservative threshold, entrained hydrocarbons may reach as far north as Ulladulla in NSW, westwards past Mornington Peninsula and southwards along the Tasmanian islands and the northern shore of Tasmania. However, it is unlikely that entrained hydrocarbons are measureable in the water column at these levels with standard laboratory methodology, while impacts on even the most sensitive biota and ecosystems would most likely not be detectable with conventional scientific methods.

6.32.2.11 Hairtail-1 and Sculpin-1 LOWC scenario - Shoreline contact

No shoreline contact, above the lowest shoreline contact threshold (≥10 g/m^2), was predicted for the modelled LOWC at Hairtail-1 or Sculpin-1. There was also no predicted impacts within state waters of Victoria or Tasmania, except at the ANZECC reference threshold for entrained hydrocarbons. Due to uncertainties in the assumptions used to build the models, there is a small chance of detectable water quality impacts in the state waters of Victoria or Tasmania. Depending on the specific spill trajectory, these impacts would be managed through consultation with impacted stakeholders and implementation of scientific monitoring where required.

Table 6-45 Hairtail-1 LOWC Scenario: Summary of predicted spill impacts

Partition	Baldfish Operational area	Commonwealth waters	Victoria State Waters	Shoreline impact	Biologically Important Areas (BIAs) (APASA 2018)	Key Ecological Features (KEF) (APASA 2018)
Actionable sea surface oil	< 2 days after release	< 2 days after release	-	-		
LOWC over 98 days	**Distance from release site**				**Probability of hydrocarbon exposure**	
Surface hydrocarbons						
Surface Hydrocarbons	4 km E (high threshold; 99%-ile)	13 km ENE (moderate threshold; 99%-ile)	NC	NC	Probability (at low threshold): whales, sea birds: 100% No exposure predicted at moderate and high concentration	Probability (at low threshold): Upwelling East of Eden: 100% Big Horseshoe Canyon: 11% (NE at moderate threshold)
>50% probability of surface oil exposure at low threshold	<30 km from release site (99%-ile)		-	-		
1-10% probability of surface oil exposure at low threshold	Up to 96 km from release site (99%-ile)		<1%	<1%		
Time to reach outer limit for low sea surface threshold	<12 hours	>30 days	-	-		
Dissolved hydrocarbons						
Dissolved Hydrocarbons (0-10m & 10-20m)	Moderate impact immediately around release site	Low impact up to 167 km from release site	NC	NC	Probability (at low threshold): whales, sea birds: 0-10 m: 100%; 10-20 m: 23%	Probability (at low threshold): Upwelling East of Eden: 0-10m: 41%; 10-20m: 11% (NE at moderate threshold) Big Horseshoe Canyon 0-10m: 2%; 10-20m: 2% (NE at moderate threshold)
Vertical distribution	0-20 m layer (may extend to 20-40 m layer at scattered locations)		-	-		
Entrained Hydrocarbons						
Entrained Hydrocarbons	Low impacts within 2 km from release site	NOEC & tainting impacts <15 km from release site	At ANZECC reference threshold (7 ppb @ 96 hrs) residual entrained hydrocarbons may reach the Victorian, NSW and Tasmania shoreline, including BIA for whales and seabirds, as well as KEF (including Upwelling East of Eden, Big Horseshoe canyon) (Figure 4-3)			
Other parameters						
Deterministic modelling (worst case)	Moderate exposure <13 km E from release site	Low exposure up to 84 km NE from release site	-	-	-	-
Duration of visible sea surface film	Continues for duration of LOWC (up to 160 km^2 around LOWC location)		-	-		
Actionable sea surface oil	Continues for duration of LOWC (<10 km^2 around LOWC location)		-	-		

NE=No exposure; NC= No contact; - = not applicable

Table 6-46 Sculpin-1 LOWC Scenario: Summary of predicted spill impacts

Partition	Sculpin-1 Operational area	Commonwealth waters	Victoria & NSW State Waters	Shoreline impact	Biologically Important Areas (BIAs) (APASA 2018b)	Key Ecological Features (KEF) (APASA 2018b)
LOWC over 119 days	**Distance from release site**				**Probability of hydrocarbon exposure**	
Surface hydrocarbons						
Surface Hydrocarbons	Immediately around well location only (high threshold; 99%-ile)	<5 km NNE (moderate threshold; 99%-ile)	NC	NC	Probability At low threshold: whales, sea birds: up to 100% At moderate threshold: 97% for some foraging seabirds In immediate vicinity of well location only No exposure predicted at high concentration	Probability (at low threshold): Upwelling East of Eden: 100% Big Horseshoe Canyon: 86% No exposure predicted at moderate and high concentrations
>50% probability of surface oil exposure at low threshold	<1 km from release site (99%-ile)		-	-		
1-10% probability of surface oil exposure at low threshold	Up to 5 km from release site (99%-ile)		<6%	-		
Time to reach outer limit for low sea surface threshold	<2.5 days	>5 days	2-4 weeks	-		
Dissolved hydrocarbons						
Dissolved Hydrocarbons	Low impact <5 km from release site	Low impact <5 km from release site	NC	NC	Probability (whales, sea birds): At low threshold: 0-10 m: 2-3%; 10-20 m: <25%; 20-30 m: <84%, 30-50 m: <68% At moderate threshold: 0-10 m: -; 10-20 m: <3%; 20-30 m: <22%, 30-50 m: <10%	Probability (at low threshold): Upwelling East of Eden: 0-10m: 2%; 10-20m: 6%; 20-30m: 6%; 30-50m: 2% Big Horseshoe Canyon 0-10m: -; 10-20m: -; 20-30m: 2%; 30-50m: -
Vertical distribution	Largely restricted to upper 30 m Largest horizontal extent between 20-30m depth Narrow plume between release point (2.3 km and 30 m depth		-	-		
Entrained Hydrocarbons						
Entrained Hydrocarbons	Low impacts within 5 km from release point, except at 0-10 m (<35 km)	NOEC & tainting impacts <10 km from release site at all depths	At ANZECC reference threshold (7 ppb @ 96 hrs) residual entrained hydrocarbons may reach the Victorian, NSW and Tasmania shoreline at <10% probability) except between Marlo and Mallacoota where probability is <50%. May impact BIA for whales and seabirds, as well as KEF (including Upwelling East of Eden, Big Horseshoe canyon) (Figure 4-4) Fish tainting likely in immediate vicinity around release point and below 1.6 km water depth. No predicted impact at other thresholds for entrained hydrocarbons			
Other parameters						
Deterministic modelling (worst case)	Moderate exposure <100 km E from release site	Low exposure up to 100 km NE from release site	-	-	-	-
Duration of visible sea surface film	Continues for duration of LOWC (up to 262 km SSE from LOWC location)		-	-		
Actionable sea surface oil	Continues for duration of LOWC (<18 km S from LOWC location)		-	-		

NE=No exposure; NC= No contact; - = not applicable

6.32.3 Impact Assessment

A LOWC was identified as a worst case spill scenario and may result in acute or chronic impacts, or mortality, of marine organisms. A vessel collision event also has the potential to impact on social receptors, resulting from surface; and in water exposure (entrained only).

The potential impacts include direct impacts (potential toxicity effects / physical oiling; potential for reduction in intrinsic values / visual aesthetics) and indirect impacts (potential damage to commercial businesses). Based on the impact thresholds identified in Section 6.28.2.4, the potential risks associated with a hydrocarbon spill are summarised below.

6.32.3.1 Potential Impacts to Offshore Open Water Environments and Receptors

As discussed in Chapter 4, a number of EBPC-Act listed species, including marine mammals, seabirds and marine reptiles could be present in an offshore spill affected area. A spill will potentially expose the fauna to surface, entrained or dissolved hydrocarbons, resulting in physical oiling and toxicity effects. The possible effects of such an event on the offshore environment are further detailed below (Table 6-48).

Our understanding of the environmental impacts resulting from a subsea LOWC was greatly expanded by scientific studies following the subsea LOWC at the Macondo field in the Gulf of Mexico (April 2010), where an estimated 4.9 Mb of oil was released, until the well was finally sealed in September 2010. The Deepwater Horizon (DWH) oil spill covered over 110,000 km^2 of the ocean surface and reached over 2,000 km of shoreline in the northern Gulf of Mexico. This extensive oiling contaminated vital foraging, migratory, and breeding habitats at the surface, in the water column, and on the ocean bottom throughout the northern Gulf of Mexico.

This event generated a large body of scientific research on the potential impacts from a deepwater hydrocarbon LOWC on marine and coastal ecosystems, greatly expanding our understanding of the impacts from a deepwater LOWC. Recent research on the potential impact from a hydrocarbon spill on a range of ecosystems are summarised in Table 6-47.

Table 6-47 Potential Environmental receptors that may be affected by an Oil Spill (6.11)

Region	Group	Summary of impacts
Offshore deep water	Fish (6.11.3.1)	Mass fish mortalities are rare following oil spills, particularly in open ocean waters (Scholtz *et al*. 1992). Due to their high mobility, this is generally attributed to the ability of pelagic fish to avoid surface waters underneath oil spills by swimming into deeper water or away from the affected areas (ITOPF 2011.) Indirect exposure may occur via consumption of contaminated prey. Owing to their ability to metabolise hydrocarbon toxicants, fish exposed to sub lethal dissolved aromatics are likely to recover (NOAA 2002). A condensate or oil release may result in stress in fish in spill affected areas. Modification of habitat due to the effects of hydrocarbon on other marine organisms (such as seagrasses) may adversely affect some fish species (Jewett *et al*. 1999 in Ecos 2001). Turbulent waters can disperse hydrocarbon throughout the water column, thereby exposing fish at depths to contamination or by reducing the amount of dissolved oxygen, which could potentially cause suffocation. Dispersal throughout the water column is highly likely in these scenarios due to high-energy oceanic conditions in Bass Strait. Gagnon and Rawson (2011) studied the effect from the Montara spill on fish. The study concluded that for each species, all individuals were in good physical condition at all sites, suggesting good health status. In the short-term, fish were exposed to, and metabolised petroleum hydrocarbons, however no consistent adverse effects on fish health or on their reproductive activity were detected. Continuing exposure to petroleum hydrocarbons was evidenced by elevated liver detoxification enzymes and PAH biliary metabolites in three out of four species collected close to the rig; in addition, red emperor collected close to the MODU had enlarged livers and elevated oxidative DNA damage. Biomarkers of fish health showed a trend towards a return to reference levels with often, but not always, comparable biomarker levels in fish collected from reference and impacted sites. Burns *et al*. (2011) analysed demersal and pelagic fish species after the Montara oil leak had stopped, although some were collected only a few days after the ‘well kill”, two months after capping of the leak. It concluded that the fish species would

Region	Group	Summary of impacts
		probably have been safe to eat as no detectable petroleum hydrocarbons were found in the fish muscle samples.
	Sharks and Rays (6.11.3.2)	No reported studies of the impacts of oil spills on cartilaginous fish (including sharks, rays and sawfish) were found in the literature. It is not known how the data on the sensitivity of bony fishes would relate to toxicity in cartilaginous fishes. All EPBC listed sharks and rays in the area of interest are viviparous or ovoviviparous and so do not have a free swimming larval stage. These species are also larger than the bony fish species for which toxicity has been studied. Sharks may be exposed to and ingest hydrocarbons entrained in the water column. Dispersal throughout the water column is highly likely in these scenarios, due to high-energy oceanic conditions of Bass Strait.
	Marine Reptiles (6.11.3.3)	Marine turtles exhibit no avoidance behaviour to oil spills. Physical oiling may lead to irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection or irritation and injury to skin where oil adheres (Etkins 1997; IPIECA 1995). Inhalation of vapours may lead to lung and other internal damage including neurological impairment (IPIECA 1995). Marine turtles are likely to occur in low densities in spill affected areas. The effects of the Deepwater Horizon (DWH) oil spill on protected marine species, and specifically sea turtles and marine mammals was studied as part of the DWH Natural Resource Damage Assessment (NRDA) (e.g. Wallace *et al* 2017). The research by NOAA scientists on some of the long term effects of the Deepwater Horizon oil spill indicates that populations of several sea turtle species will take decades to rebound, while requiring significant habitat restoration in the region (e.g. Wallace *et al*. 2017; Ylitano *et al*. 2017, Stacy *et* al. 2017, Mitchelmore *et al*. 2017, McDonald *et al.* 2017, Lauritsen *et al.* 2017, Reich *et al.* 2017).
	Seabirds (6.11.3.4)	Seabirds typically exhibit no avoidance behaviour to oil spills and may contact surface slicks when foraging or resting on the water surface. Matting of feathers on heavily oiled birds may lead to hypothermia, starvation due to loss of ability to fly and forage, and drowning due to loss of buoyancy. Oiled birds will directly ingest hydrocarbons when preening or indirectly by consuming contaminated prey. Ingestion and oiling can also lead to internal injury to sensitive membranes and organs (IPIECA 2004; AMSA 2012). Longer term exposure effects that may potentially impact seabird populations include a loss of reproductive success due to loss of breeding adults and malformation of eggs or chicks (AMSA 2012). Watson *et al*. (2009) undertook a rapid survey of the ‘megafauna’ in the Montara oil spill region. The surveys at sea revealed a high level of diversity and abundance of birds while surveys on land found 35 bird species of which 10 species were in a stage of breeding. Presence of a dead or dying birds was evidence that some species are negatively affected by the oil spill. Although some birds appeared to avoid slicks, a number of bird, cetacean and sea snake species were found in higher numbers in oil affected waters. The study could not confirm the true impact and recommended it be followed up by a long term toxicological study to assess if toxic chemicals are present in the tissue of the animals.
	Seals (6.11.3.5)	Oiling of pinniped mammals (seals and sea lions) may destroy the waterproofing and insulating properties of their feathers or fur resulting in hypothermia and affecting balance. The matted oil can also inhibit limb movement making swimming difficult and may also cause skin lesions and eye irritations (NRC 1989, Walraven 1992, Volkman *et al*. 1994; Jenssen 1996). Toxic effects following ingestion of oil from grooming as well as the consumption of food items that have been exposed to oil can include ulceration and bleeding in the gastrointestinal tract, kidney damage and altered reproductive cycles (Volkman *et al*. 1994 in Brady *et al.* 2002). However, internal effects of oil ingestion after the Exxon Valdez oil spill were observed to be not serious and although some pups lost weight, all recovered (Michel *et al*. 1992 in Ecos 2001).
	Cetaceans (6.11.3.6)	In the event of an extended duration loss of well control event, there is potential for surface slick and entrained hydrocarbons exceeding threshold concentrations to sweep across the seasonal migratory routes of EPBC Act listed whale species, including humpback whales, southern right whales and blue whales. Marine mammals that have direct physical contact with surface slicks and entrained oil may suffer surface fouling or ingestion of hydrocarbons and inhalation of toxic vapours. This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts and organs, impairment of the immune system or neurological damage (IPIECA 1995). Observational evidence indicates in some instances cetaceans may detect and exhibit avoidance behaviour and potentially move away from the spill-affected area

Region	Group	Summary of impacts
		(IPIECA, 1995). Previous studies have suggested that cetaceans would be able to detect and avoid oiled waters and, when in contact, oil would not adhere to their slick skin. However, recent studies (Aichinger Dias *et al*. 2017), following the Deepwater Horizon oil spill at the Macondo field (Gulf of Mexico, April – July 2010), confirmed persistence of the oil on their skin of cetacean response to an oil spill, so that direct exposure should be taken into account during response activities. Other NOAA studies on marine mammal (whales, dolphins) impacts from the DWH event include Takeshita *et al.* 2017, Wilkin *et al.* 2017, Aichinger Dias *et al.* 2017, Smith *et al.* 2017, Kellar *et al.* 2017, Wells *et al.* 2017, Hornsby *et al.* 2017, McDonald *et al.* 2017, Fauquier *et al.* 2017, Rosel *et al.* 2017, Hohn *et al.* 2017, Thomas *et al.* 2017, Schwacke *et al.* 2017, De Guise *et al.* 2017. Given that the VIC/P70 location is not a known breeding, feeding or aggregation area for marine mammals, only low numbers of individuals that are transiting through the area would be potentially impacted. Fin, Humpback, Pygmy Right whale and Sei whale are likely to forage in the area during transit (Section 4.8.16). Humpback whales pass along the Gippsland Basin during late Autumn on their annual migratory route to the tropical calving grounds, returning south in Spring. Southern right whales have a similar migration pattern. On the east coast, southern right whales tend to migrate between Cape Byron and Antarctica, but have been seen as far north as Hervey Bay, Queensland.
	Invertebrates and Plankton (6.11.3.7)	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 in Ecos 2001). Like protected shorelines, intertidal areas are sensitive to heavy oiling and contaminated sediments. Exposure to oil 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 in Ecos 2001). Benthic communities may also be at risk from sinking oil. Both oil and oil dispersants can be toxic to crustaceans, limpets, bivalves and sea stars (Michel *et al.,* 1992; Fukuyama *et al.,* 1998; Jewett *et al*., 1999). Commercial invertebrates, such as lobsters or scallops, may become tainted or suffer from sub-lethal effects. Polychaetes are less susceptible to the negative effects of oil and can show large fluctuations in abundances and species composition over time (Fukyama *et al*. 1998; Jewett *et al.* 1999 in Ecos 2001). Impacts on plankton communities are likely to occur in areas where dissolved or entrained hydrocarbon threshold concentrations are exceeded. Exposure to hydrocarbons in the water column can lead to changes in species composition with declines or increases in one or more species or taxonomic groups (Batten 1998). Exposure can lead to reduced photosynthetic rates in phytoplankton (Tomajka 1985) and suffocation, or behavioural changes or environmental changes that make them more susceptible to predation (Chamberlain, 1999). Due to rapid turnover, planktonic communities recover quickly (within weeks or months) (ITOPF 2011). Further note that plankton concentrations generally are higher in shallow inshore waters, with phytoplankton largely restricted to less than 100m water depth (Section 6.4.2). Felder *et al* 2014 reported that crustacean communities on Gulf Deep Banks (55–80 m deep in the Gulf of Mexico) declined in both abundance and diversity after the Macondo oil spill and exhibited major shifts in species dominance. The study postulated that this decline was due to decreased seaweed abundance having a cascading effect on direct consumers and higher trophic levels.
	Heritage Values and Shipwrecks (6.11.3.8)	Coastal waters within declared native title boundaries are unlikely to be exposed to entrained hydrocarbons or dissolved aromatics. There are a number of shipwrecks in proximity to the operational area and Operational ZPI location. No impacts are expected on shipwrecks from the worst case credible scenario.
	Commercial Fisheries (6.11.3.9)	In the event of a loss of well containment, fishers may be excluded from the spill affected area for an extended period. Exposure to hydrocarbons can result in tainting (off-flavour) of seafood at very low concentrations (e.g. Davis *et al.* 2002). Tainting may be reversible depending on the magnitude of exposure and type of organism affected. For example, fish have a high capacity to metabolise these hydrocarbons while crustaceans (such as prawns) have a reduced ability (NOAA 2002). Concern for seafood safety can affect

Region	Group	Summary of impacts
		the marketability of seafood including long after any actual risk has subsided (NOAA 2002). In the event of a major spill, economic impacts to fisheries can therefore occur due to lost fishing effort from the exclusion zone set up around spill affected areas and impacts to seafood markets.
	Oil and Gas Industry (6.11.3.10)	Worst case hydrocarbon spills imposing exclusion zones and requiring response activities could potentially impact other operators within the Operational ZPI (Section 6.10). Exclusion zones are likely to be imposed for the duration that the hydrocarbon poses a safety risk or may cause additional contamination. Impacts are also possible where surface hydrocarbons can interrupt operations/structures for Esso and other operators within the Operational ZPI (e.g. interference can occur with water intakes).
	Shipping (6.11.3.11)	Shipping traffic is likely to be affected by the imposition of exclusion zones in case of a major spill. The VIC/P70 Operational area coincides with intensive shipping activity neat the Bass Strait TSS (Section 4.12). As outlined in Section 6.9.2, AMSA has proposed to establish temporary fairways around the VIC/P70 operational area, and established a 2 NM buffer zone around each of the proposed VIC/P70 well locations for the duration of the campaigns (Section 6.25.2.1), in addition to a 500 m safety zone around the MODU, in order to deviate vessel traffic away from the VIC/P70 operational area and minimise the risk of shipping collisions.
Potential Impacts to Nearshore Marine Environments and Shoreline (6.11.4)	Fish (6.11.4.1)	Fish spawning including for commercially targeted species occurs in nearshore waters at certain times of the year. The early life stages (eggs, larvae and juveniles) of fish and other commercially-targeted taxa are at their most sensitive to exposure to hydrocarbons and the most sensitive habitats include seagrass beds and mangroves which in particular may serve as nursery areas (ITOPF 2011). A major LOWC scenario, coinciding with fish spawning periods, has the potential for lethal effects to fish larvae in affected areas. However, based on the outcome of modelled spill scenarios (see Section 5) such impacts to nearshore waters are not predicted.
	Seabirds and Shorebirds (6.11.4.2)	A major LOWC scenario has the potential for surface slicks and entrained oil to contact nearshore waters and shoreline habitats such as sandy shores, marshes, mangroves and reef flats that seabirds and resident and non-breeding overwintering shorebirds utilise for foraging and resting. However, based on the outcome of modelled spill scenarios (see Section 5) such impacts on seabirds and shorebirds are not predicted in coastal waters. While breeding oceanic seabird species can travel long distances to forage in offshore waters, most breeding seabirds will tend to forage in nearshore waters near their breeding colony resulting in higher seabird densities in nearshore waters and therefore higher sensitivity of these areas during breeding season. Consumption of contaminated fish from nearshore waters or invertebrates from intertidal foraging habitats such as sandy shores, mudflats and reef flats has the potential for lethal or sub lethal effects in seabirds and shorebirds. Ingestion can lead to internal injury to sensitive membranes and organs (IPIECA, 2004; AMSA, 2012). Longer term population effects may occur if there is a decline in reproductive performance and survivorship of chicks and adult birds.
	Cetaceans (6.11.4.3)	Felder *et al*. 2014 reported that crustacean communities on Gulf Deep Banks declined in both abundance and diversity after the Macondo Oil Spill and exhibited major shifts in species dominance.
	Heritage Values (6.11.4.4)	There are a number of shipwrecks in proximity to the operational area and Operational ZPI location (Section 6.13.2). No impacts are expected on shipwrecks or other areas of heritage value from the worst case credible scenario.
	Nearshore Commercial Fisheries (State) (6.11.4.5)	In the event of a loss of well containment, fishers may be excluded from the spill affected area. Exposure to hydrocarbons can result in tainting (off-flavour) of seafood at very low concentrations. Tainting effects crustaceans (e.g., prawns) more than fish as fish have the ability to metabolise hydrocarbons. Concern for seafood safety can affect the marketability of seafood including long after any actual risk has subsided. Predicted tainting impacts are restricted to an area immediately around the VIC/P70 operation area (Section 5.3.5) and are not affecting nearshore commercial fisheries.
	Recreational Fishing (6.11.4.6)	A major impact on survival of pelagic fish populations in open waters of the region may result in sub-lethal impacts on fish. Recreational users unlikely to be impacted if an exclusion zone were to be established around the spill affected areas due to the distance of the Operational ZPI from the shore.
	Tourism (6.11.4.7)	Typically, an oil spill that results in a visible oil slick in coastal waters and reaching shorelines will disrupt recreational activities, particularly tourism and its supporting services. For large scenarios, the tourism sector of the region may experience

Region	Group	Summary of impacts
		economic impacts. However, spill modelling indicates that in case of a major LOWC scenario from the VIC/P70 operational area, no visible sheen is expected to reach state waters (see Section 5).
	Ships and Ports (6.11.4.8)	Impacts are expected where surface hydrocarbons can interrupt operations and by the imposition of exclusion zones. No impacts to ports are predicted, based on spill modelling in case of a major LOWC scenario from the VIC/P70 operational area (see Section 5). However, impacts on commercial shipping, as outlined in Section 6.9, are possible in case of a major spill.

6.32.3.2 LOWC - Surface Hydrocarbon Exposure

Surface hydrocarbon exposures will only impact those receptors that are exposed to the sea surface. The ecological and social receptors with the potential to be exposed to surface hydrocarbon are evaluated in Table 6-47 and Table 6-48. Only those predicted to be exposed to hydrocarbon levels above the threshold value for that receptor (Table 6-31) are evaluated.

Surface hydrocarbons are predicted to extend approximately 4 km from the Hairtail-1 release site at high thresholds (99%-ile) and 13 km at moderate thresholds. For Sculpin-1 the moderate threshold is predicted to extend 18 km from the release location (99%-ile). There is >50% probability that the surface hydrocarbons resulting from a LOWC at Hairtail-1 would extend to 30 km from the release site, and <10% probability that it would extend up to 96 km from the release site. The probability that the area of moderate threshold exceeds >50 km from the release site at Sculpin-1 is less than 1%.

The BIA for whales and seabirds falls within the Operational ZPI, with surface hydrocarbons overlapping this BIA at high thresholds (100% probability). Whales, seabirds, seals and turtles may be affected by exposure to surface hydrocarbons, as summarised in Table 6-47 and Table 6-48.

Surface hydrocarbons resulting from a LOWC are expected to overlap two KEFs at low threshold: Upwelling east of Eden (100% probability for both Hairtail-1 and Sculpin-1) and Big Horseshoe Canyon (11% probability for Hairtail-1 and 86% for Sculpin-1). As Big Horseshoe Canyon is subsurface, surface hydrocarbons are not expected to affect this feature. Potential impacts to the Upwelling east of Eden is largely restricted to in-water hydrocarbon exposure (see below).

6.32.3.3 LOWC - In-water Hydrocarbon Exposure

In-water hydrocarbon exposures (from dissolved and entrained hydrocarbons) resulting from a LOWC will impact those receptors that are exposed to the water column. The ecological and social receptors with the potential to be exposed to in-water hydrocarbons are evaluated in Table 6-47 and Table 6-48. Only those predicted to be exposed to hydrocarbon levels above the threshold value for that receptor (Table 6-34) are evaluated further below.

Exposure above the in-water (entrained) NOEC impact threshold (Table 6-34) was predicted to extend up to 15 km around both the Hairtail and Sculpin release sites, and is largely restricted to the surface (0-20 m) layers. The water depth in the area predicted to be exposed above the impact threshold around both the Hairtail and Sculpin release sites is more than 350 m deep, which generally precludes the more sensitive benthic flora and fauna. No Commonwealth Marine Parks or State Marine Protected Areas were predicted to be exposed to entrained oil above the impact threshold, although low level ecological and water quality impacts may extend beyond the Operational ZPI (Section 6.32.2.3).

The probability of dissolved hydrocarbons reaching the nearby BIA at low thresholds as a result from a LOWC event at Hairtail-1 is 100% for the 0-10 m layer and 23% for 10-20 m water depth. For a LOWC event at Sculpin-1, the probability is highest at 20-30m water depth (up to 84%) in an area immediately around the point of release, and is 100% at greater depth (10% at between 800 - 2000 m) (Table 6-45 & Table 6-46). The potential effects of this hydrocarbon exposure, especially to whales and seabirds, but also seals and turtles is summarised in Table 6-48.

Two KEFs may be affected by dissolved hydrocarbons resulting from a LOWC (Table 6-45 & Table 6-46): Upwelling east of Eden (Hairtail: 41% probability for 0-10 m; 11% for the 10-20 m water depth; Sculpin: 2% probability for 0-10 m; 6% for the 10-30 m water depth) and Big Horseshoe Canyon (Hairtail: 2% probability for 0-10 m and for the 10-20 m water depth; Sculpin: 2% probability for 0-10 m water depth only). The potential effects of this hydrocarbon exposure is summarised in Table 6-48. Because of the depth of Big Horseshoe Canyon, no significant impacts are predicted. Exposure of the

Upwelling East of Eden is expected to mainly affect plankton, with potential indirect impacts on the local food chain, which is localised and of relatively short duration, until successful source control (38 – 88 days for Hairtail 1; up to 113 days for Sculpin-1; Section 7.5).

6.32.3.4 Gas releases into the water column

A well LOWC results in the uncontrolled release of a gas/condensate mixture into the water column. A substantial component of the release will be retained into the water column. WWC (2018) estimated that as much as 40% of mass is retained into the water column during an uncontrolled release (Section 7.5).

The breakdown of methane occurs very slowly. Consequently, oxygen concentrations will be untenable for a range of marine creatures, and lack of vertical mixing in the deep water is holding the dissolved methane at depth, limiting dissolved oxygen in surface waters from replenishing oxygen levels in the water column.

Soon after the explosion at the Macondo well in April 2010, scientists found that much of the escaped petroleum (oil and gas) was contained in an underwater ‘plume’, extending south-westwards from the well around 1,100 metres deep (Reddy *et al*, 2011).

The most abundant substance released from the well was methane. Methane is highly soluble in water and just 0.01% escaped into the atmosphere, compared to around 10% of ethane and 30% of propane. The deep plume formed as marine currents transported the dissolved hydrocarbons, together with some larger soluble compounds (mostly benzene, toluene, ethylbenzene and xylenes), south-westwards away from the well. The scientists estimated that the total amount of hydrocarbon dissolved in the water from the spill was likely to reduce by half each month. Had the spill been closer to the surface, it is less likely that the plume would have formed. This is because the compounds would have dispersed and evaporated, rather than dissolved.

Unlike the Macondo well, Baldfish is located in shallow waters (approximately 359 - 665 m). The rapid rise of gas to surface in a LOWC event will release gas to the atmosphere rather than being trapped at depth in the water column. Although a portion remains in the waters around the gas plume, this would not be expected to result in significant oxygen depletion given surrounding waters are generally well mixed. At the Baldfish location, thermal stratification is not normally expected (some weak thermal stratification may occur in calm summer conditions, but generally only in the middle of Bass Strait). Thus, significant ‘trapping’ of methane in deep cold waters is unlikely to occur, and long-term oxygen depletion (and consequent impacts to marine life) in any one layer of the water column is unlikely to occur. There will, however be a localised impact on marine organisms near the plume.

For Sculpin, weathering largely occurs in the water column, with any remaining hydrocarbons rapidly dissipating once the well is contained (Section 6.32.2.4; Figure 6-11).

Table 6-48 LOWC - Consequence evaluation for Hydrocarbon Exposure

Environment	Type	Exposure Evaluation	Consequence Evaluation
Surface water			
Ecological	Marine turtles	There may be marine turtles within the Operational ZPI (Section 4.8.13). However, this area is not identified as critical habitat and there are no spatially defined aggregations, or BIA for turtles.	Marine turtles are vulnerable to the effects of oil at all life stages. Marine turtles can be exposed to surface oil while swimming through a slick or by ingesting oil. Ingested oil can harm internal organs and digestive function. Oil on their bodies Can cause skin irritation and affect breathing. The number of marine turtles that may be exposed is expected to be low due to the location, and relative short duration in the case of a LOWC event. The potential impact would be limited to individuals, with no population impacts anticipated. The potential impacts and risk to marine turtles are Category 3 (Medium) for an extended LOWC (Section 5).
	Seabirds and shorebirds	Several threatened, migratory and/or listed marine species may occur in the Operational ZPI or operational area (Section 0). There are foraging BIA's for some species of petrels and albatrosses throughout the area. However, there are no breeding BIAs within this area, as the majority of known breeding habitats are within coastal habitats and islands of Bass Strait.	Individual birds may suffer impacts as a result of a spill, especially nearest to the source of the spill, when toxicity is highest due to the presence of volatile compounds. However, it is unlikely that a large number of birds will be affected. Seabirds that are resting, rafting, diving or feeding at sea have the potential to come into contact with surface sheen and may experience lethal surface thresholds. The area of contact is localised and temporary, especially in the case of a LOWC event. Contact with areas of high hydrocarbon exposure is unlikely because of the distance from shore. Acute or chronic toxicity impacts to a small number of birds is possible, especially in the case of an extended LOWC event. However, impacts ae unlikely to be significant at a population level. The potential impacts and risk to seabirds is Category 3 (Medium) for an extended LOWC (Section 5).
	Seals (Pinnipeds)	Seals are likely to occur within the Operational ZPI and operational area (Section 4.8.15). However, these areas are not identified as critical habitat, and there are no spatially defined aggregations (i.e. no BIAs for seals)	Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Fur seals are particularly vulnerable to hypothermia from oiling of their fur. Since VIC/P70 condensate is a light oil such impact is unlikely. Seal exposure is expected to be low, with impacts restricted to individuals rather than colonies. Due to the rapid weathering of condensate, the potential exposure time is limited, especially as a result from a LOWC. The potential impacts to seals are considered to be less than a Category 4 (low) risk for a LOWC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Whales & Dolphins (Cetaceans)	Several threatened, migratory and/or listed species have the potential to be migrating, resting or foraging within an area predicted to be above the 10 g/m^2 surface threshold (Section 4.8.16), while an area immediately around the operational area may also be exposed to low levels of water column hydrocarbons in the case of a loss of well integrity (Section 6.32.3). Southern Right Whale and Humpback whale migration overlap with VIC/P70 field activities (Table 4-16). The Operational ZPI and operational area overlap BIAs for whales (Section 4.8.2).	In the case of a LOWC, the environmental impact would be limited to a relatively short period following the release and would need to coincide migration to result in exposure to a large number of individuals. However, such exposure is not anticipated to result in long term population viability effects. A proportion of the migrating population of whales could be affected during a single migration event, which could result in temporary and localised consequences. Since the VIC/P70 activities are planned for two months between June and September, this is likely to overlap with migration of the southern right whale migration (mid-May to September; Section 4.8.16) and the humpback whale northern migration (north from June to August; south from September to November; Section 4.8.16). Blue whales are most likely to be present during November and December (Section 4.8.16) so that planned activities are unlikely to affect blue whales. However, the nearest BIA for southern right whales is largely restricted to Victorian state waters, outside of the affected zone. The nearest BIA for humpback whales, along the NSW coastline, lies outside of the Operational ZPI. The BIA for the pygmy blue whale overlaps with the affected zone and straddles the VIC/P70 operational area (Section 4.8.2). Physical impact by individual whales to hydrocarbon exposure is unlikely to lead to any long-term impacts (Table 6-47). Given the mobility of whales, only a small proportion of the migrating population would surface in the affected area, resulting in a Category 3 (Medium) for an extended LOWC (Section 5).
Social	Recreation and tourism	Marine pollution can result in impacts to marine-based tourism from reduced visual aesthetic. The modelling predicted no shoreline impact (Section 6.32.2.5), with visible sheen (low impact: <0.30g/m^2) extending to commonwealth waters (Section 6.32.3)	Visible sheen has the potential to reduce visual amenity. However, because of distance from shore, impact is ranked as Category 4 (low) (Section 7).
	Heritage	No shoreline impact. Vertical impact restricted to top 20 m (Section 6.32.3)	Sheen has the potential to reduce the visual amenity of known heritage sites (6.32.3). However, because of distance from shore and limited vertical distribution, impact is ranked as Category 3 (Medium) for an extended LOWC(Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
Subsurface			
Ecological	Macroalgae	Macroalgae may be present within reef and hard substrate within the Operational ZPI (Section 4.9.4), but this is not a dominant habitat in Gippsland Basin. Since the Operational ZPI excludes shallow waters along the coastline, and the operational area is too deep for macroalgae, while vertical distribution of hydrocarbons as a result from a spill is largely restricted to the top 20 m (Section 6.32.3), significant impacts on macroalgae from a LOC event are unlikely	Given the lack of dominant macroalgae habitat within the Operational ZPI and the operational area, impacts in macroalgae are considered to be limited. Reported toxic responses to oils include physiological changes to enzyme systems, photosynthesis, respiration and nucleic acid synthesis (Lewis & Pryor 2013). Macroalgae respond differently to a spill but appear to be able to recover rapidly (Connell *et al*.1981). The potential impacts to macroalgae are considered to be a Category 3 (Medium) for an extended LOWC (Section 5).
	Seagrass	Seagrass may be present in shallower water within the Operational ZPI (Section 4.9.4). However it is not a dominant ecosystem, and is restricted to shallow water, largely due to light attenuation (Duarte 1991). They are largely restricted to <35 m, but abundance rapidly declines below 10m depth, especially in high turbulence areas, where light penetration is limited (Cambridge and Kuo 1979).	Because much of seagrass biomass is in the rhizomes below the substrate (Zieman *et al*. 1984), exposure is more likely to result in sub-lethal impacts, rather than lethal impacts. The potential impacts to seagrass are considered to be less than a Category 3 (Medium) for an extended LOWC (Section 5).
	Temperate corals, ascidians, bryozoans and sponges	Soft corals may be present on hard substrate within the Operational ZPI, such as intertidal rocky shores or exposed rocky headlands (Section 4.9.3 & 4.9.9). They may also be found on hard substrate in deeper waters further offshore, including Big Horseshoe Canyon and Beagle Marine Reserve (Section 4.8.1) where adequate food is available in the water column, but their presence near the operational area is unlikely due to the lack of hard substrate, and low levels of suspended organic matter in the water column (Butler *et al*. 2002). Six sponge beds were reported in Bass Strait, in an arc along the 65-75 m contour near Tasmania. Ascidians and bryozoans occupy a similar habitat (Butler *et al.* 2002). Sponges and ascidians are also found on soft-bottom substrate (see below). However, most barnacle and ascidian species inhabit hard substrates and are generally infrequent in soft bottoms (e.g. Yakovis *et al.* 2005).	Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects (Shigenaka 2001). This may lead to reduced growth rates, tissue decomposition and localised mortality (NOOA, 2001). However, given the distribution of hard substrate relative to Operational ZPI and operational area, and limit of entrained hydrocarbons to top 20m of the water column immediately around the operational area (Section 6.32.3), such impacts are considered limited to isolated organisms. The risk of impact resulting from a LOWC to Horseshoe Canyon is low (surface: 11% at low threshold) with dissolved hydrocarbons restricted to <10 m (2% at low threshold), with no entrained hydrocarbon exposure predicted (Section 6.32.3). Therefore, the potential impacts to hard substrate communities are considered to be less than a Category 3 (Medium) for an extended LOWC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Plankton	Plankton is likely to be exposed to entrained hydrocarbons above the NOEC threshold in an area within 15 km from the operational area (Section 6.32.3). The probability of Upwelling East Of Eden to be affected by surface hydrocarbons at low threshold is 100% for a LOWC. Dissolved hydrocarbons may affect the upper layers of the water column around the Upwelling East of Eden at low threshold (0-10m: 41%; 10-20m: 11%). However, no impact from entrained hydrocarbons is predicted (Section 6.32.3).	Relatively low concentrations of hydrocarbons are toxic to plankton (including zooplankton, fish eggs and larvae) through ingestion, contact and inhalation. Plankton is widespread and abundant, and form the basis for the marine food web. A spill is unlikely to have long-lasting impacts on plankton populations at a regional level. Plankton recovers within weeks to months after water quality has returned to normal (ITOPF 2011) Therefore, the potential impacts to plankton communities are considered to be less than a Category 3 (Medium) for an extended LOWC (Section 5).
	Soft-bottom invertebrates	Soft bottom communities occur throughout the Operational ZPI, including deeper waters around the operational area and much of the Gippsland coastline (Section 4.9 and 4.10.2). As vertical impact resulting from a LOC or LOWC is largely restricted to the top 20 m of the water column, and no shoreline impact is predicted below the lowest thresholds, direct impact to soft-bottom benthic communities is not expected. Invertebrates include squid, crustaceans (rock lobster and crabs) and molluscs (scallops and abalone) Filter feeding benthic invertebrates such as sponges bryozoans, abalone and hydroids may be exposed to sub-lethal impacts. However, population level impact are unlikely. Sponges attach to hard bottom using a basal disc or anchoring spicules, or to soft sediment by means of root-like structures. Several soft-bottom invertebrates are target to commercial fisheries, including squid, abalone, rock lobster and crabs.	Acute or chronic exposure through contact and/or digestion can result in toxicological risks. The hard shell of many invertebrates protects them from absorption. Since no shoreline impact is predicted, and impacts from a LOC are restricted to the water surface and the top 20 m of the water column (Section 6.32.2.2), impact from a LOWC on benthic communities are unlikely. Therefore, the potential impacts to soft-bottom invertebrates are considered to be less than a Category 3 (Medium) for an extended LOWC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Fish, sharks, rays	Entrained hydrocarbon droplets can physically affect fish exposed for an extended duration (weeks to months). Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon levels are highest. Many target fish species are demersal, in deeper waters away from the water surface. Therefore, any impacts are expected to be highly localised. There is a known distribution and foraging BIA for the Great white shark within the Operational ZPI.	Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in the water column are predicted to be below lethal thresholds, except near the operational area (Section 6.32.2.9). Although localised tainting may be expected, these effects are reported to be short-term and reversible (Section 6.28.2.4). Juvenile fish, including larva and zooplankton ae more susceptible to hydrocarbons in the water column. Although impacts are not expected to cause population levels impacts. Impacts in eggs and larvae are not expected to be significant given the relatively short duration even in the case of a LOWC) and the limited extent of the spill. As eggs and larvae are widely distributed in the upper water column it is expected that nearby populations will rapidly drift into affected parts of the water column. Therefore, the potential impacts to fish communities are considered to be Category 3 (Medium) for an extended LOWC (Section 5).
	Seals	Fur seals occur within the Operational ZPI and may also occur in low numbers within the operational area (Section 4.8.15). Localised areas of the foraging range for New Zealand Fur Seals and Australian fur-seals may be temporary exposed to low concentrations of hydrocarbons within an area predicted to be above the 10g/m^2 surface threshold, while an area immediately around the operational area may also be exposed to low levels of water column hydrocarbons in the case of a spill or loss of well integrity. Low levels of entrained hydrocarbons may be experienced immediately around the operational area, with NOEC thresholds limited to an area <10 km from the spill location for a LOWC event. In the case of a major LOWC, low thresholds of dissolved hydrocarbons ae predicted to extend up to 167 km from the release site (largely in the upper 20 m of the water column), with low thresholds of entrained hydrocarbons extending to about 2 km from the release site and <15 km for NOEC threshold (Section 6.32.2.9).	Exposure to low levels of hydrocarbons in the water column or consumption of affected prey may cause sub-lethal impacts. However, given the temporary and localised nature of a spill, the wide distribution of seals, the low level of exposure zones, except for dissolved hydrocarbons in the upper water column in the case of a LOWC, and rapid loss of o the volatile components following a spill, impacts at a population levels are considered unlikely. The potential impacts to seals are considered to be Category 3 (Medium) for an extended LOWC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Whales and dolphins	Several threatened, migratory and/or listed marine species have the potential to be migrating, resting or foraging within an area predicted to be above the surface thresholds (Section 4.8.16). Known BIAs are present for foraging Pygmy Blue whale; and distribution for the Southern Right whale (Section 4.8.2). Low levels of entrained hydrocarbons may be experienced immediately around the operational area, with NOEC thresholds limited to an area <10 km from the spill location for a LOWC event. In the case of a major LOWC, low thresholds of dissolved hydrocarbons are predicted to extend up to 167 km from the release site (largely in the upper 20 m of the water column), with low thresholds of entrained hydrocarbons extending to about 2 km from the release site and <15 km for NOEC threshold (Section 6.32.3). Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Table 6-47). Such impacts are most likely near the release location. The risk of impacts declines further from the spill location due to weathering, and loss of the volatile toxic components.	In the case of a LOWC event, the environmental impact would be limited to a relatively short period following the release and would need to coincide migration to result in exposure to a large number of individuals. However, such exposure is not anticipated to result in long term population viability effects. A proportion of the migrating population of whales could be affected during a single migration event, which could result in temporary and localised consequences. Since the VIC/P70 activities are planned for two months between June and September, this is likely to overlap with migration of the southern right whale migration (mid-May to September; Section 4.8.16) and the humpback whale northern migration (north from June to August; south from September to November; Section 4.8.16). Blue whales are most likely to be present during November and December (Section 4.8.16) so that planned activities are less likely to affect blue whales. However, the nearest BIA for southern right whales is largely restricted to Victorian state waters, outside of the Operational ZPI. The nearest BIA for humpback whales, along the NSW coastline, lies outside of the Operational ZPI. The BIA for the pygmy blue whale overlaps with the Operational ZPI and straddles the VIC/P70 operational area (Section 4.8.2). Physical impact by individual whales to hydrocarbon exposure is unlikely to lead to any long-term impacts (Table 6-47). Given the mobility of whales, only a small proportion of the migrating population would surface in the affected area, resulting in a Category 3 (Medium) for an extended LOWC (Section 5).

Environment	Type	Exposure Evaluation	Consequence Evaluation
	Commercial and recreational fisheries	In-water exposure to entrained hydrocarbons may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets, which can have economic impacts to the industry. Several commercial fisheries may operate in the affected area and overlap the spatial extent of the water column hydrocarbon predictions.	Any acute impacts resulting from entrained hydrocarbon exposure above NOEC threshold is expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. Any exclusion zone established around a spill location would be limited to the immediate vicinity of the release point, and due to the rapid weathering of condensate would only be in place 1-2 days after release, therefore physical displacement to vessels is unlikely to be a significant impact. Tainting occurs at much higher exposure levels, further limiting exposure risk, while fish tainting is largely reversible (Section 6.28.2.4). Also see above: fish & sharks, and Invertebrates. The potential impacts to commercial and recreational fisheries are considered to be less than a Category 3 (Medium) for an extended LOWC (Section 5).
	Recreation and tourism	Tourism and recreation is also linked to the presence of marine fauna (e.g. whales), to a number of nature areas that are frequented by tourists, and to recreational fishing.	Any impact to receptors that are of interest to nature-based tourism (e.g. whales, recreational fishing, natural parks and reserves) may cause a subsequent negative impact to recreation and tourism activities. The potential impacts to whales, recreational fisheries and impacts to nature are described above and were assessed to be less than a Category 3 (Medium) for an extended LOWC (Section 5).
In-water gas exposure			
Ecological	Plankton Marine Invertebrates Marine Reptiles Fish and Sharks Seals Cetaceans	Gas released at the seabed will rapidly dissipate through the water column with only temporary and minor water quality reduction. The rapid rise of gas to surface in a LOWC event will release gas to the atmosphere rather than being trapped at depth in the water column. A portion will remain in the waters near the gas plume, but this would not be expected to result in significant oxygen depletion given surrounding waters are generally well mixed.	Low-oxygen conditions could threaten small marine organisms (e.g. plankton, fish larvae, and other creatures that can't roam large distances). These are a vital link in the food chain. However, given the well mixed and relatively shallow (359 – 665 m) surrounding waters, this is not considered likely to occur on a broader scale. Consequently, the potential impacts and risks to marine fauna from a LOWC event are considered to be Category 3 (Medium) at most for an extended LOWC (Section 5), as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

6.32.4 Controls

An approved WOMP, in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 will be in place prior to the start of drilling activities. This WOMP demonstrates how the integrity of wells is maintained by ensuring that risks to well integrity are reduced to as low as reasonably practicable. '

Esso's OIMS Framework, as described in Section 0, establishes expectations for addressing risks inherent in the business and ensuring hazards are safely controlled. OIMS Systems 5-1 (Personnel Selection, Training and Competency) and 10-2 (Emergency Preparedness and Response) contribute to the control of this risk.

- Compliance with an approved Well Operations Management Plan (WOMP); this includes:
  - Selection of mud weights to balance the well
  - Pressure and mud return monitoring
  - Cementing and cement test to confirm casing integrity
  - Casing design
  - Presence of two barriers to the reservoir at all times
  - Training and competency of personnel involved with the well
  - Well designed in accordance with ExxonMobil Standards for well control
  - Emergency Response and Well Control Contingency plans
- Compliance with an approved Safety Case; this includes;
  - Well design reviewed and approved
  - Maintained and operational BOP installed on well head prior to drilling the bottom section
- Well control equipment is maintained and tested per Esso Australia OIMS requirements and MODU Maintenance Procedures (see D-180: Well control readiness checklist; and D-210: Rig inspection report; Table 8-1).
- Project specific Oil Pollution Emergency Plans (OPEP), Operational and Scientific Monitoring Plan (OSMP) and Emergency Response Plans (ERP) have been developed, including procedures for oil spill response, the mobilisation of a capping stack and for the drilling of a relief well.
- OIMS System 10-2 (Emergency Preparedness and Response) ensures effective emergency preparedness and response plans are in place, which provide for well-maintained equipment and trained personnel and oil spill equipment is appropriately maintained.

All well control incidents will be managed using Ocean Monarch Well control procedures as outlined in the Ocean Monarch Safety Case, in the VIC/P70 Well Operations Management Plans (WOMP), the VIC/P70 Safety Case Revisions and the Ocean Monarch Well Control Bridging Document (Bridging documentation to Esso well control procedures). The MODU response plans for well control will also be applied in the event of a LOWC.

In the event of a LOWC occurring, spill response measures will be activated in accordance with the VIC/P70 OPEP, OSMP and WOMP, which includes measures for controlling the well (source control) and managing impacts of the spill.

Personnel involved in the operation of a MODU (including wellbore integrity testing) are required to have specific training and competencies (RCs, Required Competencies) appropriate for that facility.

Drilling activities are subject to stringent safety measures, including pressure monitoring and testing as part of routine drilling activities.

Esso maintains spill response capability for responding in the event of a spill, which is outlined in the OPEP and considers timeframes to mobilise and stage a response. These complement MODU procedures, which form part of the safety case (Section 3.4.10). In accordance with OIMS System 10-

2, emergency response procedures are activated when required, which includes bringing the facility back into a safe state where possible.

6.32.5 Risk Ranking

The consequences of a LOWC are High (I), as it may lead to localised, medium term, significant adverse effects. This results from a medium term duration, moderate impact, high intensity, moderate irreplaceability, and of moderate influence. Probability is very highly unlikely (E). However, LOWC is a primary concern for stakeholder as an event could impact their livelihoods and amenities.

Likelihood	Consequence	Risk Ranking
E	I	3

6.32.6 Demonstration of ALARP

Drilling and well intervention is a standard offshore activity. The risks associated with a loss of well control are well understood. The consequences of a LOWC are High (I). Consequently, ALARP Decision Context C should be applied.

MODU operation in accordance with an approved Safety Case, drilling in compliance with an approved WOMP and emergency response procedures as described in the OPEP, ERP, WOMP and OSMP, are considered sufficient control measures to reduce the impacts and risks associated with this hazard to ALARP, in accordance with Section 5.2 as the nature of this risk is well understood, the activity is a well-established practice and the residual risk resulting from this activity is considered to be medium (Category 3).

Other controls, such as adding a third level of well control barriers or running multiple BOP stacks could be implemented, however the BOP stack already has multiple barriers with redundancy specifically designed to reduce the risk to ALARP (refer to WOMP).

The existing controls, the regime for function testing, together with the procedural safeguards during operations, as accepted by the regulatory authorities through the Well Operations Management Plan (WOMP) and the Ocean Monarch Safety Case Revision, incorporate industry best practice for well control. As part of the preparation of the WOMP, emergency intervention procedures have been evaluated by WWC (WWC 2017a). This evaluation included means of well intervention, the drilling of a relief well, and the installation of a capping stack. WWC findings are summarised in the WOMP.

In the unlikely event of a spill, Esso's well-practiced oil spill response systems would be activated (per the OPEP and source control procedures; Chapter 7) and the impacts minimised.

KEF within the affected area and risks associated with a potential spill event are identified in Section 4.8.1. No further stakeholder concerns have been raised on RA28. Adequate controls are in place to manage associated impacts to ALARP (Section 6.32.4). No further evaluation against the principles of ESD is required. On this basis Esso considers the risk to be ALARP.

6.32.7 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 3 medium risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 7.1.6.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-49.

Table 6-49 RA 28: Environmental performance outcomes, standards and measurement criteria - Unplanned Events – Loss of Well Integrity

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
28	Accidental Release – Loss of well integrity	Unplanned loss of containment of reservoir fluids.	No release of condensate or gas to the marine environment as a result from a LOWC.	Well Design	Drilling procedures consider well design, drilling fluid selection, and formation pressures to ensure that there are two barriers in the well at any time during drilling. Well procedures signed off at appropriate level of management.	Well-specific drilling procedure has been signed off by the drilling manager. Supplementary drilling procedures signed by drilling superintendent. Changes to the approved procedures are managed by MOC (Section 8.9.2).	Operations Superintendent
				Esso approved drilling operations procedures in place	Drilling procedures consider well design, drilling fluid selection, and formation pressures to ensure that there are two barriers in the well at any time during drilling.	Approved drilling procedures are available on site and distributed to Esso and Diamond rig leadership. Daily reports confirm that these procedures are followed	Operations Superintendent
				Evaluation of reservoir properties	Risk profiling, well design, and construction are peer reviewed and approved by management. Each well is subject to this process and requires that a well proposal and formation evaluation program is completed.	Well proposal, including formation evaluation program, is reviewed and endorsed by drilling and business line management.	Engineering Manager
				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 WOMP details well barriers and the integrity testing that will be in place for the program. The VIC/P70 WOMP describes Esso's minimum requirements for well barriers during operations. Specifically, it requires:	A NOPSEMA approved WOMP is in place before the start of drilling activities	Engineering Manager

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					• Minimum of two independent tested barriers • Barrier integrity is verified upon installation and at periodic intervals • Suspension of operations if barrier fails resulting in fewer than two independent barriers remaining in place. API Standard 53 is an industry-developed standard that describes the recommended LOWC equipment required to be implemented for a drilling program.		
				Diamond Planned Maintenance System for BOP	PMS ensures that BOP and control systems are maintained, to enable reliable performance.	Records show routine completion of maintenance in accordance with preventative maintenance system (PMS)	Diamond Operations Manager
				BOP testing	BOP is tested before deployment on each well	Records show that BOP has successfully passed BOP test prior to deployment of the BOP and subsequent tests as per WOMP	
				Training & competency	Competencies of Esso Drilling Supervisors is tracked and training plans are established to ensure closure of any overdue refresher training as soon as practicable.	Training records shows that Esso drilling supervisors have the required competencies and there is a plan in place to address any RC gaps.	Operations Superintendent
			Minimise the impact on the environment as a result from a LOC	Emergency Response Preparedness	Emergency response capability will be maintained in accordance with EP, OPEP and related documentation.	Outcomes of internal audits and exercises demonstrate preparedness.	Operations Superintendent
				OPEP	Under the OPGGSE Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOWC, the OPEP will be implemented.	An approved OPEP is in place before the start of field activities.	Operations Superintendent
						Records confirm that emergency response activities have been implemented in accordance with the OPEP	Offshore Risk, Environment & Regulatory Supervisor

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
					The OPEP shall be tested in accordance with the OPGGSE Regulations.	Records indicate tests undertaken in accordance with the schedule given in the approved EP (Section 8.8).	Operations Superintendent
					Esso shall maintain a full time emergency response capability for the duration of the drilling activities	IMT roster. Training records current in relation to oil spill response.	IMT
					In the event that initiation criteria for MES activities are triggered, MES shall be undertaken within the timeframes specified in Table 7-7. • MES activities shall continue until termination criteria are met.	Pre-drill oil spill response audit confirms that minimum performance standards (Table 7-7) are achievable. Pre-mobilisation audit and ongoing audits confirm that measures identified in Section 7: Emergency Response Planning are met for the duration of the campaign. In the event of an incident, Daily logs of response activities prepared by IMT show that minimum time frames for response are met.	IMT
					The IMT shall be capable of mobilising to the Melbourne Office within two hours of notification Key personnel in the IMT shall have adequate expertise in their designated role.	IMT contact phone numbers checked. In the event of an emergency, records show that the IMT convened within 2 hours.	IMT
						Records show that key personnel in the IMT have adequate experience in their role.	IMT
				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	Emergency Management Team (EMT) Incident

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
						with the OSMP	Controller (IC)
				Relief well	Well Relief Plan (blowout contingency plan) prepared that includes the location and well path design as well as dynamic kill modelling. In the event, relief well drilled within timeframes defined in Section 7.5 of this EP (Source Control). Defined in the VIC/P70 Tier II/III Emergency Response Plan.	Relief well surface location is selected, well path developed and dynamic kill modelling completed prior to spud of VIC/P70 exploration wells. Tier II/III emergency response plan is in place, detailing preparation and drilling of a relief well. Status and location of suitable relief well rigs is confirmed within 30 days of first well spudding. APPEA Mutual Assistance Agreement in place. Records show that relief well was drilled as soon as reasonably practicable but within timeframes defined in Section 7.5: Source Control.	Operations Superintendent
				Capping Stack	A source control methodology as per WOMP is in place that meets the expectations defined in Section 7.5 of this EP (Source Control). Defined in the VIC/P70 Tier II/III Emergency Response Plan.	Records show that capping stack Interface with BOP and wellhead has been completed prior to first well spudding. Plume modelling of gas release has been completed prior to first well spudding. SFRT agreement in place. Tier II/III emergency response plan is in place, detailing call-off and deployment of the capping stack. Status and location of suitable	

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
						capping stack installation vessels confirmed within 30 days of first well spudding. Capping stack was installed as soon as reasonably practicable but within timeframes defined in Section 7.5: Source Control.	
					Contract with well control specialist (WWC/OSRL) for the duration of the drilling campaign	Records show that a contract is in place with well control specialists for the duration of the drilling campaign	

6.33 Accidental Release - Mooring failure/Emergency Disconnect (RA 29)

6.33.1 Hazard

In the unlikely event of a mooring failure or emergency disconnect (e.g. during heavy weather conditions) at a time when drilling was occurring, the MODU could drift off its position, requiring the riser to be disconnected from the BOP to maintain well integrity (Section 3.4.10). The emergency disconnect would lead to a loss of containment from the riser which could reduce water quality and potentially cause toxicity to marine species. The BOP is configured with autoshear / deadman functionality which is a safety feature that automatically closes the blind shear rams if all electrical and hydraulic pressure communication between the pod and the receiver manifolds is interrupted.

6.33.2 Impact Assessment

As described in Section 6.18 and 6.19, WBM and drilling fluids used during the VIC/P70 exploration drilling campaign are low toxicity fluid, so that impact from such release are considered negligible. In the event the riser is disconnected then a release of WBM and drilling fluids would occur.

There are no KEF within the potentially affected area. No stakeholder concerns have been raised on RA29. No further evaluation against the principles of ESD is required.

6.33.3 Controls

- As described by NOPSEMA (2015), the API Recommended Practice 2SK: Design and Analysis of Station keeping Systems for Floating Structures (API RP, 2005) is common industry practice for MODUs operating in Australian waters. Specifically, this recommended practice describes the approach for designing mooring systems.
- ISO 19901-7:2013: Station keeping systems for floating offshore structures and mobile offshore units (ISO 19901-7, 2013) states that mooring line tensions should be measured and recorded during normal operations to ensure that drag is reduced.
- Use of low toxicity constituents (WBM and drilling fluids), which meet Esso's chemical selection procedure (Section 8.9.1). This Risk Control Practice requires that new chemicals must be approved prior to use. This practice assesses chemicals that have the potential to be discharged to the environment (i.e. not household chemicals) to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application (see RA 14 & 15).

6.33.4 Risk Ranking

Likelihood	Consequence	Risk Ranking
E	IV	4

6.33.5 Demonstration of ALARP

The ability to maintain position is critical for drilling activities and hence the highest level of control has been applied. In addition to this, a trained operator must be continuously monitoring the system and prevent a need for emergency disconnect resulting in loss of riser drilling fluids.

The volume of WBM that would be released is based on the length of the riser which is determined by the water depth and therefore cannot be reduced. The volume is already limited as the shear rams would prevent additional fluids released from the well and all drilling systems are shut down before disconnect is activated. On this basis Esso accepts the risk to be ALARP.

6.33.6 Demonstration of Acceptability

For this hazard the residual risk was assessed at Category 4 low risk. As all relevant standards (Esso, Australian Standards and Industry best practice) have been met and there were no valid claims or objections to this risk from relevant persons, Esso considers the impacts and risk are acceptable in accordance with the criteria defined in Section 7.1.6.

The environmental performance outcomes and environmental performance standards for the controls above are given in Table 6-50.

Table 6-50 RA 29: Environmental performance outcomes, standards and measurement criteria - Unplanned Events – Mooring Failure (RA29)

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
RA 29	Mooring failure/ Emergency Disconnect	Unplanned loss of containment of drilling fluids	No release of drilling fluids to the marine environment as a result of mooring failure/Emergency Disconnect	Mooring analysis.	Mooring analysis will be undertaken before anchoring, as required by API RP 2SK Design and Analysis of Station keeping Systems for Floating Structures	Mooring analysis report shows mooring analysis was completed before anchoring commenced and records indicate mooring/anchoring undertaken as per the mooring analysis report.	MODU OIM
				Tension monitoring and station keeping	Anchor slipping / tension monitoring will be undertaken as per ISO 1990 1-7:2013 while the MODU is anchored.	Mooring records confirm anchor slipping / tension was monitored while the MODU was anchored.	MODU OIM
			Minimise the impact on the environment as a of mooring failure/Emergency Disconnect	Low toxicity drilling chemicals used.	Only CHARM gold / silver or OCNS E / D rated chemicals or equivalent are approved for use where discharge may occur.	List of approved chemicals for discharge available to the onsite drilling supervisor.	Drilling Supervisor
						Any changes in approved chemicals approved in accordance with Esso chemical selection procedure.	

6.34 Impacts resulting from Spill Response Strategies (RA 30)

6.34.1 Hazard

Table 6-51 lists the values and sensitivities within and near the Operational ZPI (Figure 4-1), based upon the modelling outcomes for both spill events described in Section 6.28 (vessel collision) and Section 6.32 (LOWC event) ; to support response planning in the event of a spill. No shoreline contact is predicted, so that no formal protection priorities were identified. However, Esso has sufficient capability to respond to the worst-case shoreline as part its Gippsland Basin operations. The information provided in Table 6-51 would support activation of operational and scientific monitoring programs in the event of a worst-case spill event.

6.34.2 Impact Assessment

The sensitivities within and near the Operational ZPI that may be impacted by spill response activities are summarised in Table 6-51. Associated impacts are as described for planned drilling activities:

Source Control

As described in Section 6.32 and Chapter 7, source control to respond to a LOWC emergency event may include drilling a relief well and deploying a capping stack. The potential impacts and risks associated with performing these activities is covered in Chapter 6, and thus are not considered further.

Monitoring, Evaluation and Surveillance (MES)

Specific risks associated with MES include:

- Localised and temporary fauna behavioural disturbance that significantly affects migration or social behaviours;
- Auditory impairment, Permanent Threshold Shift (PTS).
- Physical interaction with marine fauna.

Oiled Wildlife Response (OWR) Impact Evaluation

Although OWR activities have the potential to generate environmental aspects, the potential impacts and risks associated with physical interaction with marine fauna are evaluated in Section 6.13 (Interaction with fauna). Based upon the nature and scale of the activities, and the low likelihood for OWR, the evaluation is considered appropriate for any physical interaction with marine fauna, and thus has not been considered further in this Section. See OPEP Section 7.2.1 for further details.

6.34.3 Controls

Emergency response planning is outlined in Chapter 7. Well-related source control activities (RA 28) may range from:

- ROV intervention utilising specialist ROV tooling; and/or
- Well capping; and/or
- Relief well installation.

The potential impacts and risks associated with performing these activities is covered under the aspects evaluated in this EP (Sections 6.1 to 6.18), and thus are not considered further.

Source control arrangements for LOC from vessel failures (RA 24) includes:

- Closing water tight doors;
- Checking bulkheads;
- Determining whether vessel separation will increase spillage;
- Isolating penetrated tanks;
- Tank lightering, etc.

Implementation of source control for vessels is detailed within the below documents, and is not discussed further:

- Vessel-specific Shipboard Oil Pollution Emergency Plan (SOPEP)
- National Plan for Maritime Environmental Emergencies (NationalPlan)

Table 6-51 List of values and sensitivities identified within and near the Operational ZPI (RA30)

Sensitivity	Distance and direction from Baldfish wells	Distance and direction from Sculpin-1 well	Actionable thresholds (Operational ZPI Figure 4-1)	Environmental Monitoring ZPI* (Figure 4-2)	Values and Sensitivities
Upwelling East of Eden (KEF)	~22 Km NE	~33 km NE	Y	Y	• KEF associated with 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
Big Horseshoe Canyon (KEF)	~80 Km NE	~65 km NE	Y	Y	• KEF associated with high productivity and aggregations of marine life • The Big Horseshoe Canyon is the easternmost arm of the Bass Canyon System • The steep, rocky slopes provide hard substrate habitat for attached large megafauna. • Sponges and other habitat forming species provide structural refuges for benthic fishes, including the commercially important Pink Ling • It is the only known temperate location of the stalked crinoid *Metacrinus cyanea*
Beware Reef Marine Sanctuary	>90 km NE	~98 km N	N	Y	• State marine protected area, IUCN Category II • Indigenous heritage associated with the Bidwell and Gunai-Kurnai Indigenous people • Maritime heritage including three steamship wrecks (Auckland, Ridge Park and Albert San) • The sanctuary is in Tourism Victoria's Destination Gippsland marketing and promotion for the East Gippsland region • Range of habitats, including subtidal and intertidal reefs, exposed reefs and subtidal soft sediment; with coverage including soft corals, sponges and Bull Kelp • Haul-out area for Australian and New Zealand Fur-seals • Diverse range of fish, invertebrate, mammal and bird species

Sensitivity	Distance and direction from Baldfish wells	Distance and direction from Sculpin-1 well	Actionable thresholds (Operational ZPI Figure 4-1)	Environmental Monitoring ZPI* (Figure 4-2)	Values and Sensitivities
Point Hicks Marine National Park	109 km NE		N	N	• State marine protected area, IUCN Category II • Indigenous heritage associated with the Bidwell and Gunai-Kurnai Indigenous people • Maritime heritage including two steamship wrecks (Kerangie and Saros) Range of habitats, including subtidal and intertidal reefs, subtidal soft sediment and sandy beaches; with coverage including brown macroalgae, sponges, and soft corals • Very high diversity of fauna, including intertidal and subtidal invertebrates, marine mammals (whales, dolphins, pinnipeds), birds
Southern Right Whale BIA	>90 km N		N	Y	• Biologically important areas, including calving and aggregation areas, within the South-east Marine Region have been identified • Southern right whales regularly aggregate for breeding and calving off Warrnambool, Victoria, with calving areas tending to be very close to the shore
Humpback Whale BIA	180 Km NE		N	Y	• Humpback feeding has been observed close to shore off Eden, New South Wales, from late September until late November (SPRAT 2013a).
Pygmy Blue Whale BIA	Overlaps		N	Y	• The South-east Marine Region is an important migratory area for the pygmy blue whale and also provides one of the most significant feeding aggregation areas for blue whales in Australian waters. • The Bonney Upwelling and adjacent waters off South Australia and Victoria are the most important feeding areas. (November to May). • Pygmy blue whales predominately occupy the western area of the Bonney Upwelling from November to December, and then expand south-east during January to April,
Beagle CMP	129 km SW	140 km SW	N	Y	• Beagle CMP is a shallow reserve that surrounds a collection of Bass Strait islands. T • Support a rich array of life, • Provides homes and feeding grounds for seabirds, little penguins and Australian fur seals. • Located near the Hunter group of islands which is an important breeding area for the fairy prion, shy albatross, silver gull, short tailed shearwater, black faced cormorant, Australian gannet, common diving petrel and little penguins.
Great White Shark Breeding BIA	<15 km		N	Y	• The nearshore region from Corner Inlet to Lakes Entrance is one of three identified residency regions in Australia for juvenile Great White Sharks • Sharks will aggregate in this area seasonally

Sensitivity	Distance and direction from Baldfish wells	Distance and direction from Sculpin-1 well	Actionable thresholds (Operational ZPI Figure 4-1)	Environmental Monitoring ZPI* (Figure 4-2)	Values and Sensitivities
East Gippsland CMP	116 km	98 km	N	Y	• Commonwealth marine protected area, IUCN Category VI • Ecosystems, habitats and communities associated with the Southeast Transition, and associated with the sea-floor features including abyssal plain/deep ocean floor, canyon, escarpment and knoll/abyssal hillslope • Features with high biodiversity and productivity: Bass Cascade; Upwelling East of Eden • Important foraging area for the Wandering, Black-browed, Yellownosed and Shy Albatrosses, Great-winged and Cape Petrels, and the Wedge-tailed Shearwater • Important migration area for the Humpback Whale
Gabo Island	167 km	161 km	N	Y	• Significant breeding colony (possibly largest in world) for the Little Penguin • Breeding colony for Short-tailed Shearwaters • Foraging area for a number of birds including the White-belled Sea Eagle • Marine mammals regularly sighted off Gabo Island, including Southern Right Whales, Humpback Whales and Killer Whales; and the Common and Bottlenose Dolphins • Australian and New Zealand Fur-Seals are also often seen basking on the rocks surrounding the island
Cape Howe Marine National Park	171 km NE	165 km	N	Y	• State marine protected area, IUCN Category II • Indigenous heritage associated with the Bidwell Indigenous people • The sanctuary is in Tourism Victoria's Destination Gippsland marketing and promotion for the East Gippsland region • Range of habitats, including subtidal and intertidal reefs, subtidal soft sediment and sandy beaches; with coverage including kelp forests, sponges, and soft corals • Foraging area for significant colony of Little Penguins • Humpback Whales pass by Cape Howe on their migration from Antarctica • Diverse range of invertebrates, mammals (whales, dolphins, pinnipeds) and birds

* The Environmental Monitoring ZPI is defined in Section 4.2, and is based on the ANZECC Criteria for entrained hydrocarbons (Section 6.28.2.4).

The controls that relate to response strategies are summarised in Table 6-52 and include:

- Esso maintains capability to implement operational monitoring in a Level 2 or 3 spill event.
    - Agreements: AMOSC membership, AMSA MoU, Aviation support, Marine support services
    - Oil Spill Tracking Buoys
- As requested by the relevant CA, Esso implements operational monitoring to inform spill response (Level 2 or 3 spill only). Key tools include:
    - Oil Spill Tracking Buoy Deployment
    - Response - Observation
    - Oil Spill Trajectory Modelling
    - Response – Oil Spill Vector Calculation
- Esso maintains capability to implement its VIC/P70 Blowout Contingency Plan (part of WOMP). For this, it has access to Well Response Resources (Well Control Specialists, including capping stack capability); ROV Contractors; Subsea Engineering Company; Well Engineering Contractor; APPEA Mutual Assistance Agreement, SFRT agreements with AMOSC.
- Implement VIC/P70 Blowout Contingency Plan:
    - Level 2 Response:
        - Inspection class ROV
        - SFRT
    - Level 3 Response:
        - Well control specialists
        - Capping stack installation
        - Relief Well
- Esso maintains capability to support oiled wildlife management in a Level 2 or 3 spill event.

Esso provides resources to support oiled wildlife response strategies as directed by DELWP.

6.34.4 Risk Ranking

The risks evaluation for emergency response tools are outlined in Chapter 7. The environmental risks associated with emergency response are largely addressed under the risks for planned drilling operations.

- Table 7-2: Response technique evaluation for MDO Spill
  Risks are as per project activities: Noise, Vessel collisions, Spills etc. (as described in Chapter 6)
- Table 7-3: Response technique evaluation for Loss of Well Control
- Table 7-20: Response technique evaluation for Source Control
  Risks are as per drilling activities (Discharge of drill cuttings, cement, drilling fluids, bunkering, noise light, etc.) – no additional controls

6.34.5 Demonstration of ALARP

To demonstrate that the impacts and risk associated with response strategies have been reduced to ALARP, in accordance with Section 5.2, other controls and alternatives were considered as summarised in Chapter 7.

Modelling shows that shoreline contact is not expected to occur after a spill, either resulting from a major collision or from a LOWC event (Section 6.28.3 and 6.32.3). Therefore no specific shore-based contingencies will be in place for the VIC/P70 campaigns, other than those already in place as part of Esso operations in Bass Strait.

There were no further alternatives identified to the response strategies as they are defined in Section 7 and the OPEP. On this basis Esso considers the risk to be ALARP.

6.34.6 Demonstration of Acceptability

Details of Esso's capability to mount a suitable spill response is included in Chapter 7, the OPEP and OSMP.

The response strategies, as detailed in Chapter 7, are consistent with standard industry practice. This includes:

- Having a well-resourced response team, equipment, resources and logistics for industry to consult with relevant authorities on spill plans in line with the "Polluter pays" principle in the OPGGS Act and 'consultation' principles in the OPGGSE Regulations.
- Isolating the spill source by means of transfer, shut-in, dynamic kill, drilling a relief well.
- Establishing exclusion zones (which are commonly established for any emergency operations).
- Developed procedures as part of the WOMP for the mobilisation of a second MODU in case the drilling of a relief well is required.
- Simultaneously, establish procedures as part of the WOMP for the mobilisation of a capping stack in order to further minimise the environmental impact from a potential LOWC.

Esso considers the impacts and risks of response strategies are acceptable in accordance with the criteria defined in Section 5.2.2.

Table 6-52 RA 30: Response Strategies Impact and Risk Evaluation

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
Unplanned Events							
30	Monitor and Evaluate	LOWC emergency event may include Monitor and Evaluate	Esso maintains capability to implement operational monitoring in a Level 2 or 3 spill event.	Agreements/pre-qualifications	Esso maintains the following agreements (or contractor pre-qualifications) to maintain operational response capabilities: • AMOSC membership (Aerial Observers, RPS-APASA Contract). • AMSA MoU. • Aviation support (prequalification assessment) • Marine support services	Contracts/ memberships/ Memorandum of Understanding (MoU) and pre-qualification records are current.	IMT
				Oil Spill Tracking Buoys	Oil spill tracking buoy is readily available for deployment, as well as instructions for deployment.	Records confirm that tracking buoy is available onboard MODU or support vessel, as well as at heliport	Operations superintendent
			Esso implements operational monitoring in accordance with OSMP to inform spill response (Level 2 or 3 spill only).	Oil Spill Tracking Buoy Deployment	Oil spill tracking buoy is launched in the event of a Level 2/3 spill as soon as practicable but within 2 hours of the spill.	Incident management records verify that tracking buoy is deployed within suitable timeframe in the event of a Level 2 spill.	IMT Leader
				Response – Observations from aircraft / vessels	Operational monitoring is initiated during daylight hours within 24 hrs for aircraft observation and 24 hrs for additional vessel. Observation to be undertaken in accordance with OSMP O1 (Oil Spill Surveillance).	Spill response log notes that aircraft are deployed within 24 hours of spill (or nearest daylight hours immediately post 24 hours). Completed Aerial Observation Logs (as per OSMP O1) emailed to IMT.	Oil Spill Incident Controller (or delegate)
				Oil Spill Trajectory Modelling	RPS-APASA provides OSTM results within four hours of spill notification in accordance with OSMP O1 (Oil Spill Surveillance).	Incident records verify operational monitoring timeframes met.	Oil Spill Incident Controller (or delegate)
				Response – Oil Spill Vector Calculation	Manual vector calculations identify spill impact areas utilising oil spill tracking buoy information within 1 hr of spill incident notification.	Spill response log verifies manual trajectory calculation is provided within 1 hr of spill notification.	Oil Spill Incident Controller (or delegate)

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
			Esso implements scientific monitoring in accordance with OSMP to monitor impacts (Level 2 or 3 spill only).	Scientific Monitoring capabilities	Scientific monitoring is executed in accordance with the modules laid out in OSMP implementation strategy	Records confirm that execution of scientific monitoring is accordance with the modules laid out in OSMP implementation strategy.	Oil Spill Incident Controller (or delegate)
				OSMP Module S2	Module S2 'reactive' baseline data collection for intertidal sediments and water is commenced within 7 days, if initiation criteria are triggered.	Records confirm 'reactive' baseline data collection commenced within 7 days	Planning Section Chief (or delegate).
				OSMP Module S3	Module S3 'reactive' baseline data collection for offshore sediments is commenced within 7 days, if initiation criteria are triggered.	Records confirm 'reactive' baseline data collection commenced within 7 days	Planning Section Chief (or delegate).
	Source Control	LOWC emergency event may include drilling a relief well and deploying a capping stack	Esso maintains capability to implement its VIC/P70 Blowout Contingency Plan (part of WOMP)	Well Response Resources	Esso maintains the following agreements (or contractor pre-qualifications) to maintain source control capabilities: • Well Control Specialist (including capping stack capability) • ROV Contractors. • Subsea Engineering Company. • Well Engineering Contractor; • APPEA Mutual Assistance Agreement	Contracts/ agreements demonstrate preparedness.	Operations superintendent
					Esso conducts a source control desktop exercise before start of drilling operations (Table 8-12).	Facilitated by third party with report issued in 30 days.	Operations superintendent
			Implement VIC/P70 Blowout Contingency Plan	Level 2 Response	Inspection class ROV is mobilised to the field within 7 days of callout to identify possible causes of the wellhead leak.	Incident log verifies field mobilisation within this timeframe.	IMT Leader
					If considered suitable option, work-class ROV, subsea tooling and subsea engineer mobilised to site within 7 days to initiate repairs to wellhead valving (as required).(Table 7-12).	Incident log verifies field mobilisation within this timeframe.	IMT Leader

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				Level 3 Response	Well control specialists are mobilised to site within 1-2 days to assist with the diagnosis of the well problem and develop remedial action options (Table 7-10).	Contract call-out notice date and report from Well Control Specialist company verifies timeframe.	IMT Leader
					Capping stack: If considered a suitable option, capping equipment and deployment vessel is mobilised to the field within 23 days of well incident and well capping undertaken in accordance with the Capping Plan within 38 days of the equipment arriving in the field. (Table 7-13)	Contract call-out notice date and report from capping company verifies timeframe	IMT Leader
					Relief Well: Relief well installation will be in accordance with the relief well plan and is expected within 10(HLV; Table 7-18) – 12.6 weeks (wet tow; Table 7-19) of well incident occurring	Contract call-out notice date and report from MODU company verifies timeframe	IMT Leader
	Oiled Wildlife Response	LOWC emergency event may include Oiled Wildlife Response	Esso maintains capability to support oiled wildlife management in a Level 2 or 3 spill event.	Oiled Wildlife response capabilities	Esso maintains the following agreements to maintain OWR response capabilities: • AMOSC membership (equipment, personnel). • Waste management contract. • Vessel Contract; • Vessel of Opportunity listing	Contracts/memberships verify currency of membership.	IMT
			Esso provides resources to support oiled wildlife response strategies as directed by DELWP.	Notifications	DELWP is notified as soon as possible after the sighting of oiled wildlife has occurred.	Incident management records verify that verbal and/or written notification was provided to DELWP as soon as possible after the sighting was noted.	Oil Spill Incident Controller
				OWR kits availability	AMOSC OWR kits are deployed to site within timeframes as directed by DELWP.	Incident records verify oiled wildlife response kits are deployed to site as directed by DELWP.	Oil Spill Incident Controller

RA	Activity	Hazard/Aspect	Performance Outcomes	Controls	Performance Standards	Measurement Criteria	Responsible Person
				OWR resourcing	Esso meets DELWP resourcing needs throughout the response, meeting IAP performance outcomes.	Incident log verifies resources requested by DELWP met required IAP outcomes for oiled wildlife response.	Oil Spill Incident Controller
			Wildlife is only approached or handled by DELWP trained oiled wildlife responders.	Wildlife interaction inductions	Esso personnel are inducted into wildlife interaction restrictions.	Incident records verify no interaction by Esso personnel and wildlife.	Oil Spill Incident Controller

7 Emergency Response Planning

7.1 Oil Spill Planning Scenario Development

Sections 6.28 and 6.32 presents the oil spill risk assessment for VIC/P70 Exploration drilling. For the purpose of response planning, three representative pollution scenario, one from each response level, were selected for further analysis (Table 7-1).

Table 7-1 Credible spill scenarios identified response planning

Spill Scenario	Max. Spill Volume	Duration	Oil Type	Level
Spill during MODU refuelling (e.g. fuel line/coupling failure, leaks from hoses etc.)	5 m^3	1 Hr	MDO (Diesel)	1
Vessel collision resulting in fuel tank rupture and release of diesel	280 m^3	6 Hrs	MDO (Diesel)	2
Release of condensate from Loss of Well Control	11,000 bbl/day (1,757 m^3/day)	98 days	Condensate	3

The Loss of Well Control (LOWC) represents the worst-case discharge scenario (WCDS) and is used to demonstrate that all reasonable practicable measures to reduce oil pollution risk will be implemented and the adopted oil pollution response control measures and response arrangement detailed in the OPEP will be effective in reducing impacts and risks to ALARP.

7.2 Response Strategy Options

Spill response strategies for each scenario were evaluated. Results are summarised Table 7-2 and Table 7-3, for MDO and VIC/P70 condensate, respectively. As both MDO and condensate are highly volatile and neither of the spills are predicted to hit shoreline at the lowest thresholds, except for the ANZECC reference value for entrained hydrocarbons (see RA24 Section 6.28 and R28: Section 6.32), the primary response strategies for both oil types and all scenarios are limited to:

- Source Control,
- Natural Recovery, and
- Monitoring, Evaluation and Surveillance (MES).

Table 7-2 Response technique evaluation for a 5-280 m^3 Marine Diesel Oil (MDO) spill (NEBA)

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	✓
Natural Recovery	Non-intrusive so no impact to the environment.	MDO degrades rapidly in the open ocean. Natural recovery is therefore a viable option.	Yes	✓
Monitor, Evaluate and Surveillance	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.	Monitoring, Evaluation and Surveillance used to observe the natural break-up and dissipation of 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 animals.	Dispersant application is not recommended for MDO as it spreads rapidly to a thin layer. 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 (see The International Tanker Owners Pollution Federation [ITOPF] Technical Information Paper No. 4: The Use of Chemical Dispersants to Treat Oil Spills). Application of dispersant can contribute to water quality degradation through	Not viable	x

Response Option*	Benefits	Effectiveness on MDO spill	Viable Response?	Net Benefit?
		chemical application without removing surface oil. Considered not to add sufficient benefits.		
Contain & Recover	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**	-
Protect & Deflect	Booms and skimmers deployed to protect environmental sensitivities. Environmental conditions (e.g., current, waves) limit application	The field is sufficiently far from shore that coastline impact is not predicted.	**Not required**	-
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 is ineffective at these thicknesses.	**Not viable**	-
Oiled wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-spill captive management.	Given limited size and rapid spreading of the spill, OWR is unlikely to be required. OWR may be implemented if required. To be assessed on case-by-case basis.	**Not required**	-
Shoreline Clean-up	Last line of defence to remove oil from the marine environment.	The field is sufficiently far from shore that coastline impact is not predicted.	**Not required**	-

* *At ANZECC Reference threshold for entrained hydrocarbons (Environmental Monitoring ZPI), there is the potential for shoreline impact at below NOEC Concentrations (Section 6.28 and 6.32). However, these concentrations are too low for any controls, except MES, natural recovery and source control to be effective.*

Table 7-3 Response technique evaluation for Loss of Well Control scenario

Response Option*	Benefits	Effectiveness on Baldfish Condensate 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**	✓
Natural Recovery	Non-intrusive so no impact to the environment.	Condensate from the VIC/P70 exploration wells weathers rapidly in the open ocean. Natural recovery is therefore a viable option.	**Yes**	✓
Monitor, Evaluate and Surveillance	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.	Monitoring, Evaluation and Surveillance used to observe the natural break-up and dissipation of Condensate from the VIC/P70 exploration wells spill without the need for active intervention.	**Yes**	✓
Surface 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 animals.	Condensate from the VIC/P70 exploration wells is highly volatile and will be removed from the sea surface by evaporation. Dispersant is ineffective on Group 1 oils due to the very low viscosity and high volatility. Moreover, the VIC/P70 well locations are too far offshore for a worst-case spill to pose a threat to the coastline. Application of dispersant can contribute to water quality degradation through chemical application, without removing surface oil. Considered not to add sufficient benefits.	**Not viable**	**x**
Subsea Dispersant Application	Applies dispersant directly to the source, allowing less dispersant to be used. Prevents liquid hydrocarbons from reaching the surface, reducing VOCs at the surface.	The VIC/P70 exploration wells are expected to predominantly gas reservoirs, so a large quantity of dispersant would be required to be effective on the condensate fraction. Modelling shows that only a limited	**Not viable**	-

Response Option*	Benefits	Effectiveness on Baldfish Condensate Spill	Viable Response?	Net Benefit?
		quantity will make it to the surface, with most either entrained or dissolved into the water column (Section6.32.3; APASA 2018) Additionally, due to the distance from shore and low risk of shoreline impact, disadvantages outweigh benefits.		
Contain & Recover	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 VIC/P70 exploration wells is removed rapidly from the surface through evaporation. Suitable thickness for recovery will be present for only a very short period, making contain 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**	-
Protect & Deflect	Booms and skimmers deployed to protect environmental sensitivities. Environmental conditions (e.g., current, waves) limit application	The VIC/P70 exploration wells are sufficiently far from shore that coastline impact is not expected.	**Not required**	-
In-situ burning	In-situ burning (burning oil in place) can quickly eliminate large quantities of spilled oil.	Condensate from the VIC/P70 exploration wells is removed rapidly from the surface through evaporation. Suitable thickness for burning will be present for a very short period, making contain and recovery option ineffective. In Bass Strait sea, conditions likely to be suitable only 50% of the time.	**Not viable**	-
Oiled wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-spill captive management.	Given limited size and rapid spreading of the spill, OWR is unlikely to be required. OWR may be implemented if required. To be assessed on case-by-case basis.	**Unlikely to be required**	-
Shoreline Clean-up	Last line of defence to remove oil from the marine environment.	The VIC/P70 exploration wells are sufficiently far from shore that coastline impact is not expected.	**Not required**	-

* *At ANZECC Reference threshold for entrained hydrocarbons (Environmental Monitoring ZPI), there is the potential for shoreline impact at below NOEC Concentrations (Section 6.28 and 6.32). However, these concentrations are too low for any controls, except MES, natural recovery and source control to be effective.*

7.3 Tactical Response Planning

Anticipated response for the three scenarios are presented in Table 7-4, Table 7-5, and Table 7-6 respectively. The following sections analyses each response strategy in more detail with the objectives of:

(1) ensuring sufficient resources are available to meet the needs of the response;
(2) evaluating effectiveness of each response strategy and level of performance required;
(3) developing environmental performance standards;
(4) exploring options to improve the effectiveness and/or determine the need for any further resources.

Table 7-4 Tactical response for Level 1 spill scenario

Spill Location:	**VIC/P70 well locations**
Duration of spill:	1 hour
Spill description:	Bunkering spill
Volume of oil discharged	<5 m^3
Oil Type:	MDO
Activity	**Anticipated response actions**
Incident management	Incident Command and Response team is established under the leadership of the Incident Commander (IC) (Section 7.3)

	Notifications are made to onshore headquarters and external agencies, in conformity with the OPEP.
Surveillance and assessment	A crew transfer helicopter is mobilised (Table 7-7) and a trained observer makes an initial overflight.

Table 7-5 Tactical response for Level 2 spill scenario

Spill Location:	**VIC/P70 well locations**
Duration of spill:	12 hours
Spill description:	Vessel spill
Volume of oil discharged	280 m^3
Oil Type:	MDO
Activity	**Anticipated response actions**
Source control	Source control is initiated in accordance with the vessel operating procedures.
Incident management	Incident Command and Response team is established under the leadership of the Vessel Master. Notifications are made to onshore headquarters and external agencies in conformity with the vessel SOPEP and Baldfish OPEP. A supporting incident management team is established at Esso's onshore headquarters to aid coordination of response and handle media enquiries.
Surveillance and assessment	**As per OPEP:** **Day 1** • A crew transfer helicopter is released from evacuation duties and a trained observer liaises with the pilot to undertake surveillance activities (Table 7-7). • A tracking buoy can be deployed either from MODU, from a vessel or helicopter (Table 7-7). • Weather forecast is obtained from the Bureau of Meteorology • Desktop trajectory modelling is undertaken ((Table 7-7) • A proprietary oil spill trajectory model is run to provide prediction of slick movement under prevailing and forecast weather conditions ((Table 7-7). • Water and oil sampling is undertaken in accordance with OSMP **Day 2** A schedule of ongoing twice-daily overflights is agreed. After two days that the spill is no longer visible then aerial surveillance is stood down.

Table 7-6 Tactical response for Level 3 spill scenario

Spill Location:	**VIC/P70 Well locations**
Duration of spill:	• 38 days based on VICSS installation (Table 7-13) • 70 days based on HLV mobilisation of Relief well MODU (Table 7-18) • 88 days based on wet tow of Relief well MODU (Table 7-19) Note: spill modelling based on estimated preliminary durations (Section 6.32): • 98 days for drilling of relief well • 49 days for capping stack installation;
Spill description:	Loss of Well Control (LOWC)
Volume of oil discharged *(based on response times in Table 7-13, Table 7-16, Table 7-18 and Table 7-19)*	**Baldfish/Hairtail:** 1,757 m^3/day • 66,765 m^3 before capping stack installation (38 days of release) • 122,98 – 154,613 m^3, based on relief well alone (70 to 88 days release) **Sculpin:** 3,607 m^3/day • 136,859 m^3 before capping stack installation (38 days of release) • 367,942 – 407,622 m^3, based on relief well alone (102 to 113 days release) ***Note**: modelling was based on estimated preliminary durations (Section 6.32):* **Baldfish/Hairtail:** • 172,183 m^3 based on LOWC over 98 days • 86,091 m^3 based on capping stack installation within 49 days **Sculpin:** • 429,266 m^3 based on LOWC over 119 days • 176,476 m^3 based on capping stack installation within 49 days
Oil Type:	Group I (non-persistent)

Spill Location:	VIC/P70 Well locations
Activity	Anticipated response actions
Source control	All operations are shut down and a Well Engineer called in for assistance within 6 hours. Well control consultants from WWC are mobilised and expected on site at the onshore emergency control centre within 24 hours.
Evacuation and fire hazard control	Non-essential personnel are evacuated to the mainland. During the first few hours of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. A shipping exclusion zone of 5 km is established and broadcast.
Well control plan (See Table **7-13**)	**Day 1: Well control plan is activated** The well control plan is activated, including implementation of well capping, backed up by a relief well drilling plan. **Day 7: SFRT mobilised to site** It is estimated that it will take 7 days to mobilise the SFRT from Perth to site and 7 days for small scale debris clearing (Table 7-12), and 30 days to mobilise the capping device for vertical installation from Singapore to site, with the high potential to shut in the uncontrolled well within 38 days (Table 7-13). **Day 23: VICSS on-site** The Vertical Installation Capping Stack System (VICSS) is on site and being deployed (Table 7-13). **Day 38: Well successfully capped** The capping device is functional and at this point no further oil would be spilled. Oil spill response operations continue until the relief well is drilled. **Day 35: Relief well rig on-site (HLV scenario)** It will take approximately 35 days to mobilise relief well MODU to site when using a HLV (Table 7-18), or 51 days for a wet-tow (Table 7-19). A further 35 days are estimated to complete the relief well and kill the well. **Day 70: Relief well successfully completed – effective well kill** Effective well kill is estimated to take 70 days for the HLV scenario (Table 7-18) or 88 days for the wet-tow scenario (Table 7-19). **Day 86: Time to install OICSS** Mobilisation of an offset capping stack system (OICSS) would require 56 days (Table 7-15), and a further 30 days to cap the well, resulting in well shut in after 86 days (Table 7-16). On this basis, use of an offset capping stack scenario is last resort, as well intervention is estimated to take less time.
Incident management	**Day 1** The Incident Management Team (IMT) is assembled at the onshore emergency control centre within 60 minutes of the initial report. Working to an Incident Command System (ICS), the team quickly establishes the key management team sections and undertakes initial procedures in conformity with guiding action checklists in the OPEP. An Incident Action Plan for the next operating period (the following day) is drafted by the end of the day. Notifications to external authorities are made as detailed in OPEP. **Day 2** Relevant authorities embed liaison officers within the IMT and technical support from AMOSC, WWC and OSRL are on site, fulfilling roles within the ICS sections. Corporate company support is en-route via a regional response team, with a view to establishing a sustainable IMT for the coming weeks. A media and public affairs team is established with staffing of 10 persons drawing on corporate support. A website providing incident data directly to the public is live. **Day 3** An ICS planning cycle is fully functional. The IMT is fully staffed, with future support identified to ensure ongoing sustainability. Offers are received from the broader industry to provide technical support personnel; these are held on file and relevant personnel put on alert for potential mobilization if needed. **Day 4** AMOSC and/or OSRL personnel are on site and integrated into the IMT, providing a variety of technical expertise and operational support. **Day 5 onwards** The IMT is regarded as a sustainable entity, with staff rotations in place to ensure all personnel receive an adequate number of rest days.

Spill Location:	VIC/P70 Well locations
Surveillance and assessment	**Day 1** • A crew transfer helicopter is released from evacuation duties and a trained observer liaises with the pilot to undertake an overflight to undertake surveillance activities. • A tracking buoy is stored onboard the MODU or support vessel and deployed within two hours from the MODU, or by a vessel of helicopter. • Weather forecast is obtained from the Bureau of Meteorology • Desktop trajectory modelling is undertaken • A proprietary oil spill trajectory model is run to provide prediction of slick movement under prevailing weather conditions. • Water and oil-sampling is undertaken in accordance with OSMP The authorities have been notified and an AMSA representative accepts an offer to join the overflight. A proprietary oil spill trajectory model is run to provide a prediction of slick movement under the prevailing weather. The BOM provides the latest weather forecasting. **Day 2** A schedule of ongoing twice-daily overflights is agreed, with company and authority representatives on all flights. The contracted aviation company has an adequate number of twin-engined helicopters available. Aerial observations identify oil pollution (Code 1 and Code 2) covering an area of around 20 km^2 containing an estimated 120 m3 of oil. The oil is thinly spread (sheen/rainbow appearance) and evaporating rapidly. **Days 5 and onwards** By agreement, AMSA mobilises fixed-wing dedicated pollution monitoring aircraft (with remote sensing capability). This aircraft provides primary aerial surveillance and pollution-targeting capacity for the remainder of the incident, supplemented by helicopters.
Dispersant	N/A (Table 7-3)
In-situ burning	N/A (Table 7-3)
Containment and recovery	N/A (Table 7-3)
Shoreline protection and clean-up	Not required (Table 7-3)
Wildlife response	Not required (Table 7-3)

7.3.1 Emergency Management and Response System (EMRS)

The chain of command, including roles and responsibilities of personnel undertaking source control during an emergency LOWC response and how these personnel will interface with the incident management team detailed in the OPEP is summarised in the "*Emergency Preparedness and Response Bridging Document: Baldfish / Hairtail Drilling Program*".

This document has been developed to ensure that emergency support responsibilities are defined and agreed between Esso Australia Pty Ltd (EAPL - Emergency Support Group and Incident Management Teams), ExxonMobil Exploration Company (EMEC), and the Esso Australia & PNG Drill Team in support of Diamond Offshore General Company (DOGC, Ocean Monarch). The ExxonMobil Emergency Response Model (Figure 7-1) illustrates how tactical response escalates from a Level 1 to a Level 2 then Level 3 response, each level being absorbed into the next level during transition.

Esso's emergency management and response system is based on the simplified diagram in Figure 7-2. The response structure is designed to cater for any size emergency. The extent to which this structure is used in practice depends on the nature of the particular emergency that may arise. Guidelines are used to help classify the emergency and determine the extent to which the response structure is mobilised.

Esso's Emergency Support Group (ESG) structure is detailed in Figure 7-2. Esso's Incident Management Team (IMT) structure is based on Figure 7-3.

Support from EMDC and DOGC will be requested as necessary to provide advice to other IMT participants fulfilling their response roles.

Refer to "*Emergency Preparedness and Response Bridging Document: Baldfish / Hairtail Drilling Program*" for an overview of the DOGC / Ocean Monarch Emergency Response Framework (extract from DODI "*Australasian Region Emergency Response Manual*").

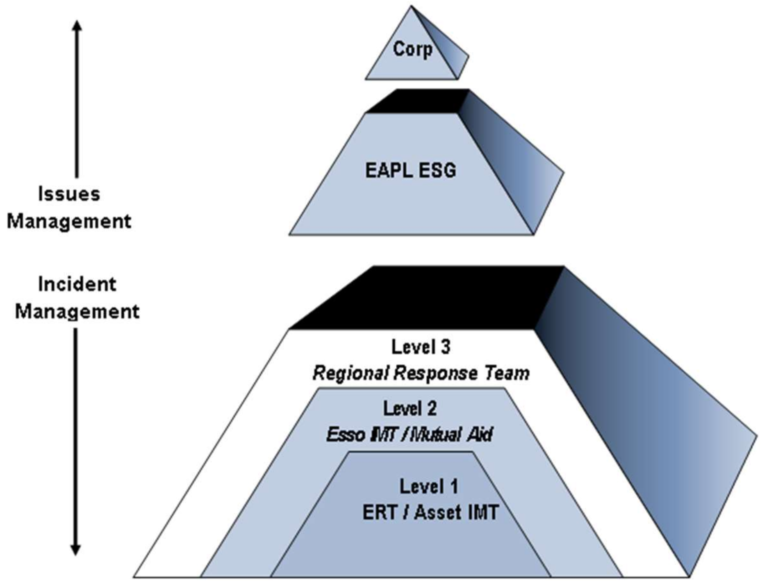


Figure 7-1 Esso emergency management and response system

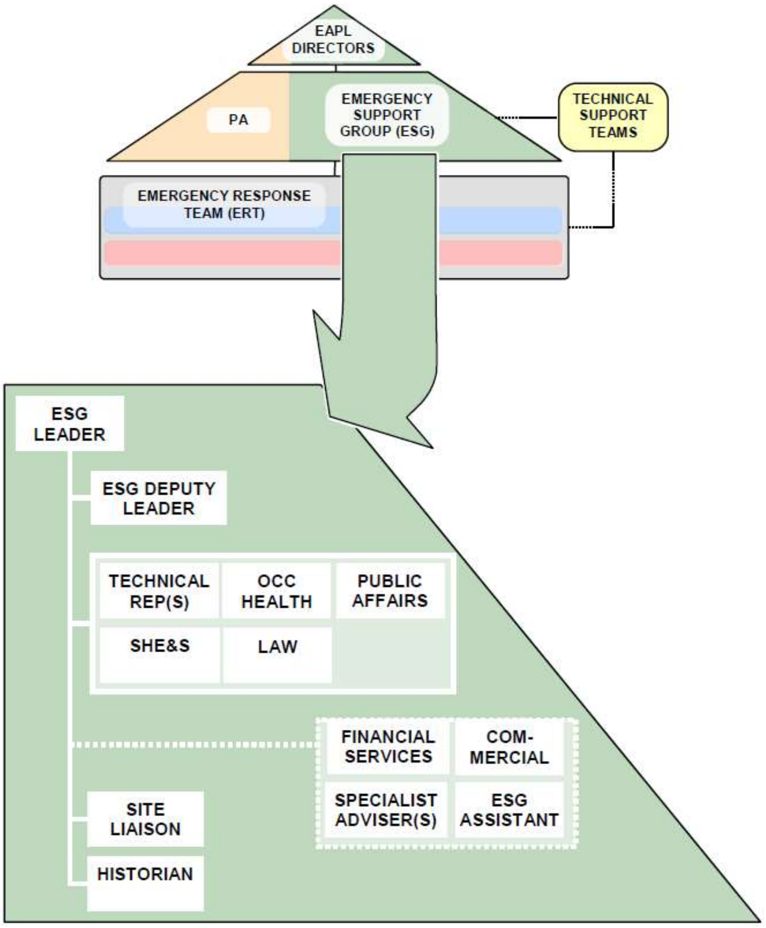


Figure 7-2 Organisation Chart – Esso Emergency Support Group (ESG) structure

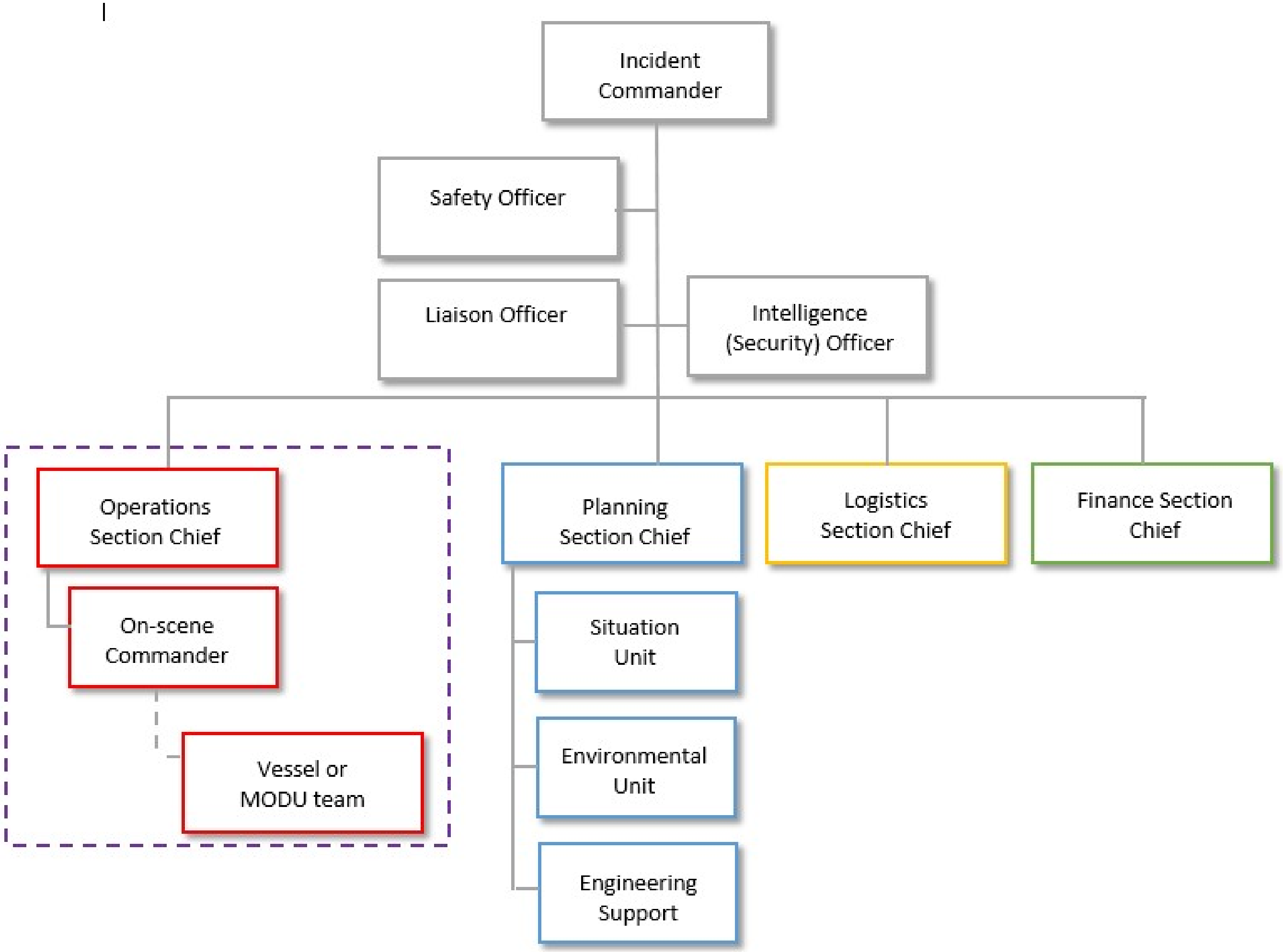


Figure 7-3 Organisation Chart – Esso Incident Management Team (IMT) structure

7.3.2 Incident Management Team (IMT)

The structure of the IMT (Figure 7-3) is based on the Incident Command System detailed in the Incident Management Handbook (The Response Group, 2015). The structure is consistent with the Australasian Inter-Service Incident Management System (AIIMS), which ensures that any interface between Commonwealth and State incident and emergency response organisations are aligned.

The structure of the team is scalable and flexible such that, if the incident dictates, not all roles need to be filled or one person can fill multiple roles. The role holders can also evolve over time. As the responsibility for the response moves from one organisation to another, a role may be replaced with a more suitable or more competent individual or the incident may be of such duration that shift change is required.

The IMT Leader (or Incident Commander (IC)), assisted by the IMT, is responsible for command, control and coordination of the response to incidents and for supporting the On-scene Commander (OC) in the tactical response to any incident. Responsibilities and checklists for IMT members are provided in the Incident Management Handbook (The Response Group, 2015).

The responsibilities highlighted by the purple box in Figure 7-3 will be undertaken by the Esso Australia & PNG Drill Team and Diamond Offshore personnel. The Operations Section Chief (OSC) will be a senior member of the Esso Australia & PNG Drill Team whenever possible, with the on-scene roles being filled by MODU personnel (e.g. the MODU OIM would be the OC).

7.3.3 Source Control Branch (SCB)

Figure 7-4 outlines the organisation chart for the Source Control Branch (SCB), as further described in the ExxonMobil Incident Management Handbook (ExxonMobil 2015). The SCB reports to the IMT through communication between the IMT Operations Section and the SCB Director. The SCB consists of the following roles, assigned to specific source control tasks:

- SCB Director
- Well Intervention & Containment team
- Debris Removal team
- Subsea Dispersant team
- Relief Well team
- Flow Engineering team
- SSH&E and Risk Assessment Support
- Human Resources and legal support
- Logistics, Finance and Planning support

Additionally, the SCB is supported by SIMOPS and the On-Scene Commander.

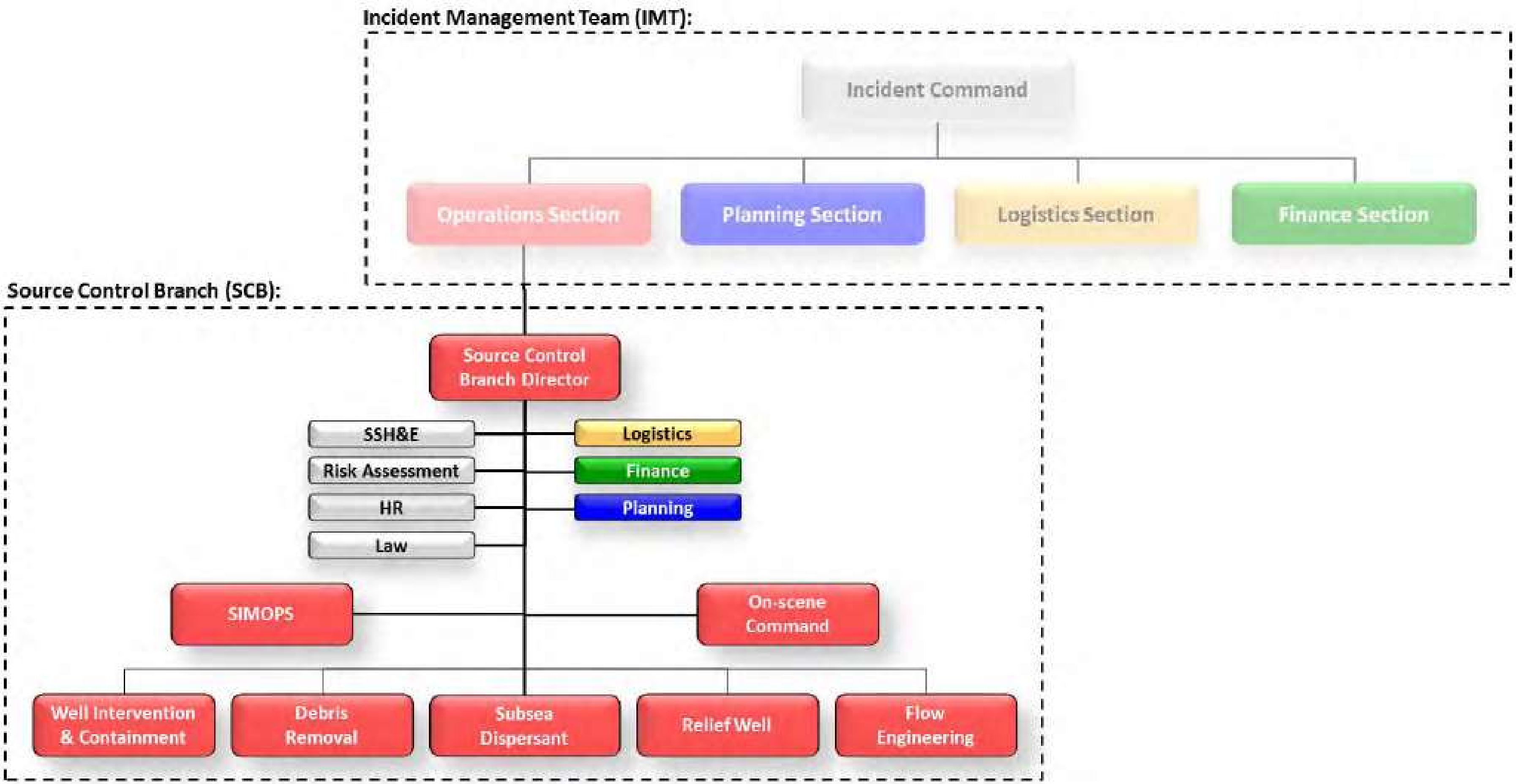


Figure 7-4 Organisation Chart – Esso Source Control Branch (SCB)

7.4 Monitoring, Evaluation and Surveillance (MES)

7.4.1 Overview

Monitoring and evaluating the oil spill is essential for maintaining situational awareness and assessing the environmental impact. This is fundamental to putting in place an effective oil spill response strategy. The key methods are:

- Aerial observation;
- Vessel-based observation;
- Computer-based tools:
    - Oil spill trajectory modelling;
    - Vector analysis (manual calculation); and
    - Automated Data Inquiry for Oil Spills (ADIOS) (a spill weathering model).
- Utilisation of satellite tracking drifter buoys;
- Remote sensing from aircraft;
- Remote sensing from satellite; and
- Water quality and oil sampling.

7.4.2 Resources Required

Oil spill modelling (APASA, 2018) demonstrates that visible surface oil is likely to be limited to a distance of 96 km from the source. Entrained oil (at the NOEC) is largely limited to the upper 20m of the water column and at a distance of <15km from the source. Dissolved oil at the low exposure threshold is seen to extend up to 167 km from the source, in the upper 20m of the water column (Section 6.32). Although entrained hydrocarbons may extend to a larger area (Figure 4-3), no viable response, other than source control, natural recovery and MES is effective at these low concentrations.

Based the oil spill modelling results, Table 7-7 summarises the minimum resource required to achieve the monitor and evaluate strategy. To demonstrate sufficient resources are available, Table 7-7 also includes the resource available at Esso's disposal and the minimum timeframes within which the resources will be activated. See OPEP Table 5-2 for further details.

Table 7-7 Monitor, Evaluate and Surveillance - summary of resource requirements, availability and minimum time standards

Task	Resource requirement	Resource availability	Minimum timeframe
Visual Observation - Aerial surveillance	• 1 x Aircraft and pilot • Air support base • 1 x Observer • Communication	Esso helicopters to aid in aerial surveillance 1 x trained spill observer provided by Esso	Initial overflight within 6 hours of spill occurring. Trained observer within 24 hours of spill occurring. (assuming good visibility, daylight hours and suitable flying conditions)
Visual Observation – vessel	• 1 x Vessel and Crew • Marine support base • 1 x Observer • Communication	1 x vessel and crew from existing fleet 1 x spill observer provided by Esso	Within 24 hours, from dedicated vessel. (note initial surveillance should be undertaken by the most convenient and efficient method using immediately available resources)
Oil Spill Trajectory Modelling	• IMT members with trajectory vectoring experience • Relevant set of marine charts for Bass Strait in Emergency Control Room. • Internal GIS mapping specialists	Contract with modelling provider (through AMOSC)	Within 6 hours of spill occurring.

Task	Resource requirement	Resource availability	Minimum timeframe
ADIOS weathering modelling	• Automated Data Inquiry for Oil Spills 2 (ADIOS2) installed on IMT computers • IMT members familiar in program use (https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/adios.html)	In-house capability through the Environmental Unit of the IMT (ADIOS)	Within 6 hours of Level 2 spill occurring.
Satellite Tracking Drifter Buoys	• 2 × tracking buoys (one on location, one at heliport) • Tracking buoy on vessel, at MODU or deployed by helicopter	AMOSC	Within 6 hours of spill occurring (Level 2 & 3 spill)
Remote sensing from aircraft	• Remote sensing equipment	AMSA	Onsite within 5 days of Level 3 spill being activated.
Remote observation using satellite imagery	Satellite imagery services via Radiant Solutions for images and service technician (Radiant Solutions geospatial hotline, +1 240 833 8282, metops@radiantsolutions.com)	Esso can engage MDA Geospatial Services (MDA).	Within 12 hours of Level 3 spill being activated.
Water and oil sampling	• 2 x vessel and crew • Initial response spill sampling kits available at various Esso locations, including VIC/P70 support vessels. • Sampling services via environmental consultancy • Laboratory services via contract with third party provider • Experienced analyst to interpret data • Field Service technician.	• Vessel contractor/ crew from Esso • Vessels of Opportunity can be contracted if required. • Initial response spill sampling kit available at various Esso locations. Sampling equipment provided by sampling contractor as part of service • 2 TPH meters from BBMT • Laboratory services and experienced analyst provided by NATA accredited lab as per OSMP	2 day to mobilise field technician and collect samples Analysis commenced within 24 hours of delivery to laboratory, All results within 5 days

7.4.3 Effectiveness and Levels of Performance

To allow environmental performance standards to be defined, the effectiveness and levels of performance for the Monitoring, Evaluation and Surveillance strategy are defined in Table 7-8.

Table 7-8 Effectiveness and level of performance for 'monitor and evaluate' response

Performance Level	Description
Aerial/Vessel Surveillance	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	Provides real time evaluation of extent, direction of travel, and visual characteristics of surface oil. The assessments stemming from surveillance should be used by the incident management team to ensure timely and suitable mobilisation, and the coordination and prioritization of oil spill response activities. This includes decisions concerning which response strategies to employ and their geographic extent. In some scenarios, surveillance may be used to observe the natural break-up and dissipation of oil pollution without the need for active intervention. In the early phase of a spill, untrained observers may be used until trained observers can be sourced from Esso/AMOSC/AMSA.

Performance Level	Description
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	Aerial/Vessel surveillance is dependent on: • being activated by Esso's Incident Management Team (IMT), and • suitable aviation/marine contractors being available Interdependencies with other systems include: • training and competency management for the emergency response and incident management teams, including. • Esso, • AMOSC; and • AMSA.
Reliability ***The probability that at any point in time it will operate correctly for a further specified length of time***	Aerial/Vessel surveillance should be: • 100% reliable at any point of time during the drilling campaign • Aerial observations should be on task within 6 hours (during daylight hours) of confirmed report of spillage, with a trained observer available with 24 hours. • Observations from dedicated vessels should be available within 24 hours.
Availability ***Time the control is available to perform its function?***	Aerial/Vessel surveillance should be available: • as required for the duration of an incident.
Oil Spill Trajectory Modelling	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	Provides forecasts of surface and subsurface behaviour of the oil.
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	OSTM is dependent on: • Contract with AMOSC to access OSTM service provider. • Reliable wind and sea current forecasts.
Reliability	• Oil spill trajectory modelling results should be available with 6 hours of spill notification
Availability ***Time the control is available to perform its function?***	• Should be available as required for the duration of an incident, with the capability for provision of results on a daily basis.
Desktop Vector analysis/ADIOS	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	Provides a rapid method of predicting spill movement and weathering of oil.
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	Desktop vector analysis and ADIOS (Automated Data Inquiry for Oil Spills) calculations are dependent on: • Competent person in the IMT to undertake the calculation. • Computer on which to run ADIOS • Availability of oil characteristics • Metocean information
Reliability	• Available with 6 hours of spill
Availability ***Time the control is available to perform its function?***	• Should be available as required for the duration of an incident.
Satellite Tracking Buoys	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	Identification of the leading edge/rear edge of the spill and informs aerial surveillance.

Performance Level	Description
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Satellite tracking buoys with new batteries (standard battery life 6 – 12 months). • Operating instructions • Log-in details to download coordinates
Reliability	• Available within 6 hours of a spill
Availability ***Time the control is available to perform its function?***	• Buoys will be deployed, tracked and recovered, as required.
Remote sensing from aircraft	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	• Airborne remote sensing equipment supplements visual observations by using sensors which detect radiation outside of the visible spectrum. Five AMSA Dornier aircraft are fitted with Side Looking Aperture Radar and Forward Looking Infrared Radar. Two AMSA aircraft are fitted with Ultraviolet and Infrared marine pollution scanning sensors tuned to detect and map surface oil spills and transmit information back to shore whilst in flight.
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Relies AMSA to provide the service under NationalPlan arrangements.
Reliability	• Onsite within 5 days.
Availability ***Time the control is available to perform its function?***	• Remote sensing from aircraft should be available as required for the duration of an incident
Remote sensing from satellite	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	• Satellite imagery provides an effective operational tool by providing a comprehensive picture of the overall extent of a hydrocarbon spill. Sensors include those that operate in the visible and infrared regions of the spectrum and Synthetic Aperture Radar (SAR).
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Relies on a contract with Radiant Solutions. ExxonMobil have a valid agreement with service provider.
Reliability	• Within 12 hours of Level 3 spill being activated.
Availability ***Time the control is available to perform its function?***	• Remote sensing from satellite should be available as required for the duration of an incident.
Water and oil sampling	
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	• Water and oil sampling describes the level, duration and type of hydrocarbon to which sensitive receptors be exposed. This allows a relationship between hydrocarbon exposure and other values, e.g. biological condition, to be established by long-term monitoring following possible hydrocarbon exposure.
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Water and oil sampling relies on OSMP
Reliability	• 2 day to mobilise field technician and collect samples • Analysis commenced within 24 hours of delivery to laboratory, • All results within 5 days
Availability ***Time the control is available to perform its function?***	• Water and oil sampling should be available as required for the duration of an incident

7.4.4 ALARP Assessment

No further practicable measures could be identified, appropriate to the nature and scale of the spill risk that could improve situational awareness.

Environmental performance outcomes and standards for monitoring, evaluation and surveillance are included in Section 6.28 for LOC resulting from a vessel collision (RA 24), and in Section 6.32.6 for Loss of Well Control (RA 28). Section 6.34 includes an ALARP assessment for the response strategies (RA 30).

7.5 Source control

7.5.1 Overview

In order to regain control of a subsea well, Esso would first secure the safety of all personnel on board the rig and then begin a detailed evaluation of the incident. If available, the ROVs at site would be used to inspect the condition of the wellhead, BOP and other subsea well equipment. If applicable, attempts would be made to close the BOP through manual intervention using the ROV. Should this be unsuccessful, then the Source Control Plan would be activated. The well construction team and well control contractors would collectively assess the situation to determine the best course of action.

Source control tools available include:

- The Subsea First Response Toolkit (SFRT)
- Installation of capping stack
- Drill a relief well.

The impacts and risks associated with performing these activities are consistent with those already evaluated by this Environment Plan (Sections 6.28 and 6.32), and thus not discussed further.

Esso have engaged Wild Well Control (WWC) to complete early execution planning for source control activities, including development of relief well plans for Baldfish-1/Hairtail-1 (WWC 2017a) and Sculpin-1 (WWC 2019b). The relief well offset from LOWC incident will be based on observed release rates and prevailing weather conditions. Historic wind and current data (strength and direction), and estimated release rate indicates (extent of flammable gas cloud; WWC 2017b) that an offset 500m SSE is a reasonable planning basis at Baldfish/Hairtail, while at Sculpin-1, more than 95% of the released gas is dissolved into the water column before it reaches the water surface; any remaining gas reaching the surface disperses to below explosive gas cloud levels (WWC 2019a).

7.5.2 Resources Required and Availability

Well source control activities, including methodologies and resources to implement source control and limit the hydrocarbon released to the environment are detailed in the ExxonMobil Incident Management Handbook – Source Control Branch (Esso 2015).

The blowout contingency plan (part of WOMP) incorporates a series of steps designed to intervene in a rapid manner. A summary of the mobilisation steps in the Source Control strategy is as follows[6]:

- Personnel for Source Control response (Figure 7-4).
- MODU (plus a Heavy-Lift Vessel if required), Construction Support Vessel for capping/relief well operations and Stimulation Vessel for dynamic kill operation.
- Materials for a relief well (i.e.: wellhead system, tubulars)
- Two working class ROVs (supply vessel deployment) from Oceaneering Perth to Marine Base by road transport.
- The primary Subsea First Response Toolkit (SFRT) from Perth to Marine Base by road transport. Load onto supply vessel to incident site.
- Conduct site survey and possibly small scale debris clearance operations.
- Mobilise the Vertical Installation Capping Stack System (VICSS) from Singapore by sea to incident site.

[6] Note that capping stack and reliefe well activities will will be performed in parallel

- If required, mobilise Offset Installation Capping Stack System (OICSS) from Stavanger by sea to incident site.
- Conduct capping operation (vertical installation or offset installation).
- Conduct relief well operation.

Table 7-9 details the resources required to undertake 'source control' activities, their availability and hence Esso's capability to support a source control response.

Table 7-9 Source control strategy summary

Task	Resource Requirement	Resource Availability	Comments
ROV subsea inspection	Well control specialists	Contract with third party well control specialist, Wild Well Control (WWC) & Oil Spill Response Limited (OSRL).	Use of ROV on MODU where possible. WWC/OSRL to supply technical services, guidance and specialised well control and capping installation equipment. Esso has a contract to access to WWC/OSRL's global inventory of well containment equipment. The estimated timeframe for the deployment of the SFRT is shown in Table 7-12. See Table 7-10 for SFRT effectiveness and performance details.
	ROVs	Esso is a member of the SFRT capability through AMOSC	
	Debris clearance tools	Esso is a member of the SFRT capability through AMOSC. Contract with third party well control specialist, Wild Well Control (WWC) & Oil Spill Response Limited (OSRL).	
	Vessels	Deployable from a MODU Support Vessel. SFRT relies on vessel of opportunity available within Australia	
Vertical Installation Capping Stack (VICSS)	$18^3/_4$: 15 kpsi Capping Stack	WWC have two compatible capping stacks, the nearest of which is in Singapore. The second is in Aberdeen	Refer to WWC (2018). Capping Stack Interface Check Ocean Monarch. Report prepared by Wild Well Control for ExxonMobil. Document No. WC-CS-ALL-INT. Rev 0.
Offset Installation Capping Stack (OICSS); Possibly applicable to Hairtail well	$18^3/_4$: 15 kpsi Capping Stack	OSRL have two compatible capping stacks. The system available in Stavanger will be assigned for use with the Offset Installation Equipment available in Trieste.	The Offset Installation Equipment (OIE) is stored in Trieste and is compatible with any of the OSRL capping stacks. The OIE is not compatible with the WWC capping stacks.
Relief well Drilling	MODU	APPEA Mutual Assistance Agreement (MAA)	The APPEA MAA is a 'best endeavours' agreement to facilitate the transfer of a drill rig between operators in the event of an emergency that requires a relief well to be drilled to 'kill' the well.
	WWC/OSRL engineering support services	Contracts with third party suppliers	ExxonMobil's global drilling organisation, together with the Esso Australia & PNG Drill Team, will provide well engineering design function.
	Well construction material	ExxonMobil maintains a global inventory of materials as well as service contracts. In addition, the Esso Australia & PNG Drill Team will have locally available inventory and contracts with third party suppliers	

7.5.3 Effectiveness and Level of Performance

7.5.3.1 Subsea First Response Toolkit (SFRT)

Table 7-10 provides an assessment of the SFRT in terms of effectiveness and required level of performance.

Table 7-10 Effectiveness and level of performance of the SFRT

Parameter	Performance Level
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	The SFRT consists of hardware to either activate the malfunctioning BOP or to prepare the site for capping. It consists of: • Tools for site survey prior to commencement of work (2D and 3D sonar) • Debris clearance equipment with cutting grappling and dragging tools to gain access to the BOP where necessary. • Flying leads, distribution manifold and dispersant wand to inject dispersant at multiple locations; • High-pressure and high-volume accumulators for closing the existing BOP.
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Response is reliant on third party well control specialist to provide competent and trained personnel. • Logistics chain to deliver equipment to site. • Suitable vessel of opportunity from which to deploy the equipment (deployable from a Rig Support Vessel).
Availability ***Time the control is available to perform its function?***	• The equipment is maintained in a state of readiness for immediate mobilization. • The SFRT is available in Henderson (south of Perth, WA). Well control and salvage specialists will mobilise from Singapore in 1-2 days. • Suitable vessel of opportunity from which to deploy the equipment (deployable from a Rig Support Vessel).
Reliability	• WWC (2017b) defines safe working distance in case of a LOWC for Baldfish-1 and Hairtail-1. • Increased water depth at the Sculpin-1 well location ensures that safe working distances are less critical, here as gas is largely dissolved in the water column, with remaining gas reaching surface not resulting in an explosive gas mixture (WWC 2019a). • Equipment deployment vessel to remain outside safe working distance upwind and upstream from the well location (generally to the west of the well location). • Timing of ROV on favourable wind and current conditions. • Monitoring of wind and current conditions is required during SFRT Operations.
Survivability	• Designed for subsea use to a maximum of 3,000m water depth; • Transportable by sea and/or air • Available for use in a variety of metocean conditions.
Compatibility	Deployable from a Rig Support Vessel

7.5.3.2 Capping stack

The subsea capping stack provides a means of choking back and stopping the flow from a well, establishing a barrier followed by pumping of heavier kill fluid.

Well capping involves the following activities:

- Site surveys to understand the issues with installation and other constraints to safely enter and work in the area;
- Possible debris removal, dependent upon the damage to the subsea well. This may involve the use of ROV / Construction Support Vessel (CSV) to ensure a clear surface for capping;
- Capping stack deployment and installation by CSV (by either Vertical or Offset Installation methodologies).

Table 7-11 provides and assessment of the capping stack in terms of effectiveness and required level of performance.

Table 7-11 Effectiveness and level of performance for the capping stack

Parameter	Capping Stack
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	The capping stack can be deployed in a vertical mode when the hydrocarbons are surfacing away from the CSV. An offset capping stack deployment is available when the CSV cannot operate directly above the wellhead (e.g. for Baldfish/Hairtail). However, this is not required for the Sculpin-1 well due to increased water depth at this location, resulting in most of the released gas being dissolved in the water column, with remaining gas reaching the water surface not reaching explosive gas cloud levels (WWC 2019a). Once lowered and latched on the BOP or wellhead, the capping stack uses stored hydraulic pressure to close a blind-shear ram and stop the flow of hydrocarbons. The well is killed by installing flexible conduits from surface and accessing the wellbore below the blind-shear ram and implementing one of several available processes, such as a top kill or circulate and kill. These methods involve pumping mud into the wellbore to overbalance reservoir pressures. CSV to support Vertical Installation have following specifications: • Australia Safety Case: Available • Operability: Able to sustain operations in expected metocean conditions during period operations • Dynamic Positioning (DP) System: DP3 requirement • Heave Compensated Crane : 150-250 metric ton rating • Deck Space: Ability to handle CSS and supporting equipment. CSV specifications include: • Australia Safety Case: Available • Operability: Able to sustain operations in expected metocean conditions during period operations • DP System: DP3 requirement • Heave Compensated Crane: 450-600 metric ton rating • Deck Space: Ability to handle capping stack and supporting equipment
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	• Response is reliant on third party well control specialist to provide equipment and competent personnel • Logistics chain to deliver equipment to site • Suitable CSV from which to deploy the equipment. • Compatibility with BOP/wellhead connectors.
Availability ***Time the control is available to perform its function?***	• Equipment is maintained in a state of readiness for immediate mobilisation. • Vertical Installation Capping Stack (VICSS), suitable for the Baldfish-1 and Sculpin-1 wells, and under some metocean conditions for the Hairtail well (because of depth considerations), is available in from WWC in Singapore and can be transported to Australia by sea. The estimated timeframe for mobilisation and installation is shown in Table 7-13. • The Offset Installation Capping Stack (OICSS), possibly has an application suitable on the Hairtail well, is available in Stavanger and can be transported to Australia by sea. The estimated timeframe for mobilising this capping stack is shown in Table 7-15. • Suitable CSVs (with approved safety case) are available in Singapore and the North Sea. • The Offset Installation Equipment (OIE) is available in Trieste (Italy) and can be transported to Australia by sea. The estimated timeframe for mobilising the OIE is shown in Table 7-14. The OIE and associated capping stack will require assembly in Australia prior to be mobilised to the incident site. The estimated timeframe for installing the OICSS is shown in Table 7-16.

	• In summary: The VICSS mobilisation & installation time is estimated at 38 days. The OID, and associated OICSS, mobilisation & installation time is estimated at 86 days.
Reliability	• WWC (2017b; for Baldfish/Hairtail) and WWC (2019a; for Sculpin-1) define safe working distance in case of a LOWC. • CSV to remain outside safe working distance, upwind and upstream from the well location (generally to the west of the well location; (Figure 7-5). • Timing of VICSS operations rely on favourable wind and current conditions, but offer a more rapid response due to simplicity of the deployment and logistics. • Monitoring of wind and current operations is required during VICSS Operations. • The OICSS operations are less susceptible to unfavourable metocean conditions, but take substantially longer due to complexity of the deployment and sourcing from Italy.
Survivability	A secondary Capping Stack System is available from Aberdeen, should the primary Capping Stack System not be available or be inoperable. WWC (2017b, 2019a) defines safe working distances.
Compatibility	WWC (2018a) confirmed direct interface of VICSS with the lower BOP at the LMRP (Lower Marine Riser Package) / lower BOP connection point (Primary Connection point; using Cameron HC connector), or the wellhead (Secondary Connection Point; using the Dril-Quip DX-15 connector or the Cameron HCH4 connector.). WWC (2018a) also confirmed accessibility of Rigging points on the LMRP subsea and the lower BOP subsea (ROV accessibility).

Table 7-12 SFRT Debris Clearing Schedule

Operation	Duration (days)		Cumulative (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1	Baldfish-1 / Hairtail-1	Sculpin-1
Notification; Arrange road transport	2	2	2	2
Transit Perth to Barry's Beach Marine Terminal (BBMT)	3	3	5	5
Load on AHTS	1	1	6	6
Transit to incident site	1	1	7	7
Small-scale Debris Clearing	7	7	14	14

Table 7-13 Vertical Installation Capping Stack System (VICSS) Installation Schedule

Activity	Duration (days)		Cumulative time (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1	Baldfish-1 / Hairtail-1	Sculpin-1
Notification; move VICSS to Singapore Dock. Simultaneously contract / prepare CSV for loading VICSS	5	5	5	5
Configure VICSS. Load on CSV	2	2	7	7
Mobilise CSV/VICSS from Singapore to Incident Location (12 kn)	16	16	23	23
Clear debris from wellhead location	7 (Table 7-12)	7 (Table 7-12)	30	30
Weather allowance*	4	4	34	34
Install VICSS	4	4	38	38

* *Weather allowance; capping stack installation requires suitable wind, wave and current conditions. Also* see Table 7-11.

Table 7-14 Offset Installation Equipment (OIE) Mobilisation Schedule

Operation	Duration (days)		Cumulative (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1	Baldfish-1 / Hairtail-1	Sculpin-1
Notification; move OIE to Trieste Dock. Simultaneously contract / prepare ocean shipping of OIE.	5	Not required	5	Not required
Load OIE onto selected transport vessel.	2		7	
Mobilise OIE from Trieste to Port of Melbourne (12 kn)	44		51	

Table 7-15 Offset Installation Capping Stack System (OICSS) Mobilisation Schedule

Operation	Duration (days)		Cumulative (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1	Baldfish-1 / Hairtail-1	Sculpin-1
Notification; move OICSS to Stavanger Dock. Simultaneously contract / prepare CSV for loading OICSS.	10	Not required	10	Not required
Configure OICSS. Load on CSV	2		12	
Mobilise CSV/OICSS from Stavanger to Melbourne (12 kn)	44		56	

Table 7-16 Offset Installation Capping Stack System (OICSS) Installation Schedule

Operation	Duration (days)		Cumulative (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1	Baldfish-1 / Hairtail-1	Sculpin-1
Mobilisation of OIE & OICSS	56 (Table 7-15)	Not required	56	Not required
Load OIE onto CSV	2		58	
Sail to Incident Site	2		60	
Conduct debris clearance operations	7		67	
Weather allowance	4		71	
Install OICSS	15		86	

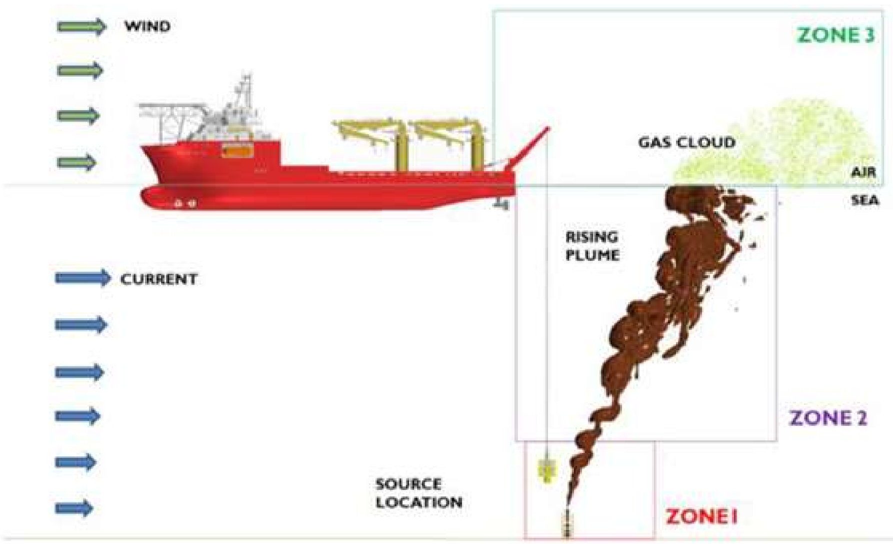


Figure 7-5 Capping Stack and relief well operations relative to well location and gas cloud

7.5.3.3 Relief Well

A relief well is constructed like a standard well using directional drilling technology. It is initially drilled vertically, then at a planned kick off point it is deviated towards the target. When within 30-60 m of the original well, the drilling assembly is pulled from hole and a magnetic proximity ranging tool is run on wireline to determine the relative distance and bearing from the target. Directional drilling continues with routine magnetic ranging checks to allow for the original well to be intersected. Once the target well is intersected, dynamic kill commences by pumping specialised fluids into the well to overcome reservoir pressure. Well kill modelling was conducted to confirm the fluid rates, pump rates and volumes required to maintain the integrity of the well bore while also killing the well (WWC 2017a, 2019).

WWC (2017a) reviewed options for well intervention and recommended the following approach for Hairtail-1/Baldfish-1:

- Relief well trajectory utilizes a location set at 500 m offset to the south-southeast from the Hairtail-1/Balfdfish-1 wells, in consideration of maximum gas cloud radius WWC (2017b) (Figure 7-5).
- Minimum relief well offset of 500 m has been confirmed through modelling and is generally accepted by the industry as a safe workable distance.
- 12¼" open hole section scenario: the well can be killed using 1,655 bbls of 17.0 ppg and 5,135 bbls of 12.0 ppg mud, at a maximum kill rate of 65 bbl/min and maximum pump pressure of 5,080 psi.
- Additional high pressure/volume pumps maybe required to augment the existing kill system on relief well MODU.
- Plan for 100% redundancy in pump capacity and kill fluid on site if possible.
- The relief well uses a simple 2D “S” type well that homes-in on the target well with sufficient interval for ranging operations.
- Due to the extensive wireline work required for ranging and gyro surveys, the maximum inclination was kept below 60.0° inclination.
- Relief well intersection at the 13⅜" casing shoe, set at 1,388 m TVD, cannot be killed within the practical limits of the well-kill operations.

  Instead, the presence of continuous drill-pipe in the hole will be required for ranging operations, preferably using active ranging (e.g. Halliburton’s WellSpot™ and WellSpot at Bit (WSAB™).

  At intersect Point (2,600.0 m TVD), the relief well and a blowout becomes a “U tube”. The relief well typically goes on a vacuum as the drilling mud “U tubes” into a blowout well (venturi-effect).

  At this point, a heavy pill of 17.0 ppg is pumped into the relief well, which continues to “U tube” into the blowout well until the reservoir is dead at the sand-face.

  Total Kill Volume Required: 1,655 bbls of 17.0 ppg followed by 5,135 bbls of 12.0 ppg. Pump Time to Stop Influx: 0.48 hours, Total Pump Time: 2.37 hours.

Recommended option for well intervention on the Sculpin-1:

- Relief well trajectory utilizes a location set at 300 m offset to the W/SW from the Sculpin-1 well.
- Gas cloud modelling of a subsea release (WWC 2019a) confirmed that the formation of an explosive gas cloud is unlikely at Sculpin-1, as most of the gas is dissolved in the water column before reaching the water surface. Nonetheless, WWC (2019a) recommends approaching well centre from upwind and up current if possible, monitoring gas concentrations at all times to confirm no gas is present.
- 8½" open hole section scenario: the well can be killed using can be killed by pumping 1,850 bbl of 10.5 ppg kill weight mud at 20 bpm (5 bpm down drillpipe and 15 bpm down annulus) with a maximum pump pressure of 550 psi (WWC 2019b).
- Additional high pressure/volume pumps are not likely to be required to augment the existing kill system on relief well MODU.
- Plan for 100% redundancy in pump capacity and kill fluid on site if possible.
- The relief well uses a simple 2D “S” type well that homes-in on the target well with sufficient interval for ranging operations.

- Due to the extensive wireline work required for ranging and gyro surveys, the maximum inclination was kept below 60° inclination.
- The presence of continuous drill-pipe in the hole allows for ranging operations below the 9 $^5/_8$" casing, using active ranging (e.g. Halliburton's WellSpot™ and WellSpot at Bit (WSAB™).
- Total Kill Volume Required: 2,500 bbls of 12.5 ppg. Pump Time to Stop Influx: 0.41 hours, Total Pump Time: 2.0 hours.

The blowout contingency plan (part of WOMP) outlines the scenario used as the basis for development of the well control event. The well has been drilled to FTD in 8-1/2" hole. The drill-string, with 5" drill-pipe across the BOP, has the bit adjacent to and BHA below the top flowing Latrobe reservoir, when the well control incident develops and then escalates. The following conditions are present on the well:

The blowout contingency plans (part of WOMP) outlines the scenario used as the basis for development of the well control event.

Hairtail-1/Baldfish-1 wells: drilled to FTD in 12$^1/_4$" hole. The drill-string, with 6$^5/_8$" drill-pipe across the BOP, has the bit adjacent to the top Latrobe reservoir, when the well control incident develops and then escalates.

Sculpin-1 well: drilled to FTD in 8$^1/_2$" hole. The drill-string, with 5" drill-pipe across the BOP, has the bit and BHA below the top flowing Latrobe reservoir, when the well control incident develops and then escalates.

The following conditions are present on the wells:

1. Well blowout rate:
   Hairtail-1/Baldfish-1: 500 MMSCFD gas with ~11,000 BPD condensate
   Sculpin-1: 360 MMSCFD gas with ~23,000 BPD condensate;
2. MODU is unable to activate the BOP stack.
3. MODU is unable to run capping stack or drill a relief well.
4. The metocean conditions are based on an updated study conducted for the Exploration Drilling programme.
5. **Hairtail-1/Baldfish-1 well configuration:**
   - 12$^1/_4$" hole to FTD Gas reservoir open (4,000 psi).
   - 13$^3/_8$" surface casing set 1,000 mBML.
   - Marine riser and LMRP disconnected from BOP.
   - 6$^5/_8$" drill-pipe.
   - Drill-pipe parted immediately above BOP.
   - No BOP rams activated.
6. **Sculpin-1 well configuration**:
   - 8$^1/_2$" hole to FTD Gas reservoir open (5,450 psi)
   - 9$^5/_8$" intermediate casing set 900 mBML
   - Marine riser and LMRP disconnected from BOP.
   - 5" drill-pipe parted immediately above BOP.
   - No BOP rams activated.
   - BSR activated but failed to close, flow rate around tool joint inside partially closed BSR rams is larger than flow area of 9-5.8" casing and 5" DP annulus
7. Well flowing in annulus between drill-pipe and open/cased hole.
8. Seafloor discharge.
9. No formation skin damage.
10. No mechanical blockage in the annulus.

Planning for the relief well will run in parallel with other well intervention options such as well capping (WWC 2017a; 2019). The following activities are prioritised as part of the immediate response operations:

- Mobilisation of well control and relief well specialists;
- Confirmation of the highest probability of success relief well strategy, specific to the observed event, with well specialists to define MODU/vessel requirements (considering aspects such as required kill fluid type/amount);

- Screen available MODUs in the region with current NOPSEMA Safety Case and select MODU to execute the strategy;
- Finalise relief well location using geophysical site survey data. This will consider the prevailing weather at the time of the incident; seabed infrastructure in the area and directional drilling requirements for well intersection;
- Confirm location of, and mobilise appropriate ranging tools for relief well strategy;
- Source and mobilise materials.

Table 7-17 provides an assessment of source control options in terms of their effectiveness and required level of performance.

The Esso Australia & PNG Drill Team and Esso personnel will be available immediately to commence work on the source control programme. Additional expertise will be mobilised from ExxonMobil global operations as required. Specialists will be available from WWC/OSRL (capping stack/relief well), relief well MODU company, CSV companies, SFRT supplier and the ROV supplier.

The Source Control organisation consists of three groups:

- Relief Well,
- Debris Removal, and
- Well Intervention.

Table 7-17 Effectiveness and level of performance for relief well

Parameter	Relief Well
Suitability/Functionality ***How does the control perform to achieve its required risk reduction?***	A relief well is drilled to intercept the out of control well and pumping in fluid to overbalance reservoir pressures. **MODU specifications:** • **Australia Safety Case**: Available • **DP System:** DP3 requirement (if available; spread mooring as alternative): • **Mooring System**: Equipped to operate with wellhead at -2,300 m below sea level and with some anchor points @ >2,300 m below sea level. • **Mud Pumping System**: 7,500 psi capability for dynamic kill operation. • **Mud System**: 7,000 bbl of 12.5 ppg fluid for dynamic kill operations
Dependencies ***Does the control measure rely on other systems to perform its intended function?***	Response is reliant on availability of suitable MODU, equipment, competent personnel and plan to mobilise equipment to site. In the event of a LOWC, Esso will complete a survey of drilling rigs available in Australian Commonwealth Waters with accepted safety cases. IMS considerations will also be part of MODU selection (Section 6.12). At the time of revision (February 2019) one MODU was working in Australian Commonwealth Waters and four MODUs were located in the Australasia region with necessary capability of operating in deep water Bass Strait conditions, including Sculpin-1, were working in Australian Commonwealth Waters.
Availability ***Time the control is available to perform its function?***	Relief well kill timeframe is estimated to take a maximum of 70 days for Baldfish-1/Hairtail-1, and 102 days for Sculpin-1, based upon MODU availability in the Australasian region and the agreements in place with other operators. The estimated timeframe for relief well operations are shown in Table 7-18 (Singapore-based MODU) and Table 7-19 (Australia-based MODU).
Reliability	WWC (2017b) confirmed gas cloud parameters in case of a LOWC. The relief well MODU will be positioned approximately 500m upwind and upstream of the incident well location for Baldfish/Hairtail. For Sculpin, this is less critical because of lack of explosive gas cloud. Nonetheless a 300m distance upwind is recommended (see Section 7.5.3.3)). Monitoring of wind and current conditions is required during relief well operations (Table 7-11).
Survivability	MODU is designed and certified to operate in the Bass Strait metocean environment, in the Baldfish/Hairtail and Sculpin-1 water depths.
Compatibility	The relief well MODU's drilling fluid and high pressure pumping equipment is suitable for conducting a dynamic kill as modelled in WWC 2017a.

A critical part of the response will be to secure a suitable MODU capable of drilling a relief well. Depending upon the location, the MODU may require the use of a heavy-lift transport vessel (HLV), to expedite mobilisation (towed MODU averages 4 kn, compared with >12 kn for HLV). The CSV would be used for debris clearance and capping operations.

Table 7-18 Relief well Installation Schedule – MODU / HLV

Operation	Duration (days)		Cumulative time (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1#	Baldfish-1 / Hairtail-1	Sculpin-1#
Notifications; Mobilise specialist personnel Initiate source control emergency response plan Source MODU; Contract; Prepare for transport Source Heavy-lift vessel; Prepare for transport operation	10	10	10	10
Load MODU	3	3	13	13
Transit to Bass Strait (Westernport Bay) **(12 kn)**	15	21	28	34
Offload MODU; Load materials (Westernport Bay)	4	4	32	38
Tow to incident site (Baldfish/Hairtail/Sculpin)	3	4	35	42
Moor & drill relief well	25	50	60	92
Weather Allowance*	5	5	65	97
Kill well	5	5	70	102

* *Weather allowance; Relief well installation requires suitable wind, wave and current conditions. Also see Table 7-11.*
\# *The longer duration for Sculpin-1 is due to larger depth, which increases time to lower BOP at the end of the increased number of riser sections. Additionally, an additional casing is required for Sculpin-1, when passing through the Lakes Entrance strata (Figure 3 6).*

Table 7-19 Relief well Installation Schedule – MODU / Wet Tow

Operation	Duration (days)		Cumulative time (days)	
	Baldfish-1 / Hairtail-1	Sculpin-1#	Baldfish-1 / Hairtail-1	Sculpin-1#
Notifications; Mobilise specialist personnel Initiate source control emergency response plan Source MODU; Contract Source AHTS	7	7	7	7
MODU suspend well, de-moor, transit to Dampier	14	14	21	21
Tow to Incident Location (4 kn)	30	30	51	51
Load equipment / materials (Bass Strait)	2	2	53	53
Moor & drill relief well	25	50	78	103
Weather allowance*	5	5	83	108
Kill well	5	5	88	113

* *Weather allowance; Relief well installation requires suitable wind, wave and current conditions. Also see Table 7-11.*
\# *The longer duration for Sculpin-1 is due to larger depth, which increases time to lower BOP at the end of the increased number of riser sections. Additionally, an additional casing is required for Sculpin-1, when passing through the Lakes Entrance strata (Figure 3 6).*

The selection of a suitable MODU/CSVs would focus on the units currently operating in Australia under an approved Safety Case. MODU to meet project IMS (Invasive Marine Species) requirements (Section 6.12). In the event of a LOWC, Esso will revalidate a survey of MODUs available in Australian Commonwealth Waters with accepted safety cases.

At the time of writing of this revision three MODUs with necessary capability of operating at the Sculpin-1 location, in deepwater Bass Strait conditions were working in Australian Commonwealth Waters. A wider search would focus on units located in the Asia-Pacific region which had operated in Australia previously under an approved Safety Case.

The minimum duration for well kill at the Sculpin-1 well location is estimated to take approximately 102 days, compared with 70 days for the Baldfish-1/Hairtail-1 locations, largely due to limited availability of deepwater rigs, mooring preparations at this deepwater location, the requirement for an additional casing, and duration for drill-strings, risers and casings to traverse this water depth.

Esso, as a member of the Australian Petroleum Producer & Exploration Association's (APPEA) Mutual Assistance Agreement (MAA), can request Australian operators to provide 'best endeavours' to facilitate the transfer of a MODU should the Blowout Contingency Plan be activated and the drilling of a relief well be required.

Two scenarios have been examined to estimate the timeframe for the relief well operation:

- Singapore-based MODU – Heavy-lift Vessel (Table 7-18)
- Dampier-based MODU – Tow (Table 7-19).

7.5.4 ALARP Assessment

Table 7-20 summarises additional measures that Esso considered to enhance source control capability and the justification for not implementing.

Table 7-20 Response technique evaluation for Source Control

Control Measure	Justification for not implementing	Practicable and implemented
Contract with Wild Well Control to provide well engineering support services	Option adopted.	Yes
Capping stack compatibility studies undertaken	Option adopted.	Yes
Member of SFRT provided by AMOSC	Option adopted.	Yes
APPEA MAA signed	Option adopted.	Yes
Contract with Wild Well Control to provide the capping stack	Option adopted.	Yes
Contracts with third party provider to supply well construction material	Option adopted.	Yes
Relief well and dynamic kill analysis studies undertake.	Option adopted.	Yes
Logistics contracts in place to facilitate mobilisation of capping stack and well construction materials	Option adopted.	Yes
Biosecurity/IMS	MODU to meet project IMS (Invasive Marine Species) requirements (Section 6.12). IMS risk assessment to be undertaken as part of MODU/CSV selection, and prior to mobilisation to site	Yes
Mobilise standby MODU to Bass Strait.	Mobilizing a standby MODU to Bass Strait will reduce the lead time to commence drilling a relief well (Table 10 15; Table 10 16). In the event of a LOWC (low probability event), the hydrocarbon liquid release to environment avoided by this reduction in time (50-60 days for Sculpin-1) is estimated to be 11,051 Bbl/d for Hailrtail-1/Balrdfish-1, and 23,000 Bbl/d for Sculpin-1 (Section 6.32.2.1), assuming that capping stack installation has not been successful. Implementation of this control measure requires an investment of ~$40M, as the standby MODU is required for the duration of the campaign (~$US 8.5M mobilisation, plus $US150,000/day on standby. Given the high potential cost of implementing this control measure, it is considered grossly disproportionate to the level of environmental benefit gained, given that the source control event has an extremely low likelihood of occurrence. This control measure is assessed as prohibitively expensive. **Option not adopted.**	No
Mobilise capping stack to Bass Strait.	Mobilization a VICSS/OIE to Bass Strait for use in a LOWC event may reduce the lead time for attempting deployment. The current time frame for mobilising a capping stack to site from Singapore is estimated to be 23 days (Table 7-13).	No

	Esso have contracted both WWC and OSRL for supply of VICSS/OICSS systems. Suitable systems are maintained in Singapore and Stavanger and are located strategically on the basis that they are shared contingency resources for many operators. These systems are designed to be air-freighted so pre-mobilization may not significantly reduce capping lead time, assuming a CSV is available to deploy. As noted above, both the WWC/OSRL VICSS and OICSS are shared resources, therefore relocation will likely necessitate lease or purchase specific to this drilling program. The cost of leasing a new capping stack was considered, and the estimated cost is ~$20M. More significantly, the manufacture, installation and acceptance testing time is estimated to be 12-18 months. Furthermore, support service and infrastructure would need to be established and maintained to ensure full operability of the system. Given the high potential cost of implementing this control measure, it is considered grossly disproportionate to the level of environmental benefit gained, given that the source control event has an extremely low likelihood of occurrence. This control measure is assessed as prohibitively expensive. **Option not adopted**.	
Mobilise standby support vessels required for drilling relief well.	It is anticipated that the support vessels (PSV, AHTs) from the base campaign will be available to support incident response activities. Alternatively, a PSV can be sourced locally from Esso Bass Strait production operations. Additionally, PSVs and AHTs are available regionally and mobilisation time is likely less than that of the MODU so that this option would not accelerate well kill. Given the high potential cost of implementing this control measure, it is considered grossly disproportionate to the level of environmental benefit gained, given that the source control event has an extremely low likelihood of occurrence. This control measure is assessed as prohibitively expensive. **Option not adopted.**	No
Mobilise materials required for relief well to Bass Strait	Wellhead and casing requirements will be identified during the planning done concurrent with relief well MODU mobilisation. Equipment sourced for the VIC/P70 exploration wells includes an extra wellhead and casing. There would be spare inventory available after both wells are drilled, any additional equipment would be mobilised from existing ExxonMobil inventory prior to the mobilisation of the relief well MODU. **Option not adopted**	No
Mobilise standby construction support vessel to Bass Strait for capping stack installation.	Mobilization of a standby construction support vessel to Bass Strait may reduce the lead time for installation of a capping stack system. This extent of reduction is dependent on mobilization timing of capping stack (option rejected above). Implementation of this control measure requires an investment of ~$15M as the standby CSV is required for the duration of the campaign ($5M mobilization, $150k/day). Given the high potential cost of implementing this control measure, it is considered grossly disproportionate to the level of environmental benefit gained, given that the source control event has an extremely low likelihood of occurrence. **Option not adopted**	No
Design detailed relief well plan in advance	Esso have engaged WWC to prepare a preliminary well kill plan, including assessment of key parameters and resource requirements. A detailed relief plan requires specific detail which is dependent on the exact LOWC scenario. Sufficient time would be available to prepare a detailed relief well plan when the specific LOWC parameters for a relief well can be determined, immediately following the incident, and whilst the relief rig is being mobilised. **Option not adopted.**	No

Pre-Drill Relief Well	Based on the relief well design, the top-hole sections of the relief well would take ~6 days to drill, or 12 days total for the two exploration wells. In the event of a LOWC (low probability event), the hydrocarbon liquid release to environment avoided by this reduction in time is estimated to be 11,051 Bbl/d (Section 6.32). Implementation of this control measure would require additional investment as part of the drilling program of ~$10M ($800k/day). Given the high potential cost of implementing this control measure, it is considered grossly disproportionate to the level of environmental benefit gained, given that the source control event has an extremely low likelihood of occurrence. **Option not adopted.**	No
Pre-draft MODU safety case revision	In the event of a LOWC, the selected MODU, assigned to complete relief well drilling, will require an accepted safety case revision for this new activity. Pre-drafting a safety case revision may reduce regulatory lead time. This option has been considered and assessed to not reduce critical path time for MODU mobilization. Several MODUs with the necessary capability are currently operating within Australian Commonwealth Waters. Any safety case revision can leverage existing information from the Ocean Monarch safety case revision for this program, but otherwise will need to be MODU specific and involve rig workforce. **Option not adopted.**	No

Various capping stack scenarios have been reviewed by the EPR team, including the Halliburton Boots & Coots (B&C) Services Global Rapid Intervention Package (GRIP), which includes the RapidCap. EPR concluded that RapidCap has a number of shortcomings and is not suitable for many wells, including the VIC/P70 wells:

- **Maximum discharge rate & GOR**: The GRIP System has a maximum discharge/vent rate of 330,000 bpd and a maximum GOR of 684 scf/bbl (compared with an estimated GOR of 15,873 scf/bbl for Sculpin reservoir and 45,327 scf/bbl for Hairtail/Baldfish). Accordingly, use in this application is outside of the design specification, creating excess back-pressure and inhibiting the installation of the capping stack on the flowing well.
- **Weight and Configuration**: RapidCap is 40 MT, compared with 105 – 100 MT for the Aberdeen and Singapore stacks. Although a lower weight is preferable for air freight, this makes latching onto a rapidly flowing gas well more challenging. The non-symmetrical configuration of the GRIP system and the high centre of gravity provides further challenges for installation. B&C are actively being engaged by ExxonMobil's Drilling & Subsurface/Operations Integrity/EPR group to model the GRIP Deployment in order to address this issue.
- **Offshore Deployment**: The deployment of the GRIP system requires the availability of a suitable CSV with an accepted Safety Case. The CSV may have to be mobilised from the Singapore region. The time to prepare the CSV, sail to the Port of Melbourne, load the GRIP and sail to site would be similar to the planned strategy of loading a constructed capping stack on board a dedicated CSV in Singapore and mobilising to site.
- **Intervention / Bore Access** – The GRIP stack is valve-based, not ram-based and restricts the centre bore access to 7-$^{1}/_{16}$", limiting later intervention options (the BOP onboard the Ocean Monarch has a bore of 18 ¾").
- **Redundancy** – There is only one capping stack in the GRIP kit. The OSRL kit includes 4 capping stacks, and the WWC subscription gives us access to 2 stacks.
- **Air Freight Offloading** – the 747's do not have on board cranes like an Antonov and require offloading equipment at the arrival airport to unload the aircraft. This system would require a main deck loader to offload the equipment through either the side door or nose door.
- **Road Freight** – The GRIP system can load and be transported on standard flatbed trailers.
- **Critical Paths** – Site surveys and debris clearance are required prior to stack installation, so that capping stack transportation and preparation for installation may not be on the critical path. Initial efforts would also concentrate on attempts to close the existing BOP. Where the required

equipment is not available locally, it can readily be air freighted from Oilspill Response Ltd (OSRL) ex. Norway or Brazil.

- **OIE System** – The GRIP system is not compatible with the OSRL Offset Installation (OIE) and Containment equipment. If the OIE system is to be deployed, it will need to be used in conjunction with a 15ksi capping stack. However, taking into consideration the water depth at the Sculpin well, this option is not required because vertical access will be available.

By comparison, the selected 15 ksi OSRL / Wild Well Control (WWC) capping stacks:

- **Interface Check** – WWC Capping Stack Interface Check (WWC 2018a) verified direct interface with the lower BOP at the LMRP / lower BOP connection point (Primary Connection point) and the wellhead (Secondary Connection Point), using the Cameron HC, HCH4 or Dril-Quip DX-15 connector.
- **Intervention / Bore Access** – Both capping stacks allow for 18 ¾" unobstructed bore access (BOP on board the Ocean Monarch also has an 18 ¾" bore).
- **Blind Shear Rams and pressure rating** – Both stacks are fitted out with 18 ¾" Cameron type TL BOPs with Blind Shear Rams (enables shearing of tubulars which a valve system (GRIP) does not allow), chokes (3 $^{1}/_{16}$" and 5 1/8" respectively), with a 15,000 psi pressure rating and 3,810m water depth rating.

7.6 OSMP Implementation Framework and Strategy

7.6.1 OSMP Framework

In the event of a significant hydrocarbon release incident at the VIC/P70 well locations, a number of environmental monitoring studies will be implemented to inform spill response (Operational Monitoring) and to evaluate the potential environmental impacts to the marine environment (Scientific Monitoring).

The potential impacts of MDO and condensate spills have been assessed in Section 6.28 & 6.32 of this EP, with management and response measures provided in the associated Oil Pollution Emergency Plans (OPEP). The content of the OSMP is aligned with the environmental sensitivities outlined in Section 4 of this Environment Plans.

7.6.1.1 Monitoring Management and Information Pathways

This OSMP has primarily been developed to achieve operational monitoring ‘readiness’ in the event of an unplanned Level 2 or Level 3 spill at the VIC/P70 well locations.

In the unlikely event of a Level 2 or Level 3 incident, Esso will immediately initiate Operational and Scientific monitoring according to the sensitivities affected. The sensitivities identified within the Zone of Potential Impact (Operational ZPI) from the largest significant hydrocarbon release for each of the assets is identified in Table 7-22. Environmental sensitivity assessment to hydrocarbon is provided in Chapter 6.

Information Pathways:

Operational monitoring information will be used by COE, the Control Agency for petroleum facility-related spills in Commonwealth waters, to inform operational response activities. AMSA, the Control Agency for vessel-based spills, is responsible for operational monitoring in Commonwealth waters to inform response activities, however Esso will assist with monitoring wherever possible. All operational monitoring information will be directed to Australian Marine Oil Spill Centre (AMOSC), Australian Maritime Safety Authority (AMSA) and the Victorian Department of Economic Development, Jobs, Transport and Resources Environmental Management Division (DEDJTR EMD) to assist in operational response planning and effectiveness.

Information resulting from scientific monitoring will be directed to the relevant Commonwealth and State environmental authorities as it becomes available.

These monitoring and information flow management pathways are illustrated conceptually in Figure 7-6.

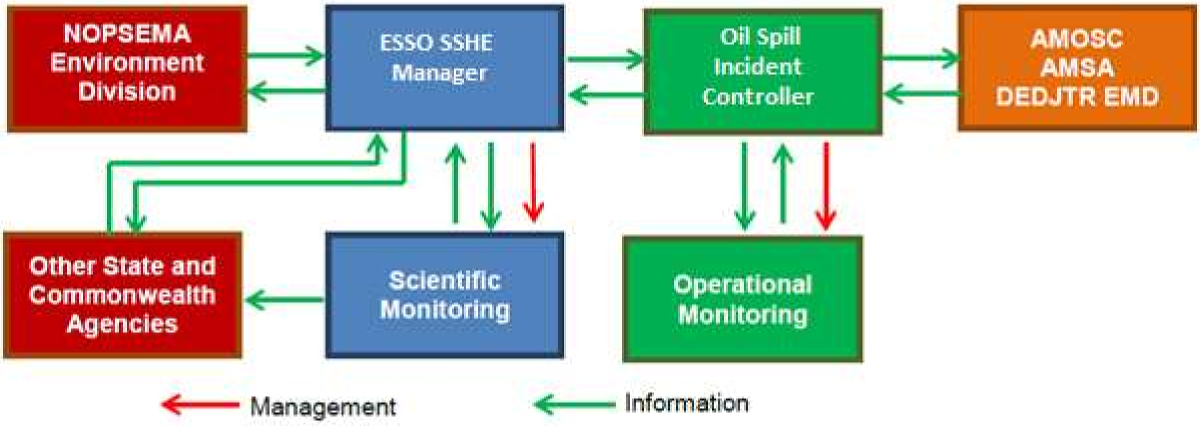


Figure 7-6 OSMP Monitoring and Information Flow Management Framework

Scientific monitoring consultation:

Esso will consult with relevant Commonwealth and Victorian State authorities prior to the implementation of scientific monitoring studies to ensure that scientific monitoring is undertaken to the satisfaction of the Commonwealth and Victoria. These authorities will include the Commonwealth Department of Environment and Energy (DoEE), for matters of National Environmental Significance (MNES) and for Victoria, the DEDJTR EMD who will coordinate the whole of government advice on the focus, scope and duration of the program.

Esso will notify these authorities on the relevant spill 'level' event and provide operational data to these authorities. Esso will consult with these authorities on the content of the Scientific Monitoring studies (e.g. baseline, location of reference and control sites, study method) and obtain feedback which will be incorporated into the study design to ensure scientific monitoring is to the satisfaction of the Commonwealth and State authorities. From this, the scientific monitoring implementation plans within this OSMP may be modified based upon this feedback.

Note that under Victorian state legislation (e.g. Emergency Management Act 2013) the state has over-riding decision making authority on the requirements of scientific monitoring. In the event that there is a conflict between the current OSMP modules and State and Commonwealth feedback, regulator recommendations will be adopted. This liaison will be adopted throughout the spill event to ensure that changing impacts and risks are captured within the process.

Operational monitoring will be provided to these authorities throughout the response to allow for continued feedback and refinement of the Scientific Monitoring study design.

7.6.1.2 List of Monitoring Studies

A consolidated list of OSMP studies and references to each study's strategy and implementation plan are provided in Table 7-21.

Table 7-21 OSMP Studies and Monitoring Performance Objectives and reference to OSMP Sections for each study's strategy and implementation

Study ID	Study Name	OSMP Section	Implementation Plan
Operational (response phase) monitoring modules			
O1	Oil spill surveillance	3.1	O1
O2	Water and oil sampling	3.2	O2
O3	Shoreline assessment	3.3	O3
O4	Fauna observations	3.4	O4
O5	Air quality	3.5	O5
Scientific (recovery phase) monitoring modules			
S1	Ecotoxicity	4.1	S1
S2:	Hydrocarbon monitoring of intertidal sediments and water	4.2	S2
S3:	Hydrocarbons in offshore sediments	4.3	S3
S4	Fish and shellfish taint and toxicity for human consumption	4.4	S4

S5	Short-term impacts to oiled fauna and flora	4.5	S5
S6	Long-term impacts to commercial and recreational fisheries	4.6	S6
S7	Long-term impacts to fauna	4.7	S7
S8	Long-term impacts to subtidal and intertidal benthic habitat	4.8	S8
S9	Long-term impacts to coastal flora	4.9	S9
S10	Long-term impacts to Ramsar values	4.10	S10

Table 7-22 Sensitivities which may be to be monitored as part of the OSMP in the event of a Level 2 spill

Environmental Sensitivity	General Offshore	Shoreline impact	OSMP Monitoring Studies	Applicable OPEP response measure
General Offshore				
Plankton	Yes		O2: Water and oil sampling S1: Ecotoxicology	MES
Fish/	Yes		S1: Ecotoxicology S4: Fish and Shellfish Taint	MES
Cetaceans/ Seals/Turtles	Yes		O4: Fauna observations S7: Long-term impacts to fauna	MES
Sub-tidal Zone				
Sub-tidal rocky reefs		Yes	S3: Hydrocarbons in offshore sediments S8: Long-term impacts to subtidal and intertidal benthic habitat	MES
Intertidal Zone				
Sandy beach		Yes	O3: Shoreline assessment S2: Hydrocarbon monitoring of intertidal sediments and water	MES Shoreline Clean-up
Mixed sand beach / platform		Yes	O3: Shoreline assessment S2: Hydrocarbon monitoring of intertidal sediments and water	MES
Seagrass		Yes	O3: Shoreline assessment S8: Long-term impacts to subtidal and intertidal benthic habitat	MES
Kelp-dominated reefs		Yes	O2: Water and oil sampling S8: Long-term impacts to subtidal and intertidal benthic habitat	MES
Saltmarsh/wetlands		Yes	O2: Water and oil sampling O3: Shoreline assessment S8: Long-term impacts to subtidal and intertidal benthic habitat S9: Long-term impacts to coastal flora S10: Long-term impacts to Ramsar values	MES, P&D Protect & Deflect
Upper Shore				
Seabird/shorebird breeding, feeding and resting area		Yes	O2: Water and oil sampling O3: Shoreline assessment S8: Long-term impacts to subtidal and intertidal benthic habitat S5: Short-term impacts to oiled fauna and flora	MES, Oiled wildlife response
Seal Colonies/Haul-out		Yes	O4: Fauna observations S7: Long-term impacts to fauna	MES
Fishing				
Commercial and recreational fishing	Yes	Yes	S4: Fish and Shellfish Taint	MES

Note. Studies O1: Oil spill surveillance & O2: Water and oil sampling are considered to be general and therefore apply to all environmental sensitivities.

7.6.1.1 Linkages between Environmental Sensitivities, Sensitive Locations, OSMP Studies and OPEP Response Options

The linkage between the environmental sensitivities, sensitive locations, this OSMP's study strategies and the OPEP response options are summarised in Table 7-22.

Note that where the spill risk is low and does not trigger a Level 2 spill incident, Esso will undertake a limited set of scientific studies to demonstrate to stakeholders that there are no ongoing impacts to water quality or shorelines.

Generally, the monitoring performance outcomes for the OSMP focus on:

- The relevant monitoring Environmental Performance Outcomes (EPOs) of the EPs.
- Informing response planning and management activities in the OPEP.
- Assessing impacts, recovery and possible remedial measures for environmental sensitivities identified in the EPs.

Hence, OSMP monitoring performance outcomes provide explicit linkages as to why the monitoring studies are required for the OPEP (i.e., operational monitoring environmental information for response planning and management) and EP (i.e., scientific monitoring study to monitor impact to and recovery of environmental sensitivities).

7.6.1.2 Monitoring Strategy Template

This section describes the generic format and content of a monitoring (field) study strategy.

Each monitoring study's strategy has been structured in a consistent manner to facilitate familiarity and ease of reference via a tabular format as described in Table 7-23.

Table 7-23 Structure of operational and scientific monitoring strategies

Strategy Component	Description
Initiation Trigger	Criteria to initiate the monitoring study.
Termination Trigger	Criteria to terminate the monitoring study.
Study Implementation Plan	Reference to OSMP Implementation Plan (IP) for a particular Study.
Competencies	Competency criteria for roles on the monitoring study team.
Reporting	Outputs (e.g. reports) of the findings of study for dissemination to relevant and approved parties.
Review and Auditing	Internal (reviews) and external (audit) overview.
Responsibilities	Responsibilities for different elements of each monitoring study.
Relevant References and Guidelines	Guidelines and high level references to implement the strategy.

7.6.1.3 Monitoring Implementation Plan Template

The implementation plans have been developed by the Principal Investigator (PI) for each study in accordance with the measurement criteria of the strategy. The implementation plans for each study include, at a minimum, the following elements:

- Introduction.
- Project Management.
- Baseline Data Establishment (studies S2-S7 only).
- Field Logistics: Mobilisation, Monitoring Logistics, and Demobilisation (not for modelling studies).
- Sampling and Analysis Methodology (or Modelling Methodology).
- Reporting and Communications.
- Quality Assurance/Control procedures.
- Internal Reviews and External Audits: Compliance Schedule and Reporting.
- Implementation plans supporting the VIC/P70 EP.

7.6.2 OSMP Implementation

7.6.2.1 Roles and Responsibilities

In the event of a Level 2 hydrocarbon release, Esso is responsible for the implementation and adherence to the OSMP. Table 7-24 identifies primary responsibilities associated with OSMP key roles. Each strategy in Section 3 provides more specificity of responsibilities for a particular monitoring program.

Table 7-24 Roles and responsibilities for the OSMP

Position	Responsibilities
Offshore Operations Manager	• Overall responsibility for implementation of the OSMP. • Report all environmental incidents.
Incident Commander	• Day to day responsibility for provision of spill characteristics and response measures needed for the implementation of the OSMP. • Day to day responsibility for facilitating/coordinating monitoring activities with response measures.
Offshore Risk, Environment and Regulatory Supervisor	• Approval of reports and plans. • Review of implementation of monitoring programs. • Oversee external audits. • Compliance interface with regulator(s).
Person in Charge (On-scene Commander)	• Initiation of spill surveillance in the initial response phase of a spill
Planning Section Chief (IMT)	• Initiating spill monitoring requirements
Environmental Unit Leader	• Managing implementation of spill monitoring modules as directed by the Planning Section Chief
Principal Investigator (PI)	• Development of IP. • Responsible for implementation of a particular OSMP study. • Review and/or carry out study's monitoring reporting requirements. • Provides advice with respect to environmental issues as required.
Monitoring Personnel (MP)	• Implement the OSMP. • Compliance with the requirements of the OSMP.

7.6.3 OSMP Phased Approach

Development and implementation of the OSMP is as detailed in Table 7-25.

Table 7-25 OSMP implementation phases

Time Period	Activity	Purpose	Output
Approval			
Regulatory acceptance of the Environment Plan(s).	Implementation Plans (IPs) prepared and available to support OSMP.	Operational and Scientific Monitoring Studies defined.	OSMP.
	Ensure availability of human resources, logistics and scientific equipment to implement OSMP if required.	'Readiness' for initiation of OSMP field activities if required.	Resources under existing agreements (people, equipment, plant), and confirmation that competent persons (PIs) are aware of OSMP responsibilities.
Readiness			
Capacity available and enhanced if and where required.	Pool of resources for monitoring team identified and provided with a contract call-off.	'Readiness' for a timely response upon notification from the GMO for OSM mobilisation.	Timely mobilisation of environmental monitoring teams in event of a Level 2 or Level 3 hydrocarbon release.
Monitoring			
Post-spill, pre-exposure (operational and scientific – as triggered)	Mobilisation of monitoring team and implementation of OSMP (operational and scientific – as triggered).	Operational monitoring studies to inform response planning and management of a hydrocarbon spill.	Data, notifications, and reports to inform response team to inform response planning and management.

Time Period	Activity	Purpose	Output
		Collection of reactive baseline data in scientific monitoring studies (as triggered).	Condition of environmental values established at start of hydrocarbon spill prior to hydrocarbon exposure (scientific monitoring – as triggered).
Post-exposure (operational and scientific – as triggered)	Continued implementation of OSMP (operational and scientific – as triggered).	Operational monitoring studies to inform response planning and management of hydrocarbon spill and scientific monitoring studies to monitor impact to environmental sensitivities.	Data, notifications, and reports to inform response planning and management (operational monitoring) and to monitor impact to environmental sensitivities (scientific monitoring – as triggered).
	Collate and assess existing baseline data for environmental sensitivities (scientific monitoring – as triggered).	Acquisition of existing data to establish baseline condition of environmental sensitivities, and identify gaps in baseline data to be acquired for scientific monitoring (scientific monitoring – as triggered).	Database of available baseline data established, plan for acquisition of baseline data gaps formulated (scientific monitoring – as triggered).
	Cease operational monitoring when termination criteria met.	Cessation of response planning and management because environmental sensitivities no longer at risk from additional hydrocarbon impacts.	Data/information collated to date for both operational and scientific monitoring to inform scientific Hind-cast modelling.
Long-Term Monitoring (scientific)	Continued implementation of OSMP (operational monitoring only).	Scientific monitoring studies to monitor impact/recovery to environmental sensitivities.	Data and reports to monitor impact / recovery to environmental sensitivities (scientific monitoring).
	Cease scientific monitoring when termination criteria are met.	Cessation of monitoring because environmental sensitivities completely / sufficiently recovered from hydrocarbon impacts.	Final Reports.

7.6.3.1 Reporting

The reporting requirements for the OSMP are detailed in each monitoring study's strategy (see OSMP).

For the scientific monitoring studies, the appropriate regulator will be provided with:

- Annual reports that summarise all of the on-going (or recently terminated) monitoring studies; and
- Final reports for each monitoring study.

Where required and agreed, the appropriate regulator can request other reports from the Esso Offshore Risk, Environment and Regulatory Supervisor (or delegate) and can also confirm adherence to the reporting schedule and contents (defined in the strategies and implementation plans) through the auditing mechanism which is described in Section 7.6.3.2 below.

7.6.3.2 Internal Review and External Auditing

Across the suite of OSMP studies, the adopted internal review and auditing approach comprises the following framework:

- Each study’s implementation plan will define a monitoring compliance audit schedule on the basis of the commitments in the study’s strategy (refer Section 3 of OSMP) and more detailed commitments defined in each study’s implementation plan.
- Internal review by the Esso Environment Advisor regarding the conformance to the OSMP’s audit schedule elements will be carried out routinely (one month for operational, three months for scientific). Any non-conformances will need to be rectified by the PI within two weeks of the internal review. All internal reviews will be recorded and archived on compliance proforma reports in each study’s implementation plan.
- External audits by the relevant regulator(s) of completed compliance reports and other OSMP commitments may be carried out at any time.

8 Implementation Strategy

The Commonwealth OPGGSE Regulation 14 requires that an implementation strategy must be included in an EP. The implementation strategy described in this section identifies systems, practices and procedures to be used to ensure that the environmental impacts and risks of the activity are reduced to As Low As Reasonably Practicable (ALARP) and acceptable levels, and that the environmental performance outcomes and standards in the Environment Plan are met.

This section details the processes that are in place for the VIC/P70 exploration drilling operation to ensure that the environmental performance standards and objectives are met. These include:

- The systems, practices and procedures being used
- The chain of command and roles and responsibilities for implementation, management and review of this environment plan
- The training and awareness of all personnel and contractors involved in the VIC/P70 exploration drilling campaign in the requirements of the plan
- Incident and other Reporting requirements
- Monitoring and audit of the environment plan
- Management of Non-Conformance and corrective actions
- Review of the Environmental performance
- Maintenance of quantitative records of emission and discharges in relation to the performance standards and measurement criteria
- Description of the VIC/P70 Oil Pollution Emergency Plan (OPEP) and review schedule.

8.1 Esso Operations Integrity Management System (OIMS)

This VIC/P70 exploration drilling program will operate in accordance with the proprietary ExxonMobil Operations Integrity Management System (OIMS). OIMS is adopted by all ExxonMobil affiliates worldwide. It contains 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). Figure 8-1 shows the 11 Elements of OIMS.

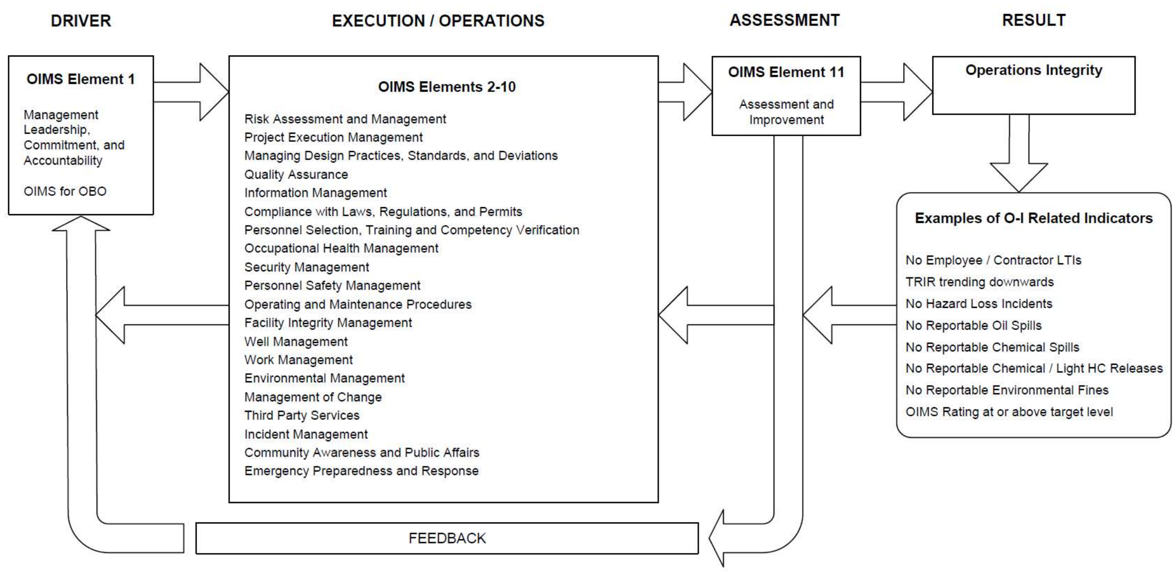


Figure 8-1 OIMS management systems

All OIMS management systems contribute to the effective management of the identified environmental risks and impacts in this EP. OIMS Systems that have been referenced include:

- **OIMS System 8-1: Third Party Services**
- **OIMS System 10-2: Emergency Preparedness and Response**

8.1.1 OIMS System 8-1: Third Party Services

The purpose of OIMS System 8-1 is to provide a systematic approach for the selection of stewardable contractors and subsequent management of interfaces between Esso and contractors and between contractors to lead to work being performed in a safe, secure, and environmentally sound manner. This System covers requirements for revaluating and selecting contractors, communication and verification of OI requirements, interface management, and performance monitoring and stewardship.

The System objectives are:

- Contractors are qualified, evaluated, and selected based on their ability to perform work in a safe, secure, and environmentally sound manner at the best total value.
- Operations Integrity requirements are clearly defined and communicated to the third party contractors
- Effective interface plans are developed, and interfaces are managed between the business line and contractors.
- Contractor performance is monitored, feedback provided, and deficiencies corrected.

The process for evaluating and selecting third party contractors ensures they meet minimum operations integrity criteria, which includes (1) a documented safety, health and environment program, including security as appropriate, that includes an effective and relevant training program together with documented safety performance; (2) compliance with relevant regulations and business line standards; (3) Operations Integrity qualification criteria are verified during the contracting process and records maintained; and (4) relative capability to perform work in a safe and environmentally sound manner is considered in addition to cost when selecting third-parties.

Job specific Operations Integrity requirements are defined and communicated to third-parties during the contracting process and included in third party contracts.

Effective interface management is a process of timely interaction and consistent communication between the business line and contractor as well as among contractors to influence behaviours and prevent incidents. Processes are in place to ensure personnel actively engage in interface activities with third-parties as well as in interface activities among multiple third-parties on one site or performing related activities.

Effective performance monitoring programs require alignment between the contractor and the business line on performance expectations and key performance indicators (KPIs) to be measured. Specific performance monitoring requirements are detailed in the contract agreement or in site-specific or contractor-specific SSH&E Plans.

8.1.2 OIMS System 10-2: Emergency Preparedness and Response

The purpose of OIMS System 10-2 is to ensure that Esso establishes effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations. This System addresses all sites for which Esso has responsibility and includes emergencies, disruptions to critical business operations, and security threats that could occur throughout the business line's sphere of influence (e.g., processing, drilling, transportation, office).

The System objectives are as follows:

- Emergency response plan(s) and business continuity plan(s) are documented, resourced with qualified personnel, accessible, current, and clearly communicated.
- Required training, exercises, simulations, and/or drills are conducted to determine the adequacy of the emergency response and business continuity plans.

Readiness and response strategies are designed to minimize business impacts by deploying continuity strategies beginning with monitoring and surveillance by site personnel and supporting systems. In the event of an incident, an effective response will be required beginning with the initial assessment and objective of minimizing impacts to personnel, the environment and critical business activities

The overall process of effective emergency response and business continuity planning includes; (1) developing the Emergency Response Plan (ERP) and Business Continuity Plan (BCP); (2) conducting training, exercises, simulations, and/or drills of incident response and business disruption scenarios affecting critical operations; and (3) updating the ERP / BCP for significant changes.

8.2 Diamond Offshore Safety and Environmental Management System (SEMS)

8.2.1 Project Management System

This project is being implemented under the umbrella of the ExxonMobil Environmental Policy and OIMS which the drilling contractor, supply vessels and any other contractors, must abide by. The drilling contractor and supply vessels and contractors have in place formal, written systems, practices and procedures for management of HSE.

Through the Third Party Services Element of OIMS (Element 8), third party systems practices and procedures are reviewed and assessed for acceptability by Esso prior to commencement of operations. Third party servicers and systems are subject to regular audits throughout the program, at a minimum these are conducted annually as part of the critical contractor’s evaluation program.

Diamond Offshore, as the nominated Facility Operator of the Ocean Monarch MODU, has in place a comprehensive Safety and Environmental Management System (SEMS) and Risk Management process.

Diamond Offshore ensures that all activities undertaken on the MODU are conducted and managed under the Ocean Monarch SEMS and all personnel including third party contractors are provided with induction training into the SEMS system prior to undertaking work on the Ocean Monarch.

Spill prevention controls include inspection/audit procedures that address housekeeping, leaks/spills, and storage areas, Marine Operations Procedures and Fuel Oil Transfer Procedures.

MODU operations are conducted within a framework of environmental awareness training, routine inspections, job safety analysis and incident reporting.

8.2.2 Permit to Work

The objective of the PTW system is to control any work that may present hazards or high risk to personnel or the integrity of the drilling unit, or conflict with other work by introducing hazards or risks not previously identified. The objective of the system is to ensure that certain work is adequately defined, planned and authorised, and that hazards are identified and a mechanism exists for their control.

The PTW system is used in close conjunction with the JSA and work instructions to ensure effective task level risk management of operations that deviate even marginally from routine operations.

8.2.3 Job Safety Analysis

Diamond Offshore has designed a JSA process to systematically plan and organise jobs, tasks and procedures in order to minimise risk to employees, equipment, or the environment, and to maximise operational efficiency.

The JSA shall be applied to all safety-critical jobs, tasks and procedures, and no completely new task will be performed without a JSA being completed. The JSA is a living document, and a master copy will be maintained on the facility and reviewed prior to performing the job for which it was written.

JSAs will be completed for at least every task listed on the JSA task list. Additional JSAs will be developed when appropriate, depending upon facility type and activity. There shall be only one JSA for a particular job task. As criteria or conditions change that may affect the original plan, it must be updated to compensate for the changes. If conditions change at any time during the performance of the task, then the job will be stopped to analyse the effects of the change. If necessary, the JSA will be modified prior to resuming the task.

The JSA is to be used as a job reference and training tool for all crew members. It is the basis for pre-job and pre-tour safety meetings, and will promote hazard awareness.

Diamond Offshore has adopted the JSA into its safety culture as one of the most important pro-active tools to ensure the safety of its employees. Recognising the need for additional training, the HSE department developed a training video that describes the importance of JSAs to the company, how to manage the JSA process, and answers some frequently asked questions about JSAs. The JSA training video is the corporate minimum standard for JSAs. The HSE Representative shall ensure that any additional local requirements are also met.

Once training and orientation are conducted, it is Diamond Offshore's expectation that JSAs will be conducted in accordance with the training received. Correct application of the JSA system will assist in achieving the shared goal of always working safely.

The JSA video is to be viewed on a periodic basis to keep this important information fresh in everyone's mind. To make sure this is achieved, all personnel are to view the video at least once a year, which is to be documented by the SDR. It is the responsibility of each SDR to show this video as part of the induction and orientation process for all new employees and third-party personnel.

The JPS is a user friendly, facility specific, computer based program which provides crew members a tool to electronically manage their facility specific JSA. JPS is accessible on each facility via a web-based browser interface.

The JSA procedure is set out in SEMS 3.5, and involves the following steps:

- Determine if a JSA is required for the task
- Define the task
- Designate resources
- Layout the procedure
- Analyse the procedure.
- Record the JSA in JPS, with all required approvals
- Review the JSA
- After-action review

It is the responsibility of the OIM to develop and maintain the master JSAs, review and approve all JSAs prior to use, ensure that all personnel are effectively utilising the JSA process and supplying all the resources required for the safe completion of all tasks. It is the responsibility of all Diamond Offshore and third party employees to be familiar with the process and implement it whenever it is required to be completed.

8.2.4 Management of Change (MOC)

The objective of the MOC standard is to describe three key elements necessary for effective MOC:

- Establish a formalised method to identify and control hazards associated with changes to facilities, procedures, or personnel
- Maintain the accuracy of safety information
- Document and communicate the change, the cost of the change and its effects to all involved parties, including management.

MOC procedures are divided into three main categories:

- **Procedural MOC procedures**:
    - Diamond Offshore Global Excellence Management System (GEMS)
    - Operational MOC procedures.
- **Technical MOC procedures:**
    - Technical services work request
    - Modification authorisation.

- **Personnel MOC procedures**:
  - Payroll and status authorisation
  - Core manning
  - Training matrix.

Any waiver from or change to company policy, standard or procedure, or a change to a documented procedure contained in the company's formal management systems, must be approved and signed by the Vice President of the department that originated the policy or procedure. A change where cost is involved also requires approval in accordance with the Approval Authority Matrix.

In international areas, there may be additional area-specific requirements. The Area Manager has approval authority to allow a waiver or change to a documented policy or procedure, as well as temporary or rig specific modification or waiver with no financial impact only in regard to those area-specific requirements. Any waiver or change at the local level must not contradict the policy or intent stated in the corporate management system and must be approved in accordance with the Approval Authority Matrix.

8.2.5 Diamond Offshore Environmental Management

A Diamond Offshore Environmental Management system (EMS) has been developed to establish standards and company policy for environmental management in operations to protect the environment and to comply with applicable laws and regulations, and is applicable to company operations worldwide.

Annual goals for the EMS are set, monitored and measured according to frequency and volume. The ultimate goal is zero incidents, but the target is continuous improvement by exceeding the previous year's performance as stated in the corporate annual plan. Annual plans and goals are described in the SEMS performance monitoring manual.

Diamond Offshore recognises the importance of all employees working together to achieve the goals in the protection of the environment. Therefore, each employee has the responsibility to conduct activities with the protection of the environment as one of the main priorities. The EMS also includes specific responsibilities that contribute to protection of the environment.

In addition to the elements detailed above, the environmental practices section addresses:

- Environmental policy
- Environmental aspects
- Regulatory compliance
- Environmental procedures
- Waste management.

8.2.6 VIC/P70 Exploration Drilling Documents

The following documents have been developed for the VIC/P70 exploration drilling program and set the standards and requirements to be met for the Drilling campaign by all parties (Esso, Diamond Offshore MODU, Support Vessels and Contractors):

- The VIC/P70 Exploration Drilling Environmental Plan (this document)
- The VIC/P70 Exploration Drilling Bridging Emergency Response Plan (ERP)
- The VIC/P70 Exploration Drilling Oil Pollution Response Plan (OPEP)
- The VIC/P70 Exploration Drilling Waste Management Plan (WMP)

The content of these documents is introduced as part of the induction process for personnel on-board the MODU and supply vessels, and copies are made available to crew members prior to the commencement of any work.

8.2.7 Summary Report Forms/Checklists

D-Forms have been developed under the ExxonMobil Drilling Company for worldwide use as a standard means of managing particular drilling activities under OIMS. The forms are used for work preparation, inspection, recording and reporting of information. Table 8-1 summarises the operations forms that are utilised for the VIC/P70 Exploration Drilling campaign.

Table 8-1 Forms and Checklist

System/Activity	Party Responsible	Frequency
D-005 OIMS Bridging Document Bridges between OIMS and MODU Operator procedures	Esso Operations Superintendent	Before start of drilling campaign
D-020 Environmental and Regulatory incident report form Provides details of the incident, also records the corrective actions and causes of the incident.	Esso Drilling Supervisor	Environmental near miss or Incident
D-075 Emergency Response Drills/Exercise Report Records details of the exercise, actions and learnings	Esso Drilling Supervisor	30 Days after completion of drill/exercise
D-100 Corrective actions Report Action Tracking register (project based). Where actions from other forms are not closed out immediately they are recorded on the D-100 form and tracked to completion.	Esso Drilling Supervisor	Monthly
D-160 Worksite radiation checklist Checks for certifications, licences, barriers, leakage tests, check for personnel radiation monitors	Esso Drilling Supervisor	Prior to storage or use of radioactive sources
D-170 Hydrocarbon and Chemical Readiness checklist Checks for hose integrity, pressure test, critical valves, SDS,	Vessel master	Prior to each transfer
D-180 Well control readiness checklist checks pressures on operating panels and accumulator system	Driller or Assistant Driller	Every Tour (every 12 hours)
D-210 Rig inspection report Checks all safety and environmental systems and equipment on board. Checks for spills and leaks.	Esso Operations Superintendent	Before the rig is contracted, and quarterly thereafter
D-220 Crane operations checklist Checks certification strut and winch line inspection	Esso Drilling Supervisor	Initially when crane put in service, annually thereafter

8.3 Contractor Management

All contractors and subcontractors represent that they are fully capable of performing work in compliance with the provisions of the contract environmental clauses and laws and regulations of Australia.

Contractors must also comply with all applicable Esso and Diamond Offshore's safety, health and environmental standards, practices and procedures that comply with these provisions.

Where Esso contractors are providing services or equipment which is deemed to be critical under the operations integrity management system (OIMS), the contractors' HSE Management Systems (SEMS) are reviewed as part of the contractor selection process to ensure they have appropriate systems to manage safety and environment.

Approval and management of contractors working on the MODU occurs via the Vendor Evaluation and Approval Procedure and the Contractor Oversight Procedure. All third party contractors must work under the Ocean Monarch SEMS and under the control of the OIM.

8.4 Roles and Responsibilities

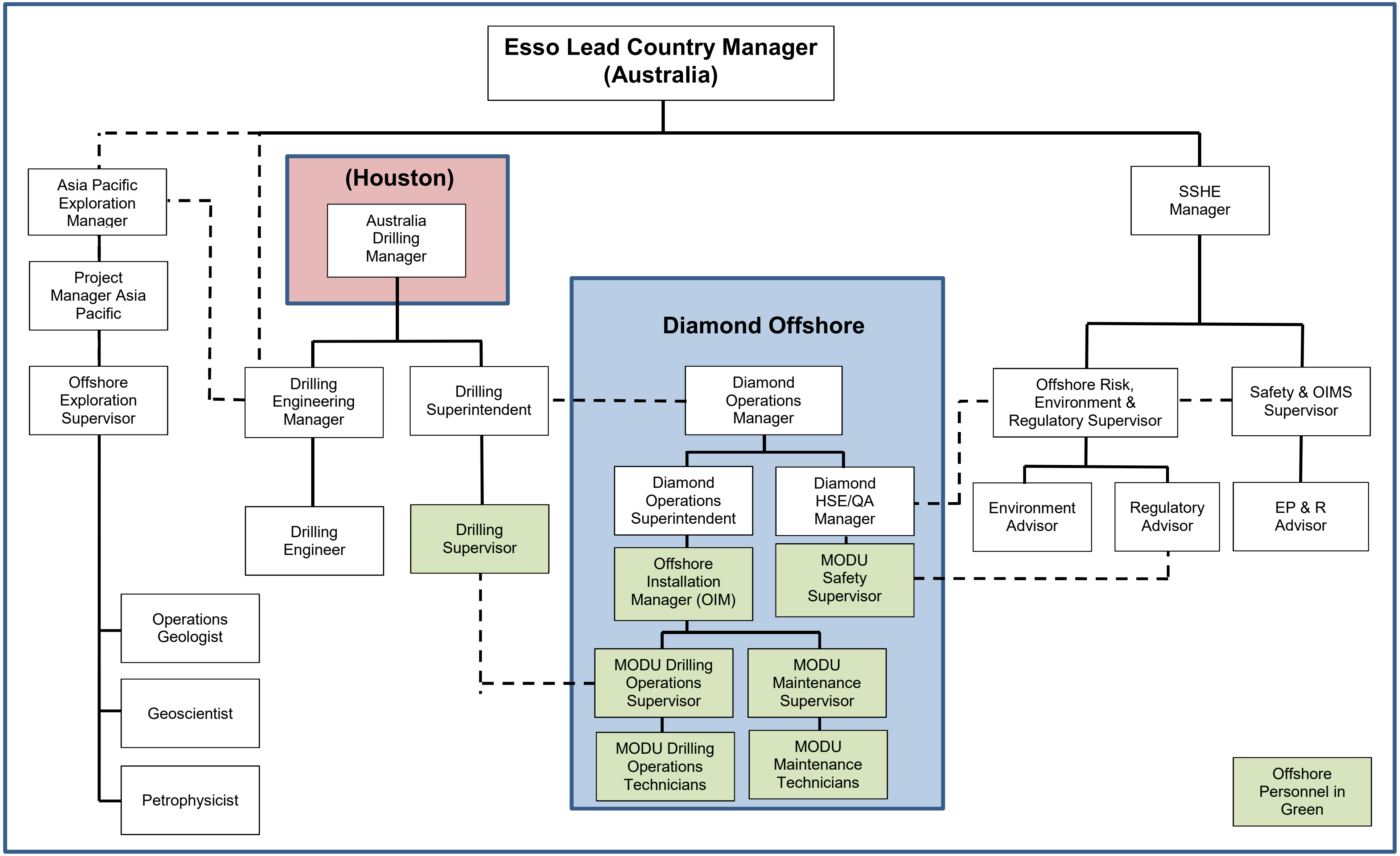
An organisation chart for the campaign is provided in Figure 8-2 and the key roles and responsibilities for key personnel including the specific performance standards they are responsible for are outlined in Table 8-2.

Table 8-2 Key Roles and Responsibilities

Role	Responsibilities
Esso Operations Superintendent	• Undertakes duties as delegated by the Drilling Manager. • Oversees day to day operations during drilling operations. • Primary point of contact between MODU Operations and shore-based team • Stewardship and sustainability of OIMS on operational area. • Ensures follow up actions arising from environmental incidents are carried out. • Reviews environmental performance at Asset Leadership Team (ALT) meetings. • Leads the Incident Management Team (IMT). • Acts in accordance with the OPEP. • Implements source control plans in the event of a well incident • Ensures prompt follow-up action is initiated and completed after inspections/audits, incidents and emergency drills conducted for operations. • Ensures that operational monitoring activities are being implemented • Reviews current operations and maintenance issues with the Diamond Offshore MODU Operations Supervisor and the MODU Maintenance Supervisor. • Responsible for the relevant performance standards given in Section 6.
Esso Drilling Engineering Manager	• Undertakes duties as delegated by the Drilling Manager. • Ensures an effective organisational structure is in place, with defined roles and responsibilities to ensure the implementation of OIMS for offshore facilities and associated drilling operations. • Ensures sufficient competent staff to execute drilling operations under normal and emergency conditions. • Ensures procedures are in place and used effectively for the safe and efficient work management during drilling operations. • Ensures systems are in place to provide technical support and competent field personnel to maintain facility integrity during drilling operations. • Ensure that arrangements are in place to respond to a well control incident • Member of the Esso Emergency Support Group. • Reports to regulatory authorities as appropriate, including the reporting of environmental incidents (this may be delegated to the Drilling Superintendent or OIM).
Esso Drilling Supervisor	• Undertakes duties as delegated by the Drilling Superintendent. • Supervises all drilling activities • Manages logistics for the MODU • Notifies drilling superintendent of any incidents. • Liaises with on scene commander, maintaining situational awareness for the IMT
Esso Drilling Engineers	• Provides technical oversight prior, during and on completion of drilling operations. • Interfaces with New reservoir Developments Supervisor, Reservoir engineers, Petrophysicists, Geoscientists and Operations Geologists.
Diamond Operations Manager	• Stewardship and sustainability of Diamond SEMS on operational area. • Conducts crew change briefings with OIMs at the commencement of their shift. • Ensures follow up actions arising from environmental incidents are carried out. • Ensures prompt follow-up action is initiated and completed after inspections/audits, incidents and emergency drills conducted for operations. • Ensures that competency based critical training is delivered on schedule. • Responsible for the relevant performance standards given in Section 6.
MODU Operations Superintendent	• Undertakes duties as delegated by the Diamond Operations Manager. • Implements and ensures adherence to relevant environmental legislative requirements, commitments, conditions and procedures on-board the vessel. • Overall responsibility for meeting requirements and standards of MODU environmental performance. • Maintains clear communication with the crew. • Communicates environmental hazards and risks to the workforce and the importance or following good work practices.

Role	Responsibilities
	• Maintains vessel in a state of preparedness for emergency response.
Diamond MODU Offshore Installation Manager (OIM)	• Notify the Drilling Superintendent of any environmental incidents. • Conducts quarterly emergency drills, quarterly safety meetings, and reviews and updates site hazard hunt register. • Conducts daily tool box meetings. • Encourages active employee and contractor involvement in hazard identification and risk assessment processes including Job Safety Analysis and Step Back 5x5. • Ensures that personnel are competent to perform critical tasks and emergency response roles. • Manages work activities in accordance with Operations, Maintenance, Drilling and Work Management procedures. • Reviews operational area and subsea facility environmental performance at Red Box meetings. • Responsible for the relevant performance standards given in Section 6.
MODU Drilling Operations Supervisor	• Stewardship and sustainability of OIMS on MODU while it is on the operational area. • Conducts crew change briefings with Drilling Supervisors at the commencement of their shift. • Responsible for the relevant performance standards given in Section 6.
Esso Offshore Risk, Environment & Regulatory Supervisor	• Undertakes duties as delegated by the SSHE Manager. • Coordinates environmental audits of the drilling operations to ensure compliance. • Ensures all regulatory reporting requirements are met. • Responsible for the relevant performance standards given in Section 6.
MODU Maintenance Supervisor	• Ensures maintenance and testing activities are carried out in accordance with the preventative maintenance systems. • Ensures sufficient competent staff to maintain the operational area and pipelines under normal and emergency conditions. • Reviews current operations and maintenance issues with the Diamond Offshore Installation Manager (OIM) and the Diamond Operations Superintendent at the Operations meetings.
Esso Regulatory Advisor	• Undertakes duties as delegated by Offshore Risk, Environment & Regulatory Supervisor. • Interface between Esso SSHE and MODU Safety Supervisor. • Coordinates audits and inspections as delegated by Offshore Risk, Environment & Regulatory Supervisor, and in discussion with environmental advisor and regulatory authorities
MODU Safety Supervisor	• Oversees day to day operations onboard MODU to ensure operations are in accordance with approved procedures • Undertakes inspections, monitoring and reporting in accordance with approved procedures, including this EP. • Coordinates daily tool box meetings. • Coordinates safety and environmental inductions onboard the MODU • Provides input into incident reporting • Undertakes incident investigation in collaboration with Regulatory Advisor and EP&R Advisor • Reports to Regulatory Advisor on the daily operations onboard the MODU
Esso Emergency Preparedness & Response Advisor (EP & R)	• Ensures emergency response capabilities are maintained.
Esso Contract Administrator	• Manages the interface between vessel third-party contractors and Esso prior, during and on completion of drilling operations.
Support Vessel Master(s)	• Implements and ensures adherence to relevant environmental legislative requirements, commitments, conditions and procedures on-board the vessel. • Maintains clear communication with the crew. • Communicates environmental hazards and risks to the workforce and the importance or following good work practices. • Maintains vessel in a state of preparedness for emergency response. • Reports environmental incidents to the Esso Drilling Superintendent and ensures follow-up actions are carried out.

Figure 8-2 VIC/P70 Exploration Drilling Organisation Chart (simplified)



8.5 Training and Competency

Esso requires that all personnel be trained in accordance with their respective contractor- established training requirements as well as Esso contractually specified requirements.

The Diamond Offshore Human Resources Manager ensures that personnel assigned to HSE positions are adequately experienced and qualified for their roles.

Diamond have established the worldwide competency program, which is integrated with the company's personnel and payroll systems and provides system controls and documentation of completion. Audits of the competency program are conducted through the internal annual GEMS, regulator, customer and IADC accreditation audits. Each third party service provider is also required to maintain training files for their personnel. These records are verified as part of initial contract requirements and then audited at a minimum of annually for critical contractors.

8.5.1 Environmental induction

All Esso personnel and third party contractors, involved in the drilling campaign, undergo environmental awareness training prior to commencing work on the project as part of their induction. The environmental training informs the work crews of their obligations and project-specific environmental management procedures.

The induction includes the following:

- The Environmental regulatory requirements of the drilling campaign
- Marine user interaction:
  - Requirement to comply with the proximity distance as per the 2017 Australia National Guideline for Whales and Dolphin Watching
  - Requirement to record and report sightings of whales and dolphins
- Waste segregation, containment and disposal:
  - No waste overboard policy
  - Requirements for waste minimisation, segregation, labelling, handling and storage.
  - Requirements for recording waste movements and transfers in Garbage Record Book.
- Housekeeping and spill prevention:
  - Requirements to store chemicals, oils and wastes in designated area.
  - Requirements to adhere to bunkering procedure for fuel transfers.
  - Availability of spill transfer equipment.
- Spill preparedness and response:
  - Alerting procedure and immediate spill response actions.
- Environmental incident reporting:
  - Requirements for reporting reportable and recordable incidents.

8.5.2 Vessel Induction

The Vessel Induction is provided to all personnel that enter the vessel bridge. The induction covers vessel-specific information about environmental awareness, including garbage management, and reporting incidents. A record is kept of completed inductions for a minimum of one year.

8.5.3 Well Control School

Well control school provides theoretical and practical simulation training of what can cause loss of well control and techniques used to bring the well under control should an incident occur. It involves learning how to calculate pressures and thereby determine the calculation of the correct weight of the muds and the pump rate required to balance and control the well. Participants must pass a written and practical assessment to acquire the Well Control Competency Certificate. People in each of the following positions must have a certificate to conduct drilling operations in accordance with Esso training requirements.

- Drilling Engineering Manager
- Drilling Operations Superintendent
- OIM
- Drilling Operations Supervisor
- Offshore Operations Manager
- Drilling Engineers
- Drilling Operations Technicians
- Driller
- Assistant Driller
- Toolpusher

8.5.4 Operations Safety Leadership

All members of the drilling operations team must attend the Operations Safety Leadership.

8.5.5 Oil Spill Response Training

Oil spill response training will be made available to specific personnel required to undertake a role in oil spill response.

Table 8-3 Oil spill response training

Section	Role	Course
Incident Command	Incident Commander	• Incident Management Training (PMAOMIR418). • Oil Spill Response Fundamentals.
Planning Section	Planning Section Chief	• Incident Management Training (PMAOMIR320). • Oil Spill Response Fundamentals.
	Environment Unit Lead*	• AMOSC IMO II Oil Spill Management or University of Spill Management • Incident Management Training (PMAOMIR320).
Operations Section	Operations Section Chief	• Incident Management Training (PMAOMIR320). • Oil Spill Response Fundamentals.
	Maritime Unit	• AMOSC Operations Course (IMO 1).
	Aviation Unit	• Oil Spill Response Fundamentals. • Aerial Observers Course
	Shoreline Unit	• AMOSC Operations Course (IMO 1).
	OH&S Unit	• ICS 200 (computer based training).
	Waste Management	• Oil Spill Response Fundamentals.
Logistics Section	Logistics Section Chief	• Incident Management Training (PMAOMIR320). • Oil Spill Response Fundamentals.
	All other roles	• ICS 200 (computer based training).
Finance & Admin Section	Finance & Admin Section Chief	• Incident Management Training (PMAOMIR320) • Oil Spill Response Fundamentals.
	All other roles	• ICS 200 (computer based training).

* *When the IMT is activated, the Environmental Unit Leader becomes responsible for managing implementation of the OSMP modules, as directed by the Planning Section Chief (OSMP, Section 2.1).*

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 the involvement in drills and spill exercises, the management of marine monitoring programmes, such as PFW monitoring, the monitoring of parameters relating to offshore drilling and operations activities. In addition, the minimum requirement includes a relevant tertiary degree in engineering, environmental science, environmental management or similar.

Esso implements incident management based on the Incident Command System (ICS). The Incident Command System (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 (NIMS) 2006 ICS Structure, with slight modifications for industry. ICS is the primary emergency response framework for an oil spill response from platform activities.

Typical incident management roles and training requirements are outlined in Table 8-3 and discussed further below.

8.5.6 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 will 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.

8.5.7 ICS 200 Training

ICS 200 Training will consist of a combination of computer based and instructor lead sessions along with a tiered exercise program.

8.5.8 Oil Spill Response Fundamentals

To supplement Incident Management Training, Esso has engaged AMOSC to deliver an Oil Spill Response Fundamentals course. Outcomes of the course are to:

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. Increase familiarity with the Bass Strait OPEP and the processes and oil spill strategies detailed therein.

8.5.9 AMOSC Operations Course

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 the Australian Marine Oil Spill Centre (AMOSC), Oil Response Company of Australia (ORCA) or another training provider. Selected personnel may also be nominated to attend AMOSC's Oil Spill Response Operations Course (IMO 1). Twenty four personnel have completed this course as at February 2014.

8.5.10 Optional Specialist Training

Optional specialist training may be made available to specific personnel required to undertake a role in oil spill response. This training has been summarised in Table 8-4 and discussed further below.

Table 8-4 Optional specialist training

Typical Attendees	Course
RRT members and select IMT members	University of Spill Management.
Members of the AMOSC Core Group	AMOSC Core Group Training.
Select IMT members	AMOSC Oil Spill Response Management.
Nominated personnel	Aerial Surveillance Course.
RRT members	Regional Response Team Training Workshop.
ESG members and select IMT members	Advanced ESG Training.

8.5.11 AMOSC Core Group

Selected Esso personnel have been identified as members of the AMOSC Core Group and may be called upon to respond under the national Plan arrangements. These personnel receive training through

AMOSC in accordance with the AMOSC core group agreement. They must also participate in annual training, exercise or response activities in order to maintain their competency

8.5.12 University of Spill Management

ExxonMobil has developed an oil spill response training program which aims to present the fundamentals of oil spill response (OSR) and provide a broad overview of OSR 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 Incident Management Team (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 (AMOSC and/or OSRL). The course is generally run over four days.

The course content covers:

- OSR concepts
- Decision processes
- Corporate policies and preferences
- Fate, behaviour, tracking and surveillance
- Response options
- Mechanical, In-situ burning, Dispersants, Monitor & Surveillance
- Response components
- Practical realities
- Common misconceptions
- Hands-on equipment deployment

On completion of the course participants will be certified in ICS 100-200.

8.5.13 AMOSC Oil Spill Response Management

As an Alternative to the University of Spill Management course, IMT personnel may attend the IMO II (Oil Spill Response Management Course).

8.5.14 AMOSC Command and Control

Personnel identified to fulfil a Tier 2/3 Incident Commander role shall attend the IMO III (Command and Control course) or equivalent.

8.5.15 Regional Response Team (RRT)

Esso, along with other ExxonMobil business units, contribute personnel to ExxonMobil's Asia Pacific Regional Response Team (AP RRT). The AP RRT conducts annual training workshops which are typically combined with a response exercises. Selected personnel from the AP RRT may also participate in workshops and exercises run by the North America, or, Europe, Africa, and Middle East RRT's. Participation in RRT workshops and exercises is coordinated by the Asia Pacific EP&R Advisor.

8.5.16 Emergency Support Group (ESG)

Members of the Emergency Support Group (ESG) provide strategic support in event of an oil spill or other emergency event. ExxonMobil's Advanced ESG course is used to train ESG members in the ESG process as well as provide an overview of ExxonMobil's emergency response structure. This is an internally run course which combines theory and a number of simulation exercises the course is typically run over 2.5 days. Course objectives are to:

- Increase awareness of the ExxonMobil emergency response system and the underpinning principles
- Assist in achieving a consistent approach to the ESG response process across the Corporation

- Familiarize participants with roles and responsibilities within the ESG and the interface with other responders and stakeholders
- Provide an opportunity for participants to practice roles
- Improve ESG leadership and communication skills
- Build confidence of participants in responding as a team and individually
- Enhance ExxonMobil's commitment to a consistent approach to emergency response

8.5.17 Aerial Surveillance Course

Members of the Aviation Unit are required to attend the Aerial Surveillance Course, which will be provided by AMOSC and OSRL and will cover:

- Basic hydrocarbon theory and its relevance to aerial surveillance.
- Basic understanding of how to work in an aviation crew environment.
- How to effectively plan and coordinate an aerial surveillance flight.
- How to carry out the plotting and recording of oil spill information.
- How to present oil spill information back through the IMT in a clear and coherent manner.

8.5.18 Ocean Monarch Training

Table 8-5 provides a summary of other training to be completed by personnel involved in the VIC/P70 Exploration Drilling campaign.

Table 8-5 Ocean Monarch Training – VIC/P70 Exploration Drilling

Type Training	Frequency	Required For	Provided By
New orientation Arrival / Environmental Training (See Section 8.5)	1st Visit to MODU or if absent for over 3 months	All visitors and normal crew	MODU OIM / Diamond Offshore
Hazardous material handling	Annual	All personnel	Diamond Offshore or 3rd Party Training institute
Permit to work	Once - refresh periodically	All personnel	Diamond Offshore
Spill Prevention	Annually	All personnel	Diamond Offshore
ERP/OSCP Drills and Exercises	As required	All personnel	See section 8.8

8.6 Reporting and Inspections

8.6.1 Daily Reporting

For the duration of the drilling campaign, daily reports, outlining the activities undertaken over the last 24 hrs are prepared. These reports contain details of the drilling activities, record environmental performance information, fluids movement on and off the MODU including, Fuel, and Brine, Volumes of muds and slops discharged.

8.6.2 Monthly Reporting

Esso submits to NOPSEMA a monthly report as required by the OPGGSE Regulations, 2009 (Cth) r. 26B.

A "*recordable incident*", i.e. any incident that breaches a performance objective of this EP (refer Section 8.6.6) and is not a "*reportable incident*". The Monthly report is submitted by the 15th of every month (see Section 8.6.6.2).

8.6.3 End of Operations Environmental Performance Report

Esso will notify NOPSEMA at the end of operations that the activities as outlined in this EP have ended; and that all of the obligations under the environment plan have been completed, in accordance with OPGGE Regulations 2009 (Reg. 25A).

End of operations will be reported in the form of a campaign specific environmental performance report, in accordance with OPGGE Regulations 2009 (Reg 14(2) and Reg. 26C). This performance report will detail the outcomes of each performance standard in the EP. The report will be submitted to the NOPSEMA within 3 months of the end of the reporting year in accordance with the Commonwealth OPGGSE Regulation 14(2).

This reports compliance against each of the EPOs and EPSs as outlined in Section 6 of this EP. It will include technical data on drilling activities as well as relevant environment reporting on emissions and discharges as outlined in Table 8-7.

8.6.4 Other External Stakeholder Reporting

Reporting and notification of external stakeholders and statutory reporting requirements for routine activities are summarised in Table 8-6.

Table 8-6 External Notification and Reporting Requirements

Notification	Timing	Reference/Comments
All relevant non-government stakeholders	At least 1 month and 1 week prior to planned activity commencement	All relevant stakeholders listed in the stakeholder register (email)
	Within 10 days of activity completion	
NOPSEMA	At least 10 days prior to activity	OPGGS(E) Reg 29 (submissions@nopsema.gov.au)
	Within 10 days of activity completion	
	At activity finalisation and obligation completion	OPGGS(E) Reg 25A
AHS - commencement date and duration	At least 4 weeks prior to activity	AHS issues a Notice to Mariners (datacentre@hydro.gov.au).
Transport Safety Victoria (TSV) - commencement date and duration.	At least 2 weeks prior to activity commencement.	TSV to issue Notice to Mariners (information@transportsafety.vic.gov.au).
AMSA	24-48 hrs before start of activity. Reconfirm on activity commencement	AMSA issues AusCoast Warnings for activity (rccaus@amsa.gov.au)
	On vessel demobilisation from field	
Provide cetacean observation data to the DoEE.	Within 3 months of activity completion	Upload information to: https://data.marinemammals.gov.au/csa

8.6.5 Monitoring and recording emissions and discharges

8.6.5.1 Routine Monitoring

Table 8-7 Summary environmental monitoring/recording and reporting requirements

Environmental Risk	Criteria to be Monitored	Frequency of Monitoring and Reporting
Hazardous waste disposal	Type and volume	Ongoing (EPR)
Diesel usage	Volume	Ongoing (EPR)
Oil spills	Type and volume	Each incident (IR)
Chemical spills	Type and volume	Each incident (IR)
WBM & cuttings discharge	Volume of cuttings	Daily During Drilling (EPR)
Discharges of cement	Volume of cement discharges	Daily During Drilling (EPR)
Chemical Inventory	Type	Ongoing (EPR)
Fuel use (MODU, support vessels)	Volume	Ongoing (EPR)
Vessels entering safety zone	Per incident	Ongoing
Oily water discharge volume	Continuous during discharge	Ongoing (EPR)
Waste to shore from MODU	Volume and type	Event/consignment (EPR)
Domestic waste discharge (Sewage/Food Scraps)	Discharge volumes; Compliance with MARPOL 73/78	Ongoing (EPR)
Incinerator waste (if present and used)	Volume, incineration temperature	Ongoing (EPR)
Ballast Water Discharges	Exchanged volume	Ongoing (EPR)
Sightings and Impacts to wildlife	Type	Ongoing (EPR/IR)

EPR: Environmental Performance Report (see Section 8.6.3)
IR: Incident Report (see Section 8.6.6)

Table 8-7 provides a summary of the environmental risk monitoring requirements for the drilling activities. This should be considered along with the Performance Standards, Objectives and Criteria in Chapter 6. The MODU OIM and Esso Drilling Superintendent are responsible for ensuring the monitoring is undertaken as per this EP.

8.6.5.2 Operational and Scientific Monitoring Program

An Operational and Scientific Monitoring Program (OSMP) has been developed in accordance with CSIRO Oil Spill Monitoring Handbook (Hook *et al.* 2016) and NOPSEMA (2016 and 2018) guidance documents. The OSMP is attached as an appendix to the VIC/P70 Exploration Drilling OPEP.

8.6.6 Incident Notification and Reporting

The OPGGSE Regulations define "*Recordable Incidents*" and "*Reportable Incidents*", and also defines reporting requirements for each type of incident.

All environmental incidents and near misses are reported by Diamond Offshore and the supply vessels to Esso (see D-020 Environmental and Regulatory incident report form; Table 8-1). Esso notifies and reports incidents to NOPSEMA in accordance with OPGGSE Regulations.

Incidents are managed internally by Esso in accordance with OIMS System 9-1 (Incident Management) to ensure valuable information and lessons learnt are available to improve operations and prevent the recurrence of similar incidents.

8.6.6.1 Reportable Incidents

The OPGGSE Regulations 2009 defines reportable incidents as "*an incident that has caused, or has the potential to cause, moderate to significant environmental damage*". Esso has interpreted this to be either.

- An unplanned release of hydrocarbon liquid or non-approved chemicals exceeding 80 litres into the marine environment; or
- Injury or death of a cetacean, a listed threatened species, a member of a listed threatened ecological community or a listed migratory species (see Table 8-8).
- An IMS introduction
- Unplanned release of waste to sea

All environmental reportable incidents are reported to NOPSEMA by the Drilling Superintendent or Esso SSHE delegate in accordance with Reg. 26 of the OPGGSE Regulations 2009 as follows (Table 8-8):

- The titleholder (Esso) of an activity must give notice, orally, of a reportable incident to the Regulator (NOPSEMA), including all material details of the incident that are reasonably available to the titleholder as soon as practicable, but in any case **not later than 2 hours after**:
  - The first occurrence of the 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.
- The oral report must contain:
  - All material facts and circumstances concerning the recordable incident that the titleholder knows of, 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 corrective action that has been taken, or is proposed to be taken, to prevent a similar recordable incident.
- Following the initial notification, and as soon as practicable after Esso notifies a reportable incident, they must give a written record of the notification to NOPSEMA, NOPTA, and DEDJTR, that contains the information given in the oral notification.
- Then, as soon as practicable, and **not later than three days after** the first occurrence of the reportable incident, they must give a written report of the reportable incident to NOPSEMA (the **"*3 day written report*").**
- If Esso triggers an internal formal investigation to determine any other corrective actions or actions proposed to be taken to prevent a similar incident occurring in the future, Esso will provide NOPSEMA with a further written report outlining these actions within 30 days after the 3 day written report of the reportable incident. Esso will specify in the 3 day written report that it intends to provide NOPSEMA a further written report ("***the Esso notification***"). NOPSEMA will accept the Esso notification as if it were the Regulator specifying another period in which the report must be provided under Reg 26A(4) (b)(1), namely 30 days, unless NOPSEMA advise that the Esso notification is not accepted and NOPSEMA refuse to specify another period under Reg 26A(4) (b)(1).
- The 3 day written report must contain:
  - All material facts and circumstances concerning the recordable incident that the titleholder knows of, 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 corrective action that has been taken, or is proposed to be taken, to prevent a similar recordable incident.
  - The action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

- Within 7 days of giving the 3 day written report to NOPSEMA, a copy of the report must be provided to NOPTA (resources@nopta.gov.au; for Commonwealth water incidents) and DEDJTR ERR (Director of Regulation & Compliance: tony.robinson@ecodev.vic.gov.au; for Victorian water incidents).

Table 8-8 Reporting to NOPSEMA in accordance with the OPGGSE Regulations

NOPSEMA Duty Officer: 08 6461 7090 https://www.nopsema.gov.au/environmental-management/notification-and-reporting/	• **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 DEDJTR) • **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 DEDJTR within 7 days) • **If formal investigation is triggered, a further written report within 30 days**
A reportable incident is one that has caused or has the potential to cause moderate to significant environmental damage (interpreted as an unplanned event that has been assessed through the risk assessment process to have a consequence ranking of I or II). A reportable incident is an actual or potential: • A reportable incident is one that has caused or has the potential to cause moderate to significant environmental damage (An unplanned event that has been assessed through the risk assessment process to have a consequence ranking of I or II.) • Unplanned release of hydrocarbon liquid or non-approved chemicals exceeding 80 litres into the marine environment • Injury or death of a cetacean, a listed threatened species, a member of a listed threatened ecological community or a listed migratory species.	

In addition to the OPGGSE Regulations 2009 requirements, unplanned releases of hydrocarbon liquid or non-approved chemicals exceeding 80 litres into the marine environment (while performing a petroleum activity) are to be reported to AMSA.

Other vessel incidents (while not performing a petroleum activity) must also be reported in accordance with the Navigation Act 2012 and other regulations (Table 8-9).

Suspected or known introductions of IMS (see Section 6.12) will be reported to the DELWP immediately.

Table 8-9 Reporting to AMSA and other government agencies - marine pollution incidents/injuries

Petroleum Activity: Actual or potential unplanned releases of hydrocarbon liquid or non-approved chemicals exceeding 80 litres into the marine environment (while performing a petroleum activity). https://www.amsa.gov.au/contact-us/index.asp#report POLREP: https://amsa-forms.nogginoca.com/public/	• **Verbally at the first available opportunity** • **POLREP report within 3 days** (see Table 8-8) AMSA 24 Hour Emergency Contact Numbers 1800 641 792 (Maritime) 1800 815 257 (Aviation) or +612 6230 6811 (Maritime) +612 6230 6899 (Aviation)	Vessel Master outside 500m petroleum safety zone OIM within the 500m petroleum safety zone
Outside 500m petroleum Safety Zone: AMSA will be notified by the Vessel Master if any of the following incidents occur (while not performing a petroleum activity): • An oil pollution incident from a vessel has occurred in Commonwealth waters (Marine Notice 1/1996); • The vessel has sustained or caused an accident occasioning loss of life or serious injury; • The vessel has received damage or is defective affecting its seaworthiness; or	• **Verbally at the first available opportunity** • **POLREP report within 2 hours** AMSA 24 Hour Emergency Contact Numbers 1800 641 792 (Maritime) 1800 815 257 (Aviation) or +612 6230 6811 (Maritime) +612 6230 6899 (Aviation)	Vessel Master

• There is a serious danger to navigation resulting from a vessel (e.g. a sizable piece of equipment likely to float is lost overboard). https://www.amsa.gov.au/environment/regulations/marpol/reporting-pollution/index.asp		
Notify port and government agencies in the event of a Level 1 (Port Authority) or Level 2 (Port Authority & DEDJTR) vessel spill	• **Immediately** DEDJTR (Transport) - 0409 858 715 (24 hrs). semdincidentroom@transport.vic.gov.au NOPSEMA: 08 6461 7090. (Commonwealth waters) Port of Portland: (03) 5525 0900	Vessel Master
Notify DELWP in the event of oiled wildlife.	• **Immediately** 1300 134 444 (24 hrs).	Vessel Master/OIM
Notify DELWP of any incidents of injury or death to native fauna including whales and dolphins.	• **Immediately.** Whale & Dolphin Emergency Hotline: 1300 136 017. Seals, Penguins or Marine Turtles: 136 186 (Mon-Fri 8am to 6pm) or AGL Marine Response Unit: 0447 158 676.	Vessel Master/OIM
Notify the DoEE of any impacts to MNES, specifically injury to or death of EPBC Act-listed species.	• **Within 7 days** Phone 1800 110 395; Email: compliance@environment.gov.au	Vessel Master/OIM
Vessel strike with cetacean is reported to the DoEE. Upload information to: https://data.marinemammals.gov.au/report/shipstrike	• **Within 72 hours of incident.**	Vessel Master/OIM

8.6.6.2 Recordable Incidents

The OPGGS (Environment) Regulations define recordable incidents as "*a breach of an environmental performance outcome or environmental performance standard, in the environment plan that applies to the activity that is not a reportable incident*".

No later than 15 days after the end of each calendar month, Esso will provide a monthly report by email to NOPSEMA as per Reg. 26B. Report to NOPSEMA: submissions@nopsema.gov.au. Monthly reports will utilise the NOPSEMA Incident Monthly Summary Report template available at https://www.nopsema.gov.au/environmental-management/notification-and-reporting/. This report will include:

- A list of all recordable incidents that occurred during the calendar month;

- All material facts and circumstances concerning the recordable incidents that Esso knows or is able, by reasonable search or enquiry, to find out (including release volumes to environment if applicable);
- Performance outcome(s) and/or standard(s) breached
- Any action taken to avoid or mitigate any adverse environment impacts of the recordable incidents; and
- The corrective action that has been taken, or is proposed, to stop, control or remedy the recordable incident; and
- The action taken, or is proposed, to prevent a similar incident occurring in the future.

If there are no recordable incidents, a ‘nil’ report will be submitted to NOPSEMA.

8.6.7 Incident Investigation

Investigations into environmental incidents are conducted in accordance with Esso's incident investigation procedures and guidelines. Investigation teams may include Diamond Offshore or supply vessel representative(s) as agreed in consultation with the Diamond Offshore MODU Manager and the Esso Operations Superintendent; the team leader for investigations will be either an Esso investigator or Esso appointed objective third party. They are reported using the Esso reporting format.

Diamond Offshore will also undertake an investigation as per their operating procedures and safety case requirements.

8.6.8 Non-Conformance Management

Non-Conformances are addressed as corrective actions. Corrective actions are raised from incident reports, audit and inspection reports and are captured on the **ExxonMobil D-100: Correctives Actions Report** (Table 8-1) where they are tracked to timely close-out.

All personnel have the authority to stop work at any time if these activities breach or threaten to breach EPOs or EPSs (Chapter 6), MODU HSE MS and Esso SSHE MS, or if they are not satisfied that measures are in place to avoid a repeat of the incident

8.6.9 Auditing and Inspections

OPGGSE Regulation 14(3) requires that specific measures are used to ensure that the environmental impacts and risks of the activity:

a) continue to be identified and reduced to a level that is as low as reasonably practicable;

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.

These requirements are met through ongoing monitoring and reporting (Section 0) and auditing and inspections (outlined below).

Table 8-10 Summary of Assessments and Inspections

Inspection/Assessment	Party/Responsibility	Status/Plan
OIMS Risk Assessment	Esso Australia & PNG Drill Team, Diamond Offshore Manager and 3rd party contractor reps	Completed prior to start up. Corrective actions closed out prior to the start of operations.
Critical Contractor OIMS Evaluations	Esso QA/QC Coordinator	Completed on completion of drilling campaign.
Lifting Equipment Certification	3rd Party Inspection	Prior to start up, during drilling campaign as required.

Rig Inspection D-210	Esso Operations Superintendent	Before the rig is contracted, and quarterly thereafter (Table 8-1)
BOP/Well Control systems inspection	3rd Party Inspection by MODU Operator, in dialogue with Drilling Superintendent	Prior to initial running of BOP, as required thereafter.
Pre-mobilisation environmental inspection	Esso Operations Superintendent	Completed prior to start up. Corrective actions closed out prior to the start of operations.
Vessel and MODU inspections	Vessel/MODU Operator	Weekly walk-arounds, documented on inspection checklists. Basis for monthly recordable incident reports (Section 8.6.6.2)
Compliance Audit	Esso Offshore Risk, Environment and Regulatory Supervisor	During drilling operations. Summarised in the Environmental Performance Report to NOPSEMA

In addition to the pre-mobilization audit, as well as ongoing monitoring and reporting, other auditing and inspection tools are implemented for the duration of the project, by Esso and by Diamond offshore (as part of its SEMS Management System; SEMS 12), with the aim to:

- Demonstrate assurance that all company systems are inherently safe, operationally functional and in compliance with company policy, operator requirements and regulatory mandates.
- Determine actions to eliminate the causes of potential nonconformities in order to prevent their occurrence and eliminate the causes of nonconformities in order to prevent recurrence.

A variety of audit programs are utilised onboard the MODU, including:

- Internal rig audit program
- External rig audits
- Shore base GEMS audits
- Rig personnel HSE audits and inspections
- Action items from alerts
- Preventative actions from risk assessments.

MODU inspections are undertaken, using the ExxonMobil D-210 Rig inspection form (Table 8-1). The rig inspection includes but is not limited to:

- WBM handling areas
- Sewage treatment
- Mud pits
- Cement unit
- Fuel storage areas
- Lifting equipment
- Oily water treatment
- Spills in bunded areas
- Drains and valves in correct positions
- Drills and exercises being undertaken

All corrective actions identified are transferred to the D-100 Corrective actions report for tracking to completion prior to the start of operations. Other assessments and inspections that take place on the

MODU are documented on the Well View daily report and a note on the MODU Daily report on the days in which they are conducted.

8.6.9.1 Pre-mobilisation Environmental Inspection

As part of pre-mobilisation, Esso will undertake a pre-mobilisation compliance audit against the EPOs and EPSs as outlined in Chapter 6 of this EP. Additionally, it will undertake at a minimum a follow up compliance audit during the drilling campaign (Table 8-10). All corrective actions arising from the audits are recorded on the D-100 Corrective action report and tracked to completion. The aim of these audits and inspections is to identify non-compliance against the EPOs and EPSs, and continuously improve the HSEC MS.

8.6.9.2 Vessel and MODU inspections

Inspections (walk-arounds) against EPOs and EPSs onboard the MODU and support vessels are normally undertaken by onboard HSE personnel or the Vessel Master on a weekly basis, in dialogue with Esso SSHE, and documented in weekly inspection checklists, for tracking and close-out. Additionally, a rig inspection is undertaken by the Drilling Team (see D-210: Rig inspection report; Table 8-1).

All audit discrepancies are entered on the Corrective Action/Preventative Action list. The system also allows for documentation and tracking of special audits and inspections from regulatory bodies, customers and third parties. Rig personnel who perform their own inspections, audits, hazard hunts, etc. can also record discrepancies utilising the action list to enable tracking and continuity with their relief crews to ensure corrections are completed in a timely manner. Vessel/MODU inspections form basis for monthly recordable incident reports (Section 8.6.6.2).

Esso undertakes a vessel contractor pre-qualification (e.g. OCIMF-OVID[7] for vessels, D-210 for drilling rigs, Table 8-1). For vessels <500 gross tonnes and/or <50 m in length, Esso will use the IMCA Marine Inspection for Small Workboats Inspection Template (IMCA, 2016) as part of the pre-qualification process.

8.6.9.3 EP Compliance Audit

In addition to a pre-mobilisation environmental inspection, Esso shall undertake a compliance audit of the commitments contained in this EP and assess the effectiveness of the implementation strategy. This will complement vessel-based inspection/audit activities. Any non-compliance with the environmental performance standards outlined in this EP (Chapter 6) will be subject to investigation and follow-up action as detailed in Section 8.6.8.

Any opportunities for improvement or non-compliances noted will be communicated to all relevant personnel at the time of the audit to ensure adequate time to implement corrective actions. The findings and recommendations of inspections and audits will be documented and distributed to relevant personnel for comments, and any actions tracked until closed out

Results from the environmental inspections and audits will be summarised in the Environmental Performance Report (Section 8.6.3) submitted to NOPSEMA.

8.6.10 Contractor OIMS Assessments

The contractor SSHE pre-qualification process is detailed in OIMS System 8-1 Evaluating, Selecting and Monitoring Third Parties. As part of contract award, third party services contractor capability and willingness to meet Esso's SSHE expectations are evaluated and verified. The SSHE group participate in the pre-qualification screening and bid evaluation process including contractor site assessments, if required.

[7] *OCIMF-OVID: Offshore Vessel Inspection Database. Developed by OCIMF (Oil Companies International Marine Forum) members to provide a database of offshore inspections. The aim of OVID is to provide a robust inspection tool and database for inspections reports, underpinned by accredited inspectors*

8.7 Environmental Performance Review

8.7.1 Daily Rig Calls

Daily rig calls are undertaken to keep all personnel involved up to date with the activities that are planned for the day and allows for input from the Management team to assist with work planning.

8.7.2 Toolbox Meetings

Toolbox meetings are conducted twice daily to plan for any events that are occurring during the shift. This allows for relevant permits and Work Risk assessments to be undertaken and to make sure that personnel completing the tasks understand all the safety and environmental risks associated.

Environmental matters will be included in daily toolbox talks as required for the specific task being risk assessed. Environmental issues will also be addressed in daily or weekly HSE meetings where all MODU / vessel crew will participate with the OIM, Vessel Master and Drilling Supervisor in discussing HSEC matters that have arisen during that day's or week's operations, and upcoming issues to consider. Outcomes will be documented in HSEC meeting minutes.

8.7.3 Monthly Meetings

Table 8-11 lists the environmental objectives that are monitored and stewarded throughout the program.

Esso and Diamond offshore, in dialogue between Esso Drilling Operations Superintendent, Esso Drilling Engineering Manager, Esso Drilling Supervisor, Diamond Operations Manager, MODU Operations Superintendent, Diamond MODU Offshore Installation Manager (OIM), Esso Offshore Risk, Environment & Regulatory Supervisor are jointly responsible for keeping personnel informed about HSEC issues, acting as a focal point for personnel to raise issues and concerns, and consulting and involving all personnel in the following:

- Issues associated with the implementation of the EP;
- Any proposed changes to equipment, systems, or methods of operation of equipment, where these may have HSEC implications;
- Any proposals for the continuous improvement of environmental protection, including the setting of environmental objectives and training schemes.

Table 8-11 Environmental Performance Indicators

Criteria Esso	Criteria Diamond Offshore	Expectations
Oil or Chemical Spills	Loss of Containment	None
Well Control incidents	Well control incidents	None
In country regulations	In country regulations	100% Compliance
Esso OIMS	Diamond Offshore HSE Management System (OM-SC-001-02)	100% Compliance
Key performance indicators		
• incident reports	Incidents reporting and investigation	None. All incidents reported to Esso as per Section 8.6.6
• Regulatory compliance	EP Compliance	100% Compliance
• Spill volume and quantity	Incidents reporting and investigation	None All spills reported to Esso as per Section 8.6.6
• Volume of waste disposal	Vessel Waste management	All waste quantities tracked and reported to Esso

• Drill cutting discharge volumes	Daily reporting	All cutting and mud volumes tracked on daily reports

8.7.4 Lessons learnt review

Esso Australia and PNG Drill team conduct regular reviews of key performance indicators including incident reports, regulatory compliance, spill volume and quantity, volume of waste disposal, and drill cutting discharge volumes.

In addition, Esso Australia & PNG Drill Team operations stewardship review is conducted every six months with Senior Management covering the environmental performance of the drilling program.

The HSE team on board the MODU meets on a monthly basis specifically to review environmental issues and initiatives. Personnel from Diamond Offshore, Esso and other contractors attend where possible.

At the completion of the drilling campaign, lessons learnt review will be conducted to determine:

- The effectiveness of control measures
- Improvements in procedures or practices for future drilling campaigns

8.8 Emergency and Oil Spill Preparedness and Response

8.8.1 Emergency Response Responsibilities

Responsibilities for the purposes of emergency response are outlined as follows:

- Diamond Offshore is the “Operator” of the Facility and has legislative responsibilities for all operations on the MODU, including response to emergencies, in accordance with MODU Emergency Procedures and the VIC/P70 OPEP.
- Esso’s role in dealing with emergencies is to provide the necessary resources to support a Diamond Offshore emergency response. Esso’s drilling team will operate from the company’s Melbourne office. Additional management, technical and emergency response support will be provided from the Melbourne and Houston offices.

8.8.2 Emergency Response Documentation

The VIC/P70 Exploration Drilling Bridging Emergency Response Plan (ERP) shall be developed to support the existing MODU Emergency Response plan. It defines the location specific arrangements for responding to emergencies including the role of helicopter and vessel support functions, extreme weather evacuation planning, medivac, regulatory liaison and reporting.

In the event of any emergency on the MODU, the SEMS Emergency Response Manual (SEMS 10) is the primary document that details how emergencies are managed on the MODU.

The Bridging ERP addresses local responses for Esso operations including appropriate support linkages to Esso's Australian and corporate-wide Emergency Preparedness and Response network including in-country, regional and global Emergency Support Groups. The Bridging ERP also details how Diamond Offshore and Esso/EAPL will interact in the event of an emergency. A campaign specific Contacts Directory listing all contact numbers has also been developed.

Contractors are required to have an up-to-date Emergency Response Manual (ERM) and a Shipboard Oil Pollution Emergency Plan (SOPEP) that includes site-specific detailed response and investigative arrangements.

Independently facilitated Emergency Response Desktop exercises will be held periodically to test interfaces and response strategies. Findings and recommendations from these exercises are incorporated into the Bridging ERP.

An exercise is undertaken at the start of the campaign to test the Emergency Response arrangements for the VIC/P70 exploration drilling campaign.

8.8.3 Oil Pollution Emergency Plan (OPEP)

Esso has a project OPEP that outline how spills will be managed (Chapter 7). For a Level 1 spill inside the 500m exclusion zone, the MODU SOPEP is the primary response plan. It is supported by the VIC/P70 OPEP. For Level 2 or 3 spills the VIC/P70 OPEP is the primary document and this will outline the resources and response strategies to be implemented depending on the size and nature of the spill. It also outlines which the lead organisations and responders are and any notification requirements.

In all cases, Esso, as nominated operator under the OPGGSE Regulations, will retain control and responsibility for managing spill response.

8.8.4 Oil Spill Response Testing

In accordance with the Commonwealth OPGGSE Regulation 14 (8C) and in accordance with OIMS System 10-2: Emergency Preparedness and Response, the OPEP will be tested:

- Prior to the commencement of a drilling campaign;
- When there is a significant amendment to the OPEP;
- Not later than 12 months after the most recent test; and
- In accordance with the schedule outlined in Table 8-12.

The effectiveness of response arrangements will be measured by the performance standards of each exercise type (Table 8-13). These exercises may be externally or internally facilitated.

Exercises will be documented and any corrective actions/recommendations arising from the exercises will be managed in accordance with the Incident Management, Non-Conformance procedures (Section 8.6.8) and stewarded to closure by the Esso EP & R Advisor. Emergency response training records will be maintained in accordance with OIMS System 10-2: Emergency Preparedness and Response (Section 8.1.2).

Where changes are required to the OPEP, resulting from exercise outcomes, altered contractual arrangements, corrective actions, routine information updates (i.e. contact details change), or other items; the Drilling Manager is responsible for ensuring changes are assessed against Commonwealth OPGGS(E) Regulation 17 revision criteria and where necessary, the EP/OPEP submitted to NOPSEMA as a formal revision, in accordance with Project MOC Procedures (Section 8.9.2). For changes which do not trigger a formal revision, internal revisions to the OPEP will be in accordance with the Management of Change procedure (Section 8.9.2) with any change justified.

The program to test oil spill response arrangements in the OPEP (in accordance with Regulation 8A, 8B and 8C) is summarised in Table 8-12. The tests will be supported by regular drills and exercises on-board the MODU and support vessels to test on-board emergency response arrangements including vessel SOPEPs. The oil spill arrangement testing identified for the VIC/P70 exploration drilling program is considered appropriate to test arrangements for this activity.

8.8.5 Testing of the Capping Stack System

The suppliers of the capping stacks, Oil Spill Response Limited (OSRL) and Wild Well Control (WWC), conduct annual mobilisation exercises with their equipment (from component storage site to assembled/tested condition quayside). The objective of these exercises is to ensure the capping stack equipment can be rapidly mobilised to the quay ready for shipment and that the system is operationally “fit for purpose”. ExxonMobil’s Drilling Operations Integrity group monitors the annual exercises and ensures the learnings are made available to all Drill Teams.

OSRL employs Trendsetter (OEM) to physically move each of their capping stacks to the quayside every year and select one stack to conduct what they call a “major mobilisation exercise” where they test all activities up to the point where the equipment is handed over to the operator. In addition, Trendsetter conducts scheduled maintenance programs on the capping stacks.

The Offset Installation Equipment became operational in the first quarter 2018 following the successful Systems Integration Testing and Commissioning. A regularly scheduled preventative maintenance and function testing program is in place for this equipment.

WWC conducts a stack up test on one of their capping stack located in Singapore annually. The results from the 2017 test showed continuous improvement in the total amount of time taken to move the equipment to quayside, assemble and test the stack, with respect to the exercises conducted in the 2015 and 2016. An ExxonMobil representative attended the 2017 test as an observer. WWC conducts scheduled maintenance programs on their capping stacks.

Table 8-12 Emergency and Oil Spill Preparedness and Response Testing

Test	Objective	Parties involved	Schedule
Desktop exercise	To familiarise the Australian Drilling IMT with their roles and responsibilities detailed in the VIC/P70 OPEP and source control plan. To validate contact information and resource activation protocols as detailed in the VIC/P70 OPEP and source control plan	Esso ESG, Esso IMT including Esso Drilling & Diamond Offshore Personnel	During the month prior to commencement of operations at VIC/P70. (see D-075 Emergency Response Drills/Exercise Report; Table 8-1)
Surveillance, evaluation and monitoring	To test the implementation of surveillance and assessment activities for a Level 2 spill scenario per EP Table 7-7	Esso IMT including Esso Drilling & Diamond Offshore Personnel	During the month prior to commencement of exploration drilling operations at VIC/P70.
Source control	To assess the availability of logistical resources to mobilise the WWC/OSRL capping stack and supporting equipment to the Bass Strait from Singapore as detailed in EP Table 7-11. The specific aspect of the logistical resources to be assessed will be the availability of suitable construction support vessels.	Esso IMT including Esso Drilling & Diamond Offshore Personnel	Shortly after arrival of the MODU at VIC/P70 locations and before start of drilling
Functionality testing	To assess the functionality of the capping stack, timing of mobilisation, assembly and installation. Update the response plan to ensure no significant changes in regards to WWC / OSRL ability to perform (i.e.: status of equipment)	WWC/OSRL	Prior to commencement of exploration drilling operations at VIC/P70.
Base operations testing			
Callout system test	To test internal emergency team active activation system	EAPL	Quarterly
Functional exercise	To test interface between the Emergency Support Group and Incident Management Teams	EAPL	Annual
Equipment deployment	Test deployment of oil spill response equipment	EAPL	Annual

Any recommendations arising from Emergency and Oil Spill Preparedness and Response testing will be actioned promptly. If a test does not meet the required Performance Standard, the test will be repeated once the issue has been rectified to confirm reliability of the control measure.

ExxonMobil Drilling Operations Integrity group annually test the Drilling organisation's global preparedness to respond to a source control incident by conducting exercises with the capping stack suppliers and critical providers, which assist operators globally with source control exercises. Any learnings are available to all Drill Teams for incorporation in their Source Control response plans. The Esso Australia & PNG Drill Team will conduct activity-specific testing of source control arrangements during the VIC/P70 exploration drilling campaign (Table 8-12).

Table 8-13 Oil Spill Preparedness (Exercise) Outcomes

Performance outcome	Performance standard	Measurement criteria
The Esso Emergency Contacts Database is reliable	**Emergency Contact Directory:** Contact numbers for stakeholders, regulators and spill response organisations are accurately recorded within the database.	Callout log verifies performance standards
The OPEP can be implemented and is effective in mitigating a spill event	**Communication:** • Incident notification communication pathways is tested, and is effective in contacting Incident Commander (IC; (Section 7.3); • Call-out mobilises a competent oil spill IMT within 1 hr of callout; • Notification and activation of oil spill response organisations is effective; • Regulator notifications are made in the required timeframes. • ICC is functional for the spill level • Information pathways are integrated and effective at providing situational awareness.	Desktop exercise report verifies the response performance against the following criteria: • Duty Manager successfully contacted and EMT callout verified; • IMT successfully mobilises within timeframe; • External notifications meet performance timeframes within the OPEP; • ICC is functional and meets the requirement to fulfil spill response activities; • Spill information is received from relevant source (i.e. vessel, MODU)
	IMT Support (Section 7.3): • IMT obtains situational awareness; • IMT implements EMRS in accordance with OPEP; • IMT tests arrangements with external oil spill providers and verifies personnel/services2[8] ability to respond; • IMT operates effectively and completes an operational NEBA and develops IAP.	Desktop exercise report verifies the IMT response performance against the following criteria. Incident log verifies that the: • OPEP is implemented; • Situational Awareness is obtained; • Operational NEBA prepared; and • IAP developed for the next operational period for the scenario. Arrangements tested with following external support resources: • **OSMP**: Successful contact with OSMP activator; Principal Investigators for relevant modules to EMT within 2 hrs of notification. • **Aviation**: Successful contact and email response of plane availability within 6 hrs of contact; • **Vessel support**: Successful contact with contracted vessel supplier, vessel location established, and deployment plan provided to achieve a site presence in 24 hrs. • **Waste Contractor**: Waste Contractor notified. Nominated contractor responds to IMT with ETA to site.

[8] Equipment availability will be tested in accordance with the assurance processes nominated in Chapter 7

Performance outcome	Performance standard	Measurement criteria
		• **Equipment Hire**: Contractor notified and confirms equipment availability and driver. Driver to contact IMT in 1 hr of activation. • **AMOSC**: Successful contact with AMOSC duty officer and activation of AMOSC arrangement. AMOSC demonstration that Service Level Agreement timeframes can be achieved for: • Aerial Observers; • SCAT Resources; • APASA activation; • Transportation Company mobilisation. • Successful transfer of modelling information to IMT
	ESG Support (Section 7.3): • ESG provides IMT with the requested support with respect to public affairs, media response, finance and insurance, legal advice.	Desktop exercise report verifies that ESG has provided relevant information requested of the IMT during exercise.
	Source Control (Section 7.3): • IMT and SCB communications and information channels tested and effective; • EMT provides situational awareness and surveillance data to the source control team as it becomes available.	Desktop exercise report verifies that: • IMT communication channels and information verified as functional • Situational awareness data provided to SCB on receipt.
OPEP can be implemented and is effective in mitigating a spill event.	**Vessel-based Release:** • Regulator notifications by vessel and Esso are made in the required timeframes (Section 8.6.6). • Internal notifications between vessel and Esso are made in the required timeframes.	Desktop exercise report verifies that Regulator and Esso notifications are completed in the required timeframes.

8.9 Operational Control

8.9.1 Esso Chemical Selection Procedure and Approval for Discharge

Any chemical that is discharged to the marine environment is selected based on their lowest toxicity. All drilling fluids meet OCNS Gold or non-CHARMable Category E (lowest toxicity). Where any of the chosen chemicals needs to be substituted, the lowest toxicity substitute is chosen, in accordance with Esso's chemical selection procedure (Workplace Substances Manual, Form WSM2). Any chemical that is the subject of a planned discharge to the marine environment must meet the requirements under the Esso chemical selection procedure.

Esso's chemical selection procedure requires that new chemicals must be approved prior to use, or prior to a change in accordance with the Management of Change Procedure (Section 8.9.2). This process is used to identify the hazards associate with the way the chemical will be used, stored and disposed, and considers potential consequences to personal health and safety, the environment and process safety.

The chemical selection process assesses chemicals that have the potential to be discharged to the environment (i.e. not household chemicals) to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application. A summary of the evaluation process is detailed in Figure 8-3.

Chemicals are reviewed for environmental acceptability. This requires the chemical to be of low toxicity, as assessed against international standards, such as OCNS (Offshore Chemical Notification Scheme, OSPAR; CEFAS 2017) HQ Band Gold or Silver, non- CHARMable (Chemical Hazard Assessment and Risk Management) OCNS Group D or E, or have an equivalent low toxicity rating.

Where no OCNS rating is available for a chemical, these are assessed against Esso's internal chemical selection procedure (Bass Strait Chemical Environmental Assessment) and ALARP Assessment (Workplace Substances Manual, Form WSM2). This procedure is equivalent to the CHARM model applied under OCNS (Chemical Hazard and Risk Management), as outlined in Thatcher *et al*. (2005), and evaluates parameters such as toxicity data to derive a predicted no effect concentration (PNEC), and a predicted environmental concentration (PEC) based on chemical concentration, solubility, biodegradation and dilution factor. Only chemicals that have a HQ factor (PEC/PNEC ratio) < 1 (Gold) or <30 (Silver) are approved for discharge to the marine environment.

Products not applicable to the CHARM model (i.e. inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping, A - E. Group A includes products considered to have the greatest potential environmental hazard and Group E the least. Only grouping D or E chemicals are approved for discharge to the marine environment.

Chemicals that do not pass one of these two acceptance tests are not considered suitable for overboard discharge and will not be discharged to the marine environment.

8.9.2 Management of change

The objective of the Esso MOC process is to ensure that additional risks are not introduced by changes that could increase the risk of harm to people, assets or the environment.

This includes:

- Deviation from established corporate processes;
- Changes to the sequence of offshore operations;
- Deviation from specified safe working practice or work instructions/procedures;
- Implementation of new systems; and
- Significant change of HSEC-critical personnel.

Environmentally relevant changes include:

- New activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have the potential to impact on the environment and have not been:
    - Assessed for environmental impact previously, in accordance with the relevant standard, or

- Authorised in the existing management plans, procedures, work instructions or maintenance plans.

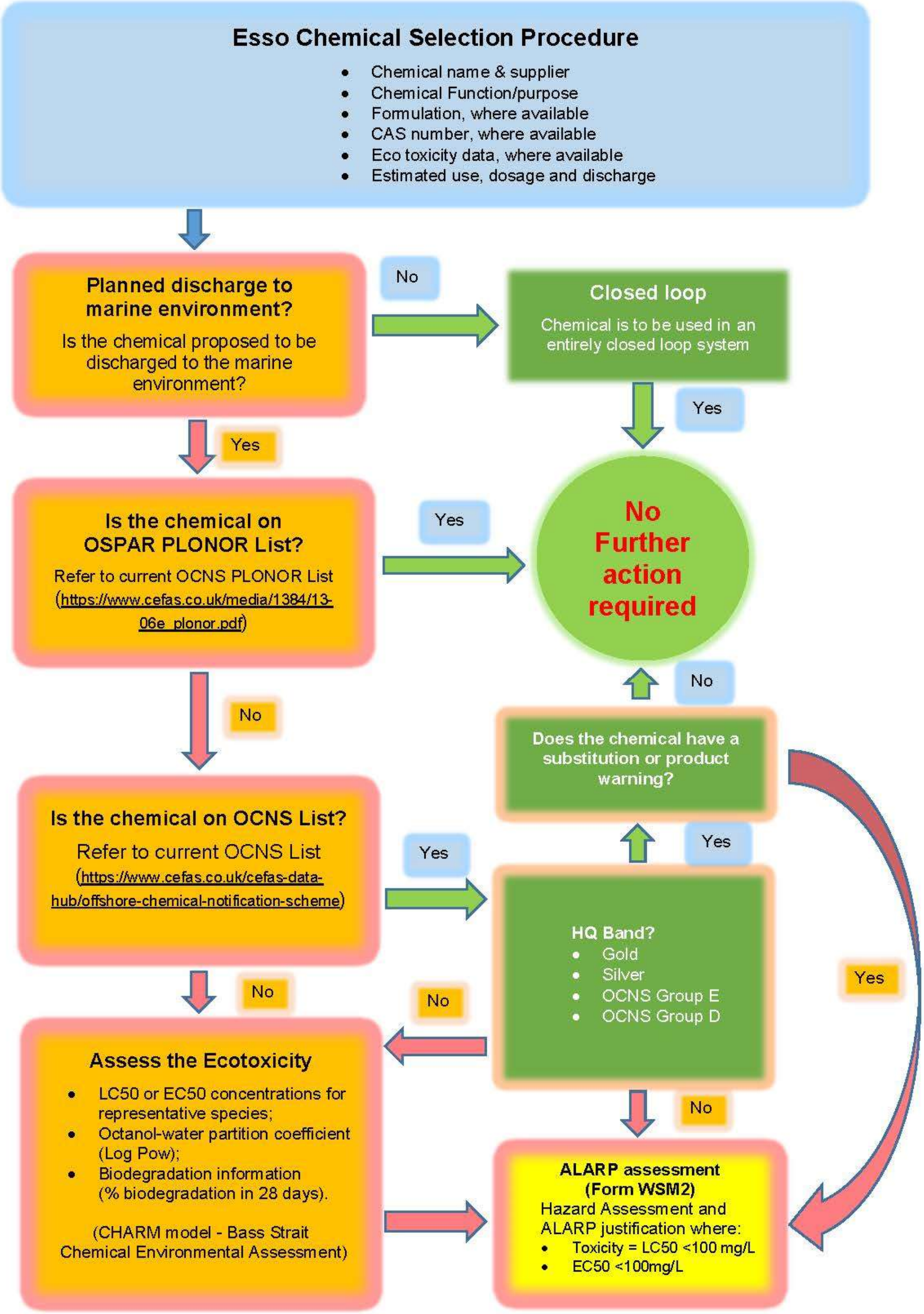


Figure 8-3 Offshore Chemical Environmental Risk Assessment Process Summary

- Proposed changes to activities, assets, equipment, processes or procedures that have the potential to impact on the environment or interface with the environmental receptor; and
- Changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences).

For any MOC with identified environmental impacts or risks, an impact/risk assessment will be undertaken to consider the impact of the proposed change on the environmental impacts/risks and the adopted control measures.

Esso has a comprehensive process to identify amending and emerging regulation (including additions to protected species lists) (Section 8.9.3).

Additional controls identified as part of the MOC must be effective in reducing the environmental impact and risk to a level which is ALARP and acceptable; and meets the nominated EPOs and EPSs set out in the accepted EP for the activity.

The Esso MOC process and procedures for drilling operations, summarised in the Drilling & Subsurface (D&S) OIMS Execution Manual (Section 8.9.2.1), overrides the Diamond Drilling MOC Procedure (Section 8.2.4).

8.9.2.1 MOC process and procedures for drilling operations

The Esso MOC process and procedures for drilling operations are outlined in Section 7-1 (MOC) of the current Drilling & Subsurface (D&S) OIMS Execution Manual. A significant change is the key driver for MOC.

Significant change is defined as any change, permanent or temporary, that increases health, safety, public, environmental, security, or financial risk. Examples of significant changes to approved plans or procedures for which exceptions might be requested include:

- Mud density outside of Well Program / Procedure tolerance or range
- Casing setting depth criteria
- Changes to well scope that impact D&S execution risk

Note: Changes to well scope that impact D&S execution risk should be documented through Operating Business Unit MOC process but must be approved by the appropriate level within the D&S Organization based on pre-mitigated risk.

Exceptions to D&S Standards may be requested include:

- Well design (anti-collision, barriers)
- Casing design (size, weight, grade, connection, safety factors)
- Wellhead and Tree equipment (design and materials)
- BOP equipment (ram configurations, choke and kill lines)
- MODUs (station-keeping)

The following changes fall outside the MOC Process:

- Permanent changes to D&S Standards.
- Changes to well scope that do not impact D&S execution risk or changes that impact long-term operability or well integrity are managed under the MOC process for the Operating Business Unit. Examples of these include:
    - Additional formation evaluation from the approved plan
    - Changes to the operating limits for a well
    - Decisions to operate a well with an anomaly and incremental risk
- Changes to personnel in Key Positions.

- Short-term or temporary changes, such as removal or replacement of equipment (these are addressed by the Permit to Work Process).
- Lesser changes (those not determined to result in increased health, safety, public, environmental, security, or financial risk) can be documented via email or other means. Examples of these include:
  - Changes to Bottom Hole Assembly (BHA) design, bit selection, and tool string configurations
  - Changes to mud rheology or cement formulations

When a proposed action has been deemed significant and therefore requires change management, a structured process is necessary to evaluate the potential impacts (i.e. risk) of the change and seek the endorsement of work groups / individuals knowledgeable on the issues associated with the proposed change. A risk screening is performed to assess pre and post-mitigated risk levels.

MOC approvals levels include (Figure 8-2):

- "Lower" Risk Assessment Reports: Drilling Superintendent
- "Medium" Risk Assessment Reports: Drilling Manager
- Category 1 (Higher) Risk Assessment Reports: Drilling & Subsurface Operations Manager (Corporate level)

8.9.3 Identification of Emerging New or Revised Regulatory Information (Including Changes to Management of Protected Matters)

Several mechanisms are in place to identify new or revised laws and regulations that may or may not have an impact on Esso business.

- Active participation in industry organizations or cooperatives (e.g. APPEA)
- Active participation in local or international trade organisations
- Subscriptions with specialised consultants, commercial publications and government provided subscriptions (e.g. SAI Global, Environment Essentials, COMLAW)
- Direct contact with government agencies or direct review of government publications of laws and regulations
- Participation in government-sanctioned working committees.

Changes to management arrangements for protected matters are also identified via the above mechanisms. Relevant changes to protected matter management are assessed on an ongoing basis by the Esso Environmental Advisor, and incorporated into the risk assessments, control measures, EPOs and EPSs and implementation strategy in the Environment Plan, where required.

8.9.3.1 Assessment of applicability

Once new, amended or existing regulations are identified, an assessment is made as to their applicability and possible impact on Esso operations. The initial screening of information is performed by Esso SSHE 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 Regulatory Group.

8.9.3.2 Assessment of the impact

If an amending or new regulation is identified that is applicable to Esso operations, an interpretation of the regulation by Esso SSHE Regulatory Advisor (with Law department assistance as required) is provided to the appropriate SMC for an assessment of the new or amended regulation's impact to Esso. The assessment will also include review of existing obligations for that regulation.

8.9.3.3 Compliance Plan Development

The SMC will then develop a Compliance Plan noting:

- Any new obligations to be met, or changes to current obligations
- Any specific or indirect impacts
- How and by whom the obligations will be met
- Any procedural or other documentary changes required as a result of the compliance plan
- A compliance timeline
- A communication / training plan
- Any ongoing compliance requirements to be entered into the regulatory obligation tracking database (Regframe), or edits to existing entries

8.9.4 Review and update of the Environment Plan

In the event that a proposed change, including new stages or significant modifications identified under MOC (Section 8.2.4), triggers the requirement for a revision under OPGGS Regulation 17 see below), this EP will be revised for re-submission to NOPSEMA.

Note all changes to the accepted EP will be traceable via ‘track-changes’ within the revision document and any changes made are fully justified. This process, including information around changes that trigger a formal revision, are documented.

In accordance with Regulation 17 of the OPGGS(E) Regulations 2009, a revision of this EP will be submitted to NOPSEMA before, or as soon as practicable after, where:

- any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk, has been identified, not provided for in the EP
- the occurrence of a series of new environmental impacts or risks, or a series of increases in existing environmental impacts or risks, which, taken together, amount to the occurrence of:
    - a significant new environmental impact or risk; or
    - a significant increase in an existing environmental impact or risk.

The internal risk assessment as part of MOC shall determine whether a risk or impact is considered 'significant' (i.e. has resulted in an increased residual risk ranking) based on information available at that time (e.g. reviewed scientific information, stakeholder claims or concerns). If the outcome of the assessment suggests that impacts and risks are new or significantly increased, then this will trigger a revision to the EP.

Under OPGGSE sub regulation 8(1) it is an offence for a titleholder to continue if a new impact or risk, or significant increase in an impact or risk not provided for in the EP in force is identified).

8.10 Ongoing Consultation

Esso will continue to consult with stakeholders on an ongoing basis. This will consist of:

- Maintaining the database of relevant stakeholders potentially affected by offshore production operations and maintains records of consultation for each stakeholder.
- Follow up with stakeholders after the EP is accepted by NOPSEMA, to thank them for their involvement, update them of the outcome, notify them of next steps going forward, and make available to them the Environment Plan summary.
- Provide an update to stakeholders at the end of the campaign, which will contain an update about the drilling campaign, including information such as environmental performance data.
- Providing any new relevant information through the dedicated website content at www.exxonmobil.com.au/offshore.
- In case of an incident, ongoing consultation with potentially impacted stakeholders, including AMSA, the Director of National Parks, Port Authorities and other relevant stakeholders as identified in Chapter 9: Stakeholder Consultation, will be implemented.

9 Stakeholder Consultation

Esso Australia, on behalf of Esso Deepwater, has undertaken consultation with all relevant stakeholders potentially affected by the VIC/P70 Exploration Drilling Campaign.

The principles of stakeholder engagement are to:

- Provide meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s).
- Provide information in advance of consultation activities and decision-making.
- Disseminate information in ways and locations that make it easy for stakeholders to access it.
- Respect local timeframes and decision making processes.
- Establish two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed.
- Adopt processes free of intimidation or coercion.
- Develop clear mechanisms for responding to people's concerns, suggestions, and grievances.
- Incorporate feedback into program design, and report back to stakeholders.
- Demonstrate that stakeholders have been consulted in accordance with the requirements of the OPGGS (Environment) Regulations 2009

9.1 Stakeholder Identification

Esso identified all stakeholders potentially affected by the VIC/P70 Exploration Drilling Campaign. Esso classified these stakeholders into three categories for this EP:

- **Primary stakeholders** are those expected to provide direct advice or collaborate on plans and who may be impacted by the project;
- **Secondary stakeholders** are those with functions, interests or activities in the Operational ZPI that could be potentially affected by the activities to be carried out under the environment plan; and
- **Tertiary stakeholders** are other persons and organisations who may have an interest in the activities, but are unlikely to be affected or unknown stakeholders with whom Esso extended an opportunity to self-identify as having an interest in activities, by way of a public consultation forum in Lakes Entrance, which was promoted through various newspaper advertisements.

A total of 73 stakeholders were identified, as given in Table 9-1.

Table 9-1 Identified Stakeholders

No.	Stakeholder Name
Primary Stakeholders	
	Commonwealth
02	• Australian Maritime Safety Authority (AMSA) / Australian Hydrographic Office (AHO)
04	• Australian Fisheries Management Authority (AFMA)
09	• Department of Environment and Energy (DoEE)
	Victoria
39	• State Emergency Service
43	• Department of Economic Development, Jobs, Transport and Resources (DEDJTR Transport) (Manager Marine Pollution – Emergency Management Division)
44	• Department of Primary Industries (Marine and Estuarine Fisheries)
45	• Department of Economic Development, Jobs, Transport and Resources (DEDJTR Earth Resources Regulation)
46	• Department of Environment, Land, Water and Planning (DELWP)
47	• VicPlan Operations Group (VPOG)

No.	Stakeholder Name
	Responders
01	• Australian Marine Oil Spill Centre (AMOSC)
03	• Asia Pacific Applied Science Associates (RPS APASA)
23	• Security Services
25	• Oil Response Company of Australia (ORCA)
55	• Wildlife Victoria
62	• Roads and Maritime Services
104	• Department of Defence
	Fishing Associations
17	• Lakes Entrance Fishermens' Co-operative Society Limited (LEFCOL)
33	• Seafood Industry Victoria (SIV)
37	• South East Trawl Fishing Industry Association (SETFIA)
Secondary Stakeholders	
	Commonwealth
103	• Director of National Parks
99	• Department of Agriculture and Water Resources
105	• Department of Foreign Affairs & Trade
	Victoria
8	• Country Fire Authority
13	• Environment Protection Authority, Victoria (EPA Vic)
15	• Gippsland Ports
27	• Parks Victoria
29	• Phillip Island Nature Park
90	• Water Police
101	• Victorian Fisheries Authority
106	• Transport Safety Victoria
	Oil & Gas Industry Operators in Bass Strait
7	• BHP Billiton Petroleum
24	• Seven Group Holdings
26	• Origin Energy
34	• Cooper Energy (formerly Santos)
57	• ROC Oil Limited
58	• Oil Basins Limited
61	• Carnarvon Hibiscus Pty Ltd
87	• Bass Oil Company Limited
100	• CarbonNet
	Fishing Associations
18	• Lakes Entrance Scallop Fishing Industry Association
40	• Sustainable Shark Fishing Association
51	• Victorian Recreational Fishing (VRFish)
52	• Victorian Scallop Industry Association
71	• Victorian Fishery Association Resource Management
76	• Commonwealth Fisheries Association (CFA)
77	• Southern Shark Industry Alliance
41	• Tasmanian Seafood Industry Council
	Ports
28	• Port of Hastings
113	• Port of Geelong
114	• Port of Melbourne Corporation
Tertiary Stakeholders	
	Victoria
10	• East Gippsland Catchment Management Authority
70	• Victorian Bays and Inlets Fisheries Association
	Responders
109	• Life Saving Victoria
	Fishing Associations
74	• Warrnambool Professional Fishermen's Association
	•
73	• Victorian Rock Lobster Association
79	• Eastern Victorian Sea Urchin Divers Association & Eastern Zone Abalone Industry Association
82	• East Gippsland Estuarine Fishermen’s Association

No.	Stakeholder Name
83	• Corner Inlet Fisheries Habitat Association
	Ports
30	• Port Franklin Fisherman's Association
32	• Victorian Ports Cooperation
115	• Port of Portland
112	• Victorian Regional Channels Authority
	Councils/Shires/Boards
11	• East Gippsland Shire Council
20	• Wellington Shire Council
38	• South Gippsland Shire Council
93	• Mornington Peninsula Shire
108	• Central Coastal Board
110	• Western Coastal Board
	Other
63	• Department of Primary Industries, Parks, Water and Environment (Tasmania)
64	• Parks and Wildlife Service (Tasmania)
107	• Boating Industry Association of Victoria
111	• Yachting Victoria
116	• Gippsland Times

A summary of Stakeholder Consultations is provided in Appendix A.

9.2 Mechanisms for Consultation

A number of mechanisms to communicate with stakeholders have been used to ensure stakeholders can make an informed assessment of the possible consequences of the activity on their functions, interests or activities.

The following mechanisms were used to communicate with stakeholders:

- Written communications:
  - Letters/emails.
  - Informative fact sheets.
  - Impact table.
- One-on-one discussions via telephone and in-person.
- Public consultation session in Lakes Entrance (17 November 2017):
  - Promoted through personal invitations, fact sheet and newspaper advertisements (see below).
- Esso community news webpage which included:
  - Fact sheets on VIC/P70 Exploration drilling and other planned activities in Gippsland Basin.
  - Information about Esso plans to extend field life of Gippsland basin
  - Contact details to lodge an enquiry.

9.2.1 Written communications

Early in October 2017, an email update was sent to Esso's Public and Government Affairs existing offshore stakeholder database, informing them about upcoming activities in the Gippsland Basin and reason Esso was seeking to consult with the stakeholders. A three-page fact sheet (*Esso Offshore Projects*) was attached, providing details of the planned VIC/P70 Exploration drilling Exploration activities. Additionally, it included an invitation to attend the public consultation session in November 2017, or arrange an alternative meeting time at their convenience.

Personal invitations for the Lakes Entrance consultation forum went out to relevant stakeholders in October 2017. In addition to the meeting request and fact sheets, the Lakes Entrance consultation forum was promoted through a series of announcements in a local newspaper (Gippsland Times: "*Back* *in the hunt for Gippsland gas",* 26 September 2017), with ongoing communications in fishing trade magazines (SETFIA, LEFCOL).

At that point of the consultation process some stakeholders indicated they had received adequate information, had no comments, and would like to be 'considered consulted'. A greater number indicated a general interest in being 'kept in the loop' without any specific comments or queries about the planned activity.

Post completion of the Baldfish drilling campaign all stakeholders were notified of its completion.

Once drilling Sculpin-1 had been internally approved, an email was sent to AMSA advising that Esso is currently considering the Sculpin-1 exploration drilling campaign and if a decision to proceed with the campaign is made. Esso will seek further consultation with AMSA to consider ending the Temporary Fairway once Blackback is completed and a decision to proceed with Sculpin-1 has been made.

A fact sheet will be included in the 1Q 2019 edition of the Seafood Industry Victoria newsletter (PROFISH) updating relevant stakeholders of all upcoming Bass Strait activities, including Sculpin-1.

9.2.2 One-on-one discussions via telephone and in-person

Depending on the stakeholders' preference, telephone and in-person discussions were held to clarify and discuss the EP and OPEP. This also included meetings held in Southbank and Lakes Entrance.

9.2.3 Public consultation sessions in Lakes Entrance (November 2017, December 2018)

The first public consultation session was held in Lakes Entrance on 17 November 2017 and was intended to consult about the project, as documented in this Environment Plan and supporting OPEP, and provide an opportunity for both known stakeholders and unknown stakeholders to learn more about Esso's offshore operations. Invitations were announced widely, followed up by individual follow-up invitations by telephone in the week before the public consultation session.

The session was well attended, with 32 stakeholders confirmed, from a wide range of backgrounds, of which 27 attended on the day. Key stakeholders with particular relevance to the Baldfish location included Johnathon Davey from Seafood Industry Victoria and Brad Duncan from LEFCOL. Esso was represented by the Offshore Operations Manager, the Offshore Risk, Environmental & Regulatory Supervisor, Public and Government Affairs and the Project SSHE Coordinator. A brief overview of planned activities, including the Baldfish Exploration Drilling program, was presented by the Esso Offshore Operations Manager. This was followed by a Q&A session and one-on-one conversations.

A series of informative posters were also presented at the session, which visitors were invited to read and discuss with Esso personnel. In addition, the flyer with information on the Baldfish Exploration Drilling Campaign was available for visitors to take away.

No major concerns were raised with regards the Baldfish drilling campaign. Areas discussed included the proximity to shipping lanes and how this would be managed (Section 6.25) and the proximity to the Fishery Independent Survey (FIS) Sites (Section 6.24). Further details summarised below.

Tourist Information: introduced them to the project and Esso operations, minor issues raised included a request for additional information sheets and posters that they could provide to interested members of the public, introduced them to Joanne. They also wanted to know the names of the nearest platforms and where they were supported from.

LEFCOL: informal talk with Brad Duncan about the various projects and what impact there could be on the local fishermen. Baldfish drilling campaign may be the closest to the FIS locations, estimated about 20 NM away. Require actual FIS coordinates to calculate the exact separation distances. The Baldfish drilling campaign is unlikely to have any impact on the FIS locations. The level of noise and discharges is unlikely to be significant and may be hard to differentiate from the passing marine traffic. Previously requested details of the FIS locations from Simon Boag. Brad committed to further discussing this with Simon next time they met. Brad and Simon see each other regularly. No major concerns raised.

SIV (Seafood Industry Victoria): Informal talk with Johnathon and Brad, discussing seismic campaigns and they raised the issue that seismic campaigns can result in environmental impacts – rock lobsters developing deformed tails was raised. Reiterated that none of the current Esso projects are seismic surveys and that when and if Esso plans to conduct a future seismic survey this will be discussed with stakeholders and planned operations will be explained.

The nature of consultation and the amount of consultation that LEFCOL and SIV are asked to participate in was discussed. Feedback is that there is a lot of consultation (too much) and that any way that the oil and gas industry could help in reducing these, or making these more efficient would be gratefully received. It was pointed out that Esso had combined three offshore projects in Gippsland Basin in a single flyer for this reason, and also combined these during the public forum in order to try and minimise the number of requests for consultation. In addition, the SIV newsletter (which is issued quarterly) was discussed as a means of further disseminating the information to a greater number of fishermen. SIV and LEFCOL were both supportive of this as it may be the only real way in which individual fishermen will be made aware of the various projects.

SES: Discussion about oil and gas developments and explained what condensate was. Discussed the three projects at a high level. No specific issues raised. Mainly interested to know more about the O&G industry and what it was doing.

We also discussed the regulatory process and how oil and gas facilities gain approval. Stakeholders were interested to hear about the various regulatory approvals and submissions required. No specific concerns raised.

A second public consultation session was held in Lakes Entrance on 5 December 2018 and this covered the completion of the Baldfish exploration campaign and notification that an additional well (Sculpin-1) was being considered to further assess the VIC/P70 licence block.

The session was well attended, with 96 stakeholders invited, from a wide range of backgrounds, of which 34 attended on the day. A key stakeholder with particular relevance to the Baldfish location included Brad Duncan from LEFCOL. Esso was again represented by the Offshore Operations Manager, the Offshore Risk, Environmental & Regulatory Supervisor, Public and Government Affairs and the Regulatory Advisor. A brief overview of planned activities, including the additional VIC/P70 Exploration Drilling program, was presented by the Esso Offshore Operations Manager. This was followed by a Q&A session and one-on-one conversations.

No concerns were raised with regards the additional VIC/P70 drilling campaign.

9.2.4 Project-specific webpage

In August 2017, Esso updated its offshore webpage (www.exxonmobil.com.au/) with information about the acquisition of permit VIC/P70 and the hunt for new gas ("*Back in the hunt for Gippsland gas*", Richard Owen, Lead Country Manager, 3 August 2017).

Esso also created a portal of information throughout the consultation period (Esso community news webpage), which included:

- Downloadable PDF of the fact sheet ("*Esso Offshore Projects*") on VIC/P70 exploration drilling activities and other planned activities in Gippsland Basin, which included an announcement about the upcoming consultation session (Oct. 2017).
- Information about Esso plans to extend field life of Gippsland basin through exploration in Block VIC/P70:
    - "*Back in the hunt for Gippsland gas*" (Aug. 2017);
    - "*Key gas fields nearing the end but news not all bad*" (Oct. 2017);
    - "*East coast gas supply Q&As*"
- The webpage also features a clear "*contact us*" link for interested parties to email Esso.

An "Offshore projects" page was created in November 2017, to provide ongoing updates on Esso offshore activities (http://www.exxonmobil.com.au/en-au/energy/natural-gas/natural-gas-operations/offshore-projects). Further details were added to this website as they came to hand.

9.3 Timing

Esso began communications with key stakeholders, such as those with a pivotal role in shipping safety around the Marine Traffic Separation Scheme (TSS), and fishing activities in Block VIC/P70 in August 2017. Further dialogue followed after issue of the email update (Section 9.2). Esso reached out to remaining stakeholders during October and November 2017 via telephone and email/postal letters.

The consultation period (from August 2017 to February 2019) provided sufficient time for stakeholders to:

- Learn about the activities covered in the VIC/P70 Exploration Drilling Environment Plan including Oil Pollution Emergency Plan;
- Ask and have questions resolved;
- Have the opportunity to provide comment with ample time for consideration in the VIC/P70 Exploration Drilling Environment Plan and;
- Identify other potential stakeholders or allow unknown stakeholders to self-identify.

9.4 Consultation Outcomes

Much of the interaction with stakeholders during the consultative process was administrative in nature, rather than feedback about the Environment Plan. Common reasons for providing feedback throughout the process were to:

- Re-direct Esso's communication to another position in the organization;
- Advise Esso the stakeholder would like to be kept updated about Esso's offshore operations;
- Notification they had received the information and considered themselves consulted.

A number of stakeholders either asked clarifying questions about, or provided comment to, the activity outlined in the Environment Plan. These questions and Esso's assessments and responses are noted in Appendix A.

The key issues identified are summarised in the following table, with further details provided in Appendix A.

Table 9-2 Summary of Key Issues, Merits and Measures Adopted

Issue	Raised by	Merit and Measures Adopted
Interference with commercial shipping and potential risk of collision	AMSA	This issue had already been identified by Esso as one of the key safety and environmental concerns with the proposed drilling locations and the proximity to the Bass Strait Traffic Separation Scheme. Esso have worked with AMSA to identify temporary fairways that could be established to re-route marine traffic and these have been adopted (Section 6.25.2.1). In addition 2 NM buffer zones will be established to provide the rig and support vessels protection, in addition to the temporary Petroleum Safety Zones. AMSA also provided input in the necessary navigation aids (Section 3.4.1) and confirmed that the tool in place exceed AMSA's expectations. Notices to mariners have been issued and Esso has consulted with key ports and 3rd parties as recommended by AMSA – no further issues or objections have been raised. PSZ has been established around the VIC/P70 wells (Baldfish/Hairtail: NOPSEMA Notice A604295 of 17 April 2018; Sculpin-1: PSZ to be established at least one month before start of field activities).
Proximity to Fishery Independent Survey (FIS) locations and the potential to impact the quality of this survey	SETFIA	Based on the FIS locations and the planned well locations, there will be an 11nm separation between the two activities. The well location and the FIS locations are also separated by a busy shipping lane. The additional noise from drilling

		activities is not considered to have any significant impact to fish densities. This has been discussed with LEFCOL and SETFIA. The timing of the FIS is uncertain, it was supposed to be mid-year but may not even proceed this year. Esso and SETFIA will continue to consult and if the FIS proceeds, Esso will be checking to see if supply vessel routing should be reviewed.
Consultation with fishermen	LEFCOL, SETFIA, SIV	All the main fishing organisation have expressed a concern about how individual fishermen can be made aware of the various projects. Through discussions with SIV, Esso publishes information about its projects, including VIC/P70 Exploration Drilling within the SIV quarterly newsletter PROFISH. Through discussions with SETFIA, Esso are also issuing SMS alerts to SETFIA fishing contacts to raise the awareness of the project activities, including when and where they are taking place. Further means of consultation will also be assessed as and when they are identified. Given the level of fishing based on the ABARES data Esso consider that the consultation with SETFIA, LEFCOL and SIV and the use of the SIV newsletter and SETFIA SMS system should be sufficient.

10 References

ABARES (Australian Bureau of Agricultural and Resource Economics). 2016a. Fishery Status Reports 2016. Department of Agriculture, Fisheries and Forestry. A WWW publication accessed in September 2017 at http://www.agriculture.gov.au/abares/publications/publications

ABARES 2016b. Fisheries status reports 2016. Chapter 2: Bass Strait Central Zone Scallop Fishery. L. Georgeson, R. Green and S. Nicol. A WWW publication accessed in September 2017 at http://www.agriculture.gov.au/abares/publications/publications.

ABARES 2016c. Fisheries status reports 2016. Chapter 8: Southern and Eastern Scalefish and Shark Fishery. N Marton and R Green. A WWW publication accessed in September 2017 at http://www.agriculture.gov.au/abares/publications/publications.

ABARES (Australian Bureau of Agricultural and Resource Economics). 2017. Fishery Status Reports 2016. Department of Agriculture, Fisheries and Forestry. A WWW publication accessed in October 2017 at http://www.agriculture.gov.au/abares/publications/publications.

AFMA (Australian Fisheries Management Authority) 2010. Commonwealth Trawl Sector. Commonwealth Trawl Sector. A WWW publication accessed in September 2017 at http://www.afma.gov.au/wp-content/uploads/2010/07/fs_trawl.pdf.

AFMA 2014a. Small Pelagic Fishery Management Arrangements Booklet 2013-2014. A WWW publication accessed in September 2017. http://www.afma.gov.au/wp-content/uploads/2014/11/Small-Pelagic-Fishery-management-arrangements-booklet-2014-15.pdf.

AFMA 2014b. Re-opening of a commercial fishery for orange roughy (*Hoplostethus atlanticus*) in Australia. Accessed in September 2017 at http://www.afma.gov.au/wp-content/uploads/2014/03/Orange-roughy-Handout.pdf.

AFMA 2014c. Orange Roughy (*Hoplostethus atlanticus*) stock rebuilding strategy. Accessed in September 2017 at http://www.afma.gov.au/sustainability-environment/protected-species-management-strategies/.

AFMA 2014d. School Shark (*Galeorhinus galeus*) Stock Rebuilding Strategy-Revised 2015. A WWW publication accessed in September 2017 at http://www.afma.gov.au/wp-content/uploads/2014/12/School-Shark-Rebuilding-Strategy.pdf.

AFMA 2016. Southern and Eastern Scalefish and Shark Fishery 2016 Management Arrangements Booklet. Accessed in September 2017 at http://www.afma.gov.au/wp-content/uploads/2016/04/SESSF-Management-Arrangements-Booklet-2016.pdf.

AFMA 2017a. Commonwealth fisheries annual catch data. Accessed in September 2017 at http://www.afma.gov.au/resources/catch-data/.

AFMA 2017b. Petroleum industry consultation with the commercial fishing industry. Accessed in September 2017 at http://www.afma.gov.au/sustainability-environment/petroleum-industry-consultation/.

AFMA 2017c. Bass Strait Central Zone Scallop Fishery Management Arrangements Booklet (July 2017). Accessed September 2017 at http://www.afma.gov.au/wp-content/uploads/2017/07/BSCZSF-Management-Arrangements-Booklet-2017-final.pdf.

AFMA 2017d. Catch data Commonwealth Fisheries around Block VIC/P70 for 2010 to 2016. Dataset made available through AFMA, 10 November 2017.

Agriculture Victorina 2017. Victorian Emergency Animal Welfare Plan (Revision 1) A WWW publication accessed in September 2017 at http://agriculture.vic.gov.au/__data/assets/pdf_file/0003/365088/Victorian-Animal-Emergency-Welfare-Plan_updated.pdf.

Aichinger Dias LA, J Litz, L Garrison, A Martinez, K Barry and T Speakman 2017. Exposure of cetaceans to petroleum products following the Deepwater Horizon oil spill in the Gulf of Mexico. Endang. Species Res. 33: 119–125.

Ainsaar, M., Ruzzene, M., and Abbinga, E. 2007. Gippsland sustainable tourism: Project summary report. Urban Enterprise Pty Ltd.

Allen, S., H. Marsh and A. Hodgson, 2004. Occurrence and Conservation of the Dugong (Sirenia: Dugongidae) in New South Wales. Proceedings of the Linnean Society of New South Wales. 125:211-216.

AMSA 2012. NatPlan to Combat the Pollution of the Sea by Oil and other Noxious and Hazardous Substances, Interim Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities, July 2012, Australian Government.

AMSA 2015a. Technical guidelines for preparing contingency plans for marine and coastal facilities, 1-63. https://www.amsa.gov.au/forms-and-publications/Publications/AMSA413.pdf.

AMSA 2015b. National plan. Response, assessment and Termination of cleaning for Oil contaminated foreshores. Guidance Reference: NP-GUI-025. Endorsed by the NPSCC November 2015. A WWW publication accessed in September 2017 at https://www.amsa.gov.au/marine-environment/national-plan-maritime-environmental-emergencies/index-supporting-documents.

AMSA 2017a. Automatic Identification System (AIS). A WWW publication accessed in September 2017 at https://www.amsa.gov.au/navigation/services/ais/.AMSA 2017b. Vessel Traffic Data - Historic Vessel Tracking Request. A WWW publication accessed in September 2017 at https://www.operations.amsa.gov.au/Spatial/.

AMSA 2017c. The International Convention for the Prevention of Pollution from Ships (MARPOL). A WWW publication accessed in September 2017 at https://www.amsa.gov.au/environment/regulations/marpol/.

ANZECC (2000). National water quality management strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council / Agriculture and Resource Management Council of Australia and New Zealand. October 2000.

Apache 2008. Gippsland Basin 2008 Drilling Environment Plan: Public Summary February 2008.

APASA 2017a. Memo. Impact from revised Esso - Baldfish Hairtail Well Location on modelling results. 2Nov 2017

APASA, 2017b. Baldfish & Hairtail Exploration, Gippsland Basin. Drill Cuttings and Muds Dispersion Modelling Study. Prepared for Esso Australia Pty Ltd by RPS Asia-Pacific Applied Science Associates. Report Number: MAQ0611J, November 2017 (RPS APASA).

APASA 2018. Baldfish & Hairtail Exploration, Gippsland Basin Oil Spill Modelling Study. Prepared for Esso Australia PTY LTD by RPS Australia. Report Number: MAQ0611J, Rev 3, 12 February 2018.

APASA 2019. Sculpin Oil Spill Modelling. Prepared for Esso Australia PTY LTD by RPS Australia. Report Number: MAQ0776J, Rev b, 24 January 2019.

Arnould, J. P. Y. and Kirkwood, R. 2008. Habitat selection by female Australian fur seals (*Arctocephalus pusillus doriferus*). Aquatic Conservation: Marine and Freshwater Ecosystems. 17: S53–S67.

ANZECC (Australian and New Zealand Environment and Conservation Council) 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1 The Guidelines (Chapters 1-7).

ANZECC 2000. Australian and New Zealand guidelines for fresh and marine water quality. Volume 1, The guidelines (National water quality management strategy; no.4). Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

AQIS. 2011. Australian Ballast Water Management Requirements. Version 5. Australian Quarantine Inspection Service, Department of Agriculture, Fisheries and Forestry. Canberra.

Azis P, Al-Tisan I, Daili M, Green T, Dalvi A and Javeed M 2003. Chlorophyll and plankton of the Gulf coastal waters of Saudi Arabia bordering a desalination plant Desalination, 154 (2003), pp. 291–302.

Azwell, TMS, MJ Blum, A Hare, S Joye, S Kubendran, A Laleian, G Lane, DJ Meffert, EB Overton, J Thomas & LE White 2011. The Macondo Blowout Environmental Report - Deepwater Horizon Study Group Environmental Report – January 2011.

Balch, A. H., and M. W. Lee, eds., 1984, Vertical seismic profiling—technique, applications, and case histories: Boston, MA, IHRDC, 488 p.

Badruzzaman, A. 2011. Radioactive sources: their importance, challenges and opportunities. A WWW publication accessed in September 2017 at https://www.epmag.com/radioactive-sources-their-importance-challenges-and-opportunities-658506.

Bannister, J. L., Kemper, C. M., and Warneke, R. M. 1996. The Action Plan for Australian Cetaceans. Department of Environment and Water Resources (DEW). Canberra. Accessed online in September 2017 at https://www.environment.gov.au/system/files/resources/2711a6fd-dbf3-4aad-b79b-14ef6ba2687d/files/whaleplan.pdf.

Batten SD, Allen RJS and Wotton COM, 1998, The effects of the Sea Empress Oil Spill on the Plankton of the Southern Irish Sea. Marine Pollution Bulletin 36(10): 764-774.

Baumgartner, D. J., W. E. Frick, P. J. W. Roberts, and C. A. Bodeen. 1992. Dilution Models for Effluent Discharges. Standards and Applied Science Division, Office of Science and Technology; Oceans and Coastal Protection Division, Office of Wetlands, Oceans, and Watersheds; Pacific Ecosystems Branch, ERL-N, 2111 S. E. Marine Science Drive, Newport, Oregon 97365-5260, U. S. Environmental Protection Agency.

Bax, N. J., and Williams, A. 2001. Seabed habitat on the south-eastern Australian continental shelf: context, vulnerability and monitoring. Marine and Freshwater Research 52: 491–512.

Bejarano AC, JK. Farr, P Jenne, V Chu, and A Hielscher 2016. The chemical aquatic fate and effects database (CAFE), a tool that supports assessments of chemical spills in aquatic environments. Env Tox Chem 35(6): 1576–1586.

Bejaranoa AC, Gardiner WW, Barron MG, Word JQ, 2017, Relative sensitivity of Arctic species to physically and chemically dispersed oil determined from three hydrocarbon measures of aquatic toxicity. Mar Poll Bull 122:316-322.

BirdLife International. 2012. Light pollution has a negative impact on many seabirds including several globally threatened species. Available online at: http://www.birdlife.org/datazone/sowb/casestudy/488.

Black KP, Brand GW, Grynberg H, Gwyther D, Hammond LS, Mourtikas S, Richardson BJ and Wardrop JA 1994. Production facilities. In: Environmental implications of offshore oil and gas development in Australia – the findings of an independent scientific review. Swan, J.M., Neff, J.M. and Young, P.C. (eds) Australian Petroleum Exploration Association. Sydney. pp 209–407.

Black, K., Rosenberg, M., Hatton, D., Colman, R., Symmonds, G., Simons, R, Pattiaratchi, C., and Nielsen, P. 1991. Hydrodynamic and sediment dynamic measurements in eastern Bass Strait. Volume 2. Sea bed description and sediment size analysis. Working paper No. 21, Victorian Institute of Marine Sciences.

BOM (Bureau of Meteorology) 2017. Climate Averages. A WWW database accessed in September 2017 at http://www.bom.gov.au/climate/.

Boon PI., Allen T, Brook J., Carr G, Frood D, Hoye J, HartyC, McMahon A, Mathews S, Rosengren N, Sinclair S, White M and Yugovoc J, 2011. Mangroves and coastal saltmarsh of Victoria: distribution, condition, threats and management. Report to Department of Sustainability and Environment by Institute for Sustainability and Innovation, Victoria University, Melbourne. 513pp.

BP 2013. Shah Deniz 2 Project. Environmental & Socio-Economic Impact Assessment. BP Development Pty Ltd.

Brandsma MG., Smith JP., O'Reilly JE., Ayers RC. and Holmquist, AL. 1992 Modeling Offshore Discharges of Produced Water in Produced Water. Edited by J. P. Ray and F. R. Englehardt, Plenum Press, New York, pp. 59-71.

Brady B, Morris L and Ball D, 2002. Oil Spill Dispersants and Temperate Marine Environments. A Literature Review to Support Development of Dispersant Use Protocols for Victoria. Marine and Freshwater Resources Institute Report No. 51. September 2002.

BRS 2007. Designated Exchange Areas Project – Providing Informed Decision on the Discharge of Ballast Water in Australia (Phase II). By Emma Knight, Simon Barry, Rupert Summerson, Scott Cameron and Rebecca Darbyshire. Australian Bureau of Rural Sciences.

Bruce, B.D., Bradford, R., Daley, R., Green, M., Phillips, K., 2002. Targeted review of biological and ecological information from fisheries research in the South Ease Marine Region. December. Prepared for the National Oceans Office.

Bruinzeel, LW, van Belle, J and Davids, L 2009. The Impact of Conventional Illumination of Offshore Operational areas in the North Sea on Migratory Bird Populations. Presented at the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic meeting of the Working Group on the Environmental Impact of Human Activities. November 2009.

Burton, GA, Batley, G.E., Chapman, P.M., Forbes, V.E., Schlekat, C.E., Smith, E.P., den Besten, P.J., Bailer, J., Reynoldson, T., Green, A.S., Dwyer, R.L., Berti, W.R. 2002. A weight-of-evidence framework for assessing ecosystem impairment: improving certainty in the decision-making process. Human Ecology and Risk Assessment. 8: 1675-1696.

Burns K, Slee D, Lloyd J, Hanlon M, Skepper C & Mitsopoulos G 2011. Monitoring plan for the montara well release, Timor Sea monitoring study S3 "Assessement of fish for the presence of oil". WA Department of Fisheries.

Cambridge ML and Kuo J 1979. Two new species of seagrasses from Australia, *Posidonia sinuosa* and *P. angustifolia* (Posidoniaceae). Aquatic Botany, 6: 307-328.

Cardno, 2017. Metocean Criteria for Drilling-Baldfish, Bass Strait. Report 59918018. Prepared for ExxonMobil by Cardno (NSW/ACT), St Leonards NSW, October 2017.

Cato, DH, Bell, M.J., 1992. Ultrasonic ambient noise in Australian shallow waters at frequencies up to 200 kHz. Defence Science and Technology Organisation,Sydney.

Cato, DH, Tavener, S., 1997. Ambient sea noise dependence on local, regional and geostrophic wind speeds: implications for forecasting noise. Applied Acoustics 51, 317–338.

CEFAS (Centre for Environment, Fisheries and Aquaculture Science) 2017. Offshore Chemical Notification Scheme. Accessed in September 2017 at https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/.

Clarke RH 2010. The Status of Seabirds and Shorebirds at Ashmore Reef, Cartier Island and Browse Island. Monitoring Program for the Montara Well Release. Pre-impact Assessment and First Post-Impact Field Survey. Prepared on behalf of PTTEP Australasia and the Department of the Environment, Water, Heritage and the Arts by the Australian Centre for Biodiversity, Monash University. Melbourne.

Coffey 2010. Snapper platform seabed survey- January 2010. Report CR 946_13_v3. Prepared for Esso Australia Pty Ltd by Coffey Environments Pty Ltd, Perth, Australia.

Coleman, N. (1988) Monitoring of scallop spatfall and growth rates at Lakes Entrance, September 1987 to May 1988.

Conolly, R. 1968. Submarine canyons of the continental margin, East Bass Strait (Australia). Mar. Geol. 6, 449–461.

CNR (Victorina Department of Conservation and Natural Resources; now Department of Natural Resources and Environment), 2003. Map 4 Resource Uses, Marine and Coastal Special Investigations. Land Conservation Council, Victoria.

Cogger HG 2000. The Status of Marine Reptiles in New South Wales. A Report prepared for the New South Wales. National Parks and Wildlife Service by. Dr Harold G. Cogger.

Coleman N. 1988. Monitoring of scallop spatfall and growth rates at Lakes Entrance, September 1987 to May 1988.

C&R Consulting 2009. Impacts of plastic debris on Australian marine wildlife. Report by C&R Consulting for The Department of the Environment, Water, Heritage and the Arts19th June 2009. Available online: http://www.environment.gov.au/marine/publications/impacts-plastic-debris-australian-marine-wildlife.

CSIRO 2014. Orange Roughy (*Hoplostethus atlanticus*) Eastern Zone stock assessment incorporating data up to 2014. Accessed in September 2017 at http://www.afma.gov.au/wp-content/uploads/2014/03/SESSF-CSIRO-Orange-Roughy-Eastern-Assessment-Final-2014.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry) 2009. The National Biofouling Management Guidance for the Petroleum Production and Exploration Industry. A WWW document downloaded from http://www.marinepests.gov.au/marine_pests/publications/Pages/petroleum-exportation.aspx.

DAFF. 2017. Marine Pests Interactive Map. A WWW database accessed in April 2017 at http://www.marinepests.gov.au/Pages/marinepest-map.aspx

DAWR 2015. Ballast Water. A WWW database accessed at http://www.agriculture.gov.au/biosecurity/avm/vessels/quarantine-concerns/ballast.. Department of Agriculture and Water Resources. Canberra.

DAWR (Department of Agriculture and Water Resources) 2016. The Australian Ballast Water Management Requirements (v6). http://www.agriculture.gov.au/biosecurity/avm/vessels/ballast/australian-ballast-water-management-requirements-version6.

DAWR 2017. Australian Ballast Water Management Requirements, Version 7. Accessed in January 2018 at http://www.agriculture.gov.au/biosecurity/avm/vessels/ballast/australian-ballast-water-management-requirements.

Davis HK, CF Moffat, NJ Shepherd (2002). Experimental Tainting of Marine Fish by Three Chemically Dispersed Petroleum Products, with Comparisons to the Braer Oil Spill. Spill Science & Technology Bulletin, Vol. 7, Nos. 5–6, pp. 257–278, 2002.

Davies J.M., Bedborough D.M., Blackman R.A.A., Addy J.M., Appelbee J.F., Grogan W.C., Parker J.G. and Whitehead A. 1989. The Environmental Effect of Oil-based Mud Drilling in the North Sea. In:DrillingWastes. Edited by Engelhardt F.R., Ray J.P. and Gillam A.H. Elsevier Applied Science, London.

DECCW (Department of Environment, Climate Change and Water NSW) 2010. Towra Point Nature Reserve Ramsar site - Ecological character description. A WWW publication accessed in June 2018 at http://www.environment.nsw.gov.au/research-and-publications/publications-search/towra-point-nature-reserve-ramsar-site-ecological-character-description.

DEDJTR (Victoria Department of Economic Development, Jobs, Transport and Resources) 2017. Victorian Emergency Animal Welfare Plan (Revision 1) A WWW publication accessed in September 2017 at http://agriculture.vic.gov.au/__data/assets/pdf_file/0003/365088/Victorian-Animal-Emergency-Welfare-Plan_updated.pdf.

De Guise S, Levin M, Gebhard E, Jasperse L, Burdett Hart L, Smith CR, Venn-Watson S, Townsend F, Wells R, Balmer B, Zolman E, Rowles T, Schwacke L 2017. Changes in immune functions in bottlenose dolphins in the northern Gulf of Mexico associated with the Deepwater Horizon oil spill. Endang. Species Res. 33:291-303.

DEH (Department of the Environment and Heritage), 2005. Humpback Whale Recovery Plan 2005 - 2010. [Online]. (Now Department of the Environment and Energy (DoEE). Canberra, Commonwealth of Australia. Available from: http://155.187.2.69/biodiversity/threatened/publications/recovery/m-novaeangliae/index.html.

DEH 2006. A Guide to the Integrated Marine and Coastal Regionalisation of Australia IMCRA Version 4.0. Department of the Environment and Heritage, Canberra, Australia.

De Leo FC, Smith CR, Rowden AA, Bowden DA, Clark MR. 2010. Submarine canyons: hotspots of benthic biomass and productivity in the deep sea. Proceedings of the Royal Society B: Biological Sciences. 2010: 277(1695):2783-2792. doi:10.1098/rspb.2010.0462.

DELWP (Victoria Department of Environment, Land, Water and Planning), 1998. Commercial Fishing Methods in Victoria. John Tomkin. Note Number: FN0105 A WWW publication accessed in September 2017 at http://pandora.nla.gov.au/pan/59217/20060524-0000/FN0105.pdf.

DELWP. 2017a. Victorian biodiversity atlas. A WWW database accessed at https://vba.dse.vic.gov.au/vba/#/.

DELWP 2017b. Wildlife emergencies. A WWW publication accessed in September 2017 at https://www.wildlife.vic.gov.au/wildlife-emergencies/wildlife-emergencies.

Diamond Offshore 2015. Diamond Offshore - GEMS Customer Portal, [Online] Available at: https://gemscustomer.dodi.com/SitePages/Home.aspx.

Diamond Offshore 2017. Diamond Offshore Safety Case Ocean Monarch Mobile Offshore Drilling Unit Portal, [Online] Available at: www.HSECase.com.

Director of National Parks 2013, South-east Commonwealth Marine Parks Network management plan 2013-23, Director of National Parks, Canberra.

Director of National Parks, Canberra.

DMP (WA Department of Mines and Petroleum), 2013. Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline. Available online at http://www.dmp.wa.gov.au/Documents/Environment/ENV-PEB-165.pdf.

DNV 2011. Shipping and Offshore Activity Data for Australian Ports and Waters. Prepared by DET NORSKE VERITAS for Australian Maritime Safety Authority, December 2011. Available online at https://www.amsa.gov.au/forms-and-publications/environment/publications/Other-Reports/documents/DNVApp1.pdf.

DOD (Department of Defence) 2017. Aqueous Film Forming Foams (AFFF)/PFAS Information Sheet. http://www.defence.gov.au/whs/_Master/docs/programs/Aqueous%20Film%20Forming%20Foams.pdf.

DoEE (Department of Environment and Energy) 2000. EPBC Regulations (Part 8: Interacting with cetaceans and whale watching). Version SR 2000 No. 181 of 17 October 2016 (F2016C00914). Administered by: Environment and Energy. Accessed in September 2017 at http://www.environment.gov.au/epbc/about.

DoEE 2008. EPBC Act Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines. http://www.environment.gov.au/resource/epbc-act-policy-statement-21-interaction-between-offshore-seismic-exploration-and-whales

DoEE 2015a. South-east marine region profile. Accessed in September 2017 at http://www.environment.gov.au/system/files/resources/7a110303-f9c7-44e4-b337-00cb2e4b9fbf/files/south-east-marine-region-profile.pdf.

DoEE 2015b. Conservation Values Atlas. Accessed online at http://www.environment.gov.au/topics/marine/marine-bioregional-plans/conservation-values-atlas.

DoEE 2017a. EPBC Act Protected Matters Report for the Baldfish Operational ZPI. Department of Environment. October 2017.

DoEE, 2017b. Flinders Commonwealth Marine Park. Accessed in September 2017 at http://www.environment.gov.au/topics/marine/marine-reserves/south-east/flinders.

DoEE 2017c. Shipwrecks Database. A WWW publication accessed in September 2017 at http://www.environment.gov.au/topics/heritage/historic-shipwrecks/australian-national-shipwreck-database.

DoEE 2017d. Loggerhead turtle. A WWW publication accessed in September 2017 at http://www.environment.gov.au/coasts/species/turtles/loggerhead.html.

DoEE 2017e. Leatherback turtle. A WWW publication accessed in September 2017 at http://www.environment.gov.au/coasts/species/turtles/leatherback.html.

DoEE 2017f. Green turtle. A WWW publication accessed in September 2017 at http://www.environment.gov.au/marine/marine-species/marine-turtles/green.

DoEE 2017g. Hawksbill turtle (*Eretmochelys imbricata*). Accessed in September 2017 at http://www.environment.gov.au/marine/marine-species/marine-turtles/hawksbill.

DoEE 2017h. Hooded plover. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66726.

DoEE 2017i. Fairy tern. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82950.

DoEE 2017j. Species Profile and Threats (SPRAT) Database - EPBC Act List of Threatened Fauna. Accessed in September 2017 at http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl.

DoEE 2017k. Species Profile and Threats (SPRAT) Database - *Eubalaena australis* — Southern Right Whale. Accessed in September 2017 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=40.

DoEE 2017l. Australian Whale Sanctuary. Accessed in September 2017 at http://www.environment.gov.au/marine/marine-species/cetaceans/australian-whale-sanctuary.

DoEE 2017m. Species Profile and Threats Database (SPRAT), *Eudyptula minor* — Little Penguin Accessed in September 2017 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1085http://www.environment.gov.au/marine/marine-species/marine-turtles/hawksbill.

DoEE 2017n. East Gippsland Commonwealth Marine Park. Accessed in September 2017 at http://www.environment.gov.au/topics/marine/marine-reserves/south-east/east-gippsland.

DoEE 2017o. Australian National Guidelines for Whale and Dolphin Watching 2017. Accessed in November 2017 at http://www.environment.gov.au/marine/publications/australian-national-guidelines-whale-and-dolphin-watching-2017.

DoEE 2017p. Commonwealth Marine Parks. A WWW publication accessed September 2017 at http://www.environment.gov.au/topics/marine/marine-reserves.

DoEE 2017q. Freycinet Commonwealth Marine Park. Accessed in September 2017 at. http://www.environment.gov.au/topics/marine/marine-reserves/south-east/freycinet.

DoEE, 2017r. Australian Wetlands Database – Ramsar wetlands, Corner Inlet. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=13.

DoEE, 2017s. Australian Wetlands Database – Ramsar wetlands, Gippsland Lakes. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=21.

DoEE, 2017t. Littoral rainforests and coastal vine thickets of eastern Australia. Accessed in September 2017 at http://www.environment.gov.au/epbc/publications/littoral-rainforest.

DoEE, 2017u. Beagle Commonwealth Marine Park. Accessed in September 2017 at http://www.environment.gov.au/topics/marine/marine-reserves/south-east/beagle.

DoEE, 2017v. Australian Wetlands Database – Ramsar wetlands, Towra Point Nature Reserve. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=23.

DoEE, 2017w. Central Eastern Commonwealth Marine Park. A WWW publication accessed in September 2017 at http://www.environment.gov.au/topics/marine/marine-reserves/temperate-east/central-eastern.

DoEE, 2017x. Australian Wetlands Database – Ramsar wetlands, Logan Lagoon. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=4.

DoEE, 2017y. Australian Wetlands Database – Ramsar wetlands, East Coast Cape Barren Island Lagoons. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=8.

DoEE, 2017z. Australian Wetlands Database – Ramsar wetlands, Flood Plain Lower Ringarooma River. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=9.

DoEE, 2017aa. Australian Wetlands Database – Ramsar wetlands, Little Waterhouse Lake. A WWW publication accessed in September 2017 at http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=12.

DoEE 2018a. EPBC Act Protected Matters Report for the VIC/P70 operational area – Hairtail-1. Department of Environment. February 2018.

DoEE 2018b. EPBC Act Protected Matters Report for the VIC/P70 operational area – Baldfish -1. Department of Environment. February 2018.

DoEE 2018c. Species Profile and Threats Database *Balaenoptera musculus* — Blue Whale. A WWW publication accessed in February 2018 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=36.

DoEE, 2018d. New Lord Howe Commonwealth Marine Park. A WWW publication accessed in February 2018 at http://www.environment.gov.au/topics/marine/marine-reserves/temperate-east/lord-howe.

DoEE 2018e. Species Profile and Threats Database. Mesoplodon ginkgodens — Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale. A WWW publication accessed in April 2018 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=83756.

DoEE 2018f. Species Profile and Threats Database. Thymichthys politus — Red Handfish. A WWW publication accessed in April 2018 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=83756.

DoEE 2018g. EPBC Act Protected Matters Report for the Baldfish/Hairtail Environmental Monitoring ZPI. Department of Environment. May 2018.

DoEE 2019a. EPBC Act Protected Matters Report for the VIC/P70 operational area – Sculpin -1. Department of Environment. January 2019.

DoEE 2019b. EPBC Act Protected Matters Report for the VIC/P70 operational ZPI – Sculpin -1. Department of Environment. January 2019.

DoEE 2019c. EPBC Act Protected Matters Report for the VIC/P70 environmetal monitoring ZPI – Sculpin -1. Department of Environment. January 2019.

DoEE, 2019d SPRAT Datatabase, *Galaxiella Pusilla* – Eastern Dwarf Galaxias, Dwarf Galaxias. A WWW publication accessed in February 2019 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=56790.

DoEE 2019e. SPRAT DatABASE, *Macculochella peelii* – Murray Cod. A WWW publication accessed in February 2019 at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66633.

DOF (WA Department of Fisheries) 2009. A Review: Biosecurity Risks Posed by Vessels and Mitigation Options. Fisheries Occasional Publication No. 55. Department of Fisheries. Government of Western Australia.

DOF 2015. Vessel Check User Guide - Biofouling Risk Assessment Tool for Commercial / Non-Trading / Petroleum / Commercial Fishing Vessel for International and Interstate Movements

Dolman S, Williams-Grey V, Asmutis-Silvia R & Isaac S. 2006. Vessel collisions and cetaceans: What happens when they don't miss the boat. A WDCS Science Report. 25 p.

DPI (NSW Department Primary Industries) 2017a. Port Stephens - Great Lakes Marine Park. A WWW publication accessed in September 2017 at http://www.dpi.nsw.gov.au/fishing/marine-protected-areas/marine-parks/port-stephens-marine-park.

DPI 2017b. Lord Howe Island Marine Park. A WWW publication accessed in September 2017 at http://www.dpi.nsw.gov.au/fishing/marine-protected-areas/marine-parks/lord-howe-island-marine-park.

DPI, 2017. Our fisheries. A WWW publication accessed in September 2017 at http://www.dpi.nsw.gov.au/fisheries/commercial/fisheries.

DPIWE (Department of Primary Industries, Parks, Water and Environment, Tasmania) 2011. Islands of the Hogan Group - Bass Strait. Biodiversity & Oil Spill Response Survey. A WWW publication accessed in September 2017 at http://dpipwe.tas.gov.au/Documents/Oil-Spill-Response-Survey.pdf.

DPIWE 2017a. Marine Reserves. A WWW publication accessed in September 2017 at http://dpipwe.tas.gov.au/sea-fishing-aquaculture/recreational-fishing/area-restrictions/marine-reserves.

DPIPWE, 2017b. Commercial Fishing. A WWW publication accessed in September 2017 at http://dpipwe.tas.gov.au/sea-fishing-aquaculture/commercial-fishing.

DSE (Victoria Department of Sustainability and Environment) 2009a. Wildlife Emergencies Factsheet No 4: Wildlife Impacted by Marine Pollution. A WWW publication accessed in September 2017 at http://www.dse.vic.gov.au/__data/assets/pdf_file/0019/103591/6.4_Oiled_Wildlife_Emergencies_Fact_Sheet v1.pdf.

DSE 2009b. Wildlife (Marine Mammals) Regulations 2009 - REG 8. A WWW publication at http://www8.austlii.edu.au/cgi-bin/viewdb/au/legis/vic/consol_reg/wmr2009321/.

DSEWPAC 2008. East Coast Cape Barren Island Ramsar Site Ecological Character Description. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

DSEWPAC 2010. Gippsland Lakes Ramsar site Ecological Character Description. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

DSEWPAC 2011. Corner Inlet Ramsar site Ecological Character Description. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

DSEWPAC 2012a. Ecological character description for the Logan Lagoon Ramsar site. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra, Australian Capital Territory, Prepared by Elgin Associates. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

DSEWPAC 2012b. Flood Plain Lower Ringarooma River Ramsar Site ECD. Prepared by Newall PR, and Lloyd LN of Lloyd Environmnetal Pty Ltd for DSEWPAC Project LE0944) March 2012. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

Duarte CM 1991. Seagrass depth limits. Aquatic Botany Vol 40(4): 363-377.

Dunham R.J. 1962. Classification of carbonate rocks according to depositional texture. In: Classification of Carbonate Rocks (Ed. W.E. Ham), Am. Assoc. Pet. Geol. Mem., 1, 108–121.

EA (Environment Australia) 2002. Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) in Australia. Available from DoEE website: http://www.environment.gov.au/coasts/publications/grey-nurse-plan/index.html.

EA 2003. Recovery Plan for Marine Turtles in Australia. Prepared by the Marine Species Section, Approvals and Wildlife Division, Environment Australia in consultation with the Marine Turtle Recovery Team. July 2003. www.environment.sa.gov.au/files/sharedassets/public/plants_and_animals/fauna_recovery_plans/pa-rec-marineturtles.pdf.

Ecos Consulting (Aust) Pty Ltd, 2001. National Oceans Office South East Regional Marine Plan – Impacts of Petroleum.

Edgar, G. J. 1997. Australian Marine Life: The plants and animals of temperate waters. Reed New Holland, Sydney, Australia.

Edgar, G. J. 2001. Australian Marine Habitats in Temperate Waters. Reed New Holland, Sydney, Australia.

EMSA, 2016 http://www.emsa.europa.eu/news-a-press-centre/external-news/item/2925-the-management-of-ship-generated-waste-on-board-ships.html.

Environ International (Environ), 2016. Assessment of POP Criteria for Specific Short-Chain Perfluorinated Alkyl Substances https://fluorocouncil.com/wp-content/uploads/2017/03/ENVIRON-Assessment-of-POP-Criteria-Resources-1.pdf

EPA 2017a. The Victorian Environment Protection (Ships' Ballast Water) Regulations 2017 (S.R. No. 28/2017). http://www.epa.vic.gov.au/your-environment/water/ballast-water.

EPA 2017b Protocol for Environmental Management: Domestic Ballast Water Management in Victorian Waters. http://www.epa.vic.gov.au/our-work/publications/publication/2017/march/949-7.

EPR. 1993. Baldfish discharge study. Memorandum to Esso Australia Ltd 1993. Exxon Production Research.

Esso Australia Ltd. 1990. 1989 Metocean Design Criteria for Bass Strait fixed platforms. Vols. 1 - 4.

Esso 2015. Incident Management Handbook – Proces, Organisation and Language for Incident Response Management. Developeed by The Response Group, Texas, USA for ExxonMobil.

Etter, RJ, Grassle, JF, 1992. Patterns of species diversity in the deep sea as a function of sediment particle size diversity. Nature 360, 576-578.

Etkins, D.S., 1997. The impacts of oil spills on marine mammals. OSIR Report – Special Report. OSIR Baker Hughes INTEQ.

Exon, NF, Hill, PJ, Keene, JB, Smith, SM, 1999. The “SOJOURN 7” Swath-Mapping Cruise of R.V. Melville off eastern Tasmania and in the Gippsland Basin. AGSO Record 1999/7 Record 1999/7, pp. 1–50.

Exxon Mobil 2012. Environmental Aspects Guide. Effective - January 1, 2012.

Fauquier DA, Litz J, Sanchez S, Colegrove K, Schwacke LH, Hart L, Saliki J, Smith C, Goldstein T, Bowen-Stevens S, McFee W, Fougeres E, Mase-Guthrie B, Stratton E, Ewing R, Venn-Watson S, Carmichael RH, Clemons-Chevis C, Hatchett W, Shannon D, Shippee S, Smith S, Staggs L, Tumlin MC, Wingers NL, Rowles TK 2017. Evaluation of morbillivirus exposure in cetaceans from the northern Gulf of Mexico 2010−2014. Endang. Species Res. 33:211-220.

Felder DL, Thoma BP, Schmidt WE, Sauvage T, Self-Krayesky SL, Christoserdov A, Bracken-Grissom HD and Fredericq S. 2014. Seaweeds and Decapod Crustaceans on Gulf Deep Banks after the Macondo Oil Spill. Bioscience 64: 808–819.

FFFC (Fire Fighting Foam Coalition), 2017. Fact Sheet on AFFF Fire-fighting Agents https://docs.wixstatic.com/ugd/331cad_fa5766eb867b4a5080330ce96db195fa.pdf

French DP, Schuttenberg, H.Z., and Isaji, T., 1999. Probabilities of oil exceeding thresholds of concern: example from an evaluation for the Florida power and light. In: proceedings: AMOP 99 Technical Seminar, June 2nd–4th 1999, Calgary, Alberta, Canada, pp. 243-260.

French-McCay DP, 2002. Development and application of an oil toxicity and exposure model, OilToxEx. Environmental Toxicology and Chemistry 21, 2080-2094.

French McCay D, 2003. Development and application of damage assessment modelling: Example assessment for the North Cape oil spill. Mar Pollut Bull 47:341–359.French McCay, D.P., 2004. Oil Spill Impact Modeling: Development and Validation. Environmental Toxicology and Chemistry 23, 2441–2456.

French-McCay, D (2016). Potential Effects Thresholds for Oil Spill Risk Assessments. By: Deborah French McCay, RPS-ASA, USA. Proceedings of the Thirty-ninth AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON pp. 285-303, 2016.

Fugro. 1995. Blackback Project Site Survey and Pipeline Route Investigation Survey Report. Project HY11760 (Prepared for Esso) February 1995.

Fugro. 1996. Blackback Project Subsea Site Investigation along Route ‘A’. Project HY11760 (Prepared for Esso) June 1996.

Fukuyama, AK, G Shigenaka, and GR VanBlaricom. 1998. Oil spill impacts and the biological basis for response guidance: an applied synthesis of research on three subarctic intertidal communities. NOAA Technical Memorandum NOS ORCA 125. Seattle: Hazardous Materials Response and Assessment Division, National Oceanic and Atmospheric Administration. 73 pp.

Gage, JD, Lamount, PA, Tyler, PA, 1995. Deep-sea macrobenthic communities at contrasting sites off Portugal, preliminary results: I – Introduction and diversity comparisons. Internationale Revue Gesamten Hydrobiologie 80, 235-250.

Gagnon MM and Rawson C 2011. Montara Well Release, Monitoring Study S4A – Assessment of Effects on Timor Sea Fish. Curtin University, Perth, Australia.

GEMS. 2005. Nexus Petroleum. Oil Spill Risk Assessment Longtom-3 Bass Strait VIC. Global Environmental Modelling System.

Geoscience Australia, 2017. Australian Marine Spatial Information System. Accessed in September 2017 at http://www.ga.gov.au/scientific-topics/marine/jurisdiction/amsis.

Gibbs CF, Arnott GH, Longmore AR and Marchant JW, 1991. Nutrient and plankton distribution near a shelf break front in the region of the Bass Strait cascade. Australian Journal of Marine and Freshwater Research 42(2) 201 – 217.

Gill, P. C., 2002. A blue whale (*Balaenoptera musculus*) feeding ground in a southern Australian coastal upwelling zone. Journal of Cetacean Research and Management 4:179–184.

Gill, P.C., and Morrice, M.G., 2003. Blue Whale research in the Bonney Upwelling, South-east Australia - current information. Deakin University, School of Ecology and Environment, Technical paper 2001/1. November 2003.

Godfrey JS, Jones ISF,Maxwell JGH, Scott BD, 1980. On the winter cascade from Bass Strait into the Tasman Sea. Australian Journal of Marine and Freshwater Research 31, 275–286.

Gonzalez, AM, 1996. A laboratory-formulated sediment incorporating synthetic acid volatile sulfide. Environmental Toxicology and Chemistry, 15: 2209-2220.

Gros J, CM. Reddy, RK. Nelson, SA. Socolofsky, and JS Arey 2016. Simulating Gas−Liquid−Water Partitioning and Fluid Properties of Petroleum under Pressure: Implications for Deep-Sea Blowouts. Env Sci Technol. 50:7397-7408.

Hardage BA, 1985, Vertical seismic profiling, Part A— principles, 2nd ed.: Oxford, U., K., Pergamon Press, 509 p.

Harris, M.P. and Norman, F.I. 1981. Distribution and status of coastal colonies of seabirds in Victoria. Memoires of the Museum of Victoria. 42: 89–106.

Hartley JP 1996. Environmental monitoring of offshore oil and gas drilling discharges – A caution on the use of barium as a tracer. Mar. Pollut. Bull. 32:727-733.

Heislers S and Parry GD 2007. Species diversity and composition of benthic infaunal communities found in Marine National Parks along the outer Victorian coast. Parks Victoria Technical Paper Series No. 53. Fisheries Victoria, Department of Primary Industries, Queenscliff.

Henry, WC, Hyden, AM, Williams, SL, 2000. Innovations in subsea development and operation. APPEA J. 40, 439–449.

Heyward A, Moore C, Radford B and Colquhoun J. 2010. Monitoring Program for the Montara Well Release Timor Sea: Final Report on the Nature of Barracouta and Vulcan Shoals. Prepared by the Australian Institute of Marine Science for PTTEP Australasia (Ashmore Cartier) Pty Ltd.

Hirst, A. and Bott, N.J. 2016. Marine pests in the Gippsland Lakes: Existing threats and future monitoring. RMIT Centre for Environmental Sustainability and Remediation. Melbourne.

Hohn AA, Thomas L, Carmichael RH, Litz J, Clemons-Chevis C, Shippee SF, Sinclair C, Smith S, Speakman TR, Tumlin MC, Zolman ES 2017. Assigning stranded bottlenose dolphins to source stocks using stable isotope ratios following the Deepwater Horizon oil spill. Endang. Species Res. 33:235-252.

Holdgate, GR, Wallace, MW, Gallagher, SJ, Smith, AJ,Keene, JB, Moore, D, Shafik, S, 2003. Plio-Pleistocene tectonics and eustasy in the Gippsland Basin, southeast Australia: evidence from magnetic imagery andmarine geological data. Aust. J. Earth Sci. 50, 403–426.

Hook S, Batley G, Holloway M, Irving P & Ross A 2016. Oil Spill Monitoring Handbook. CSIRO Publishing.

Hornsby FE, McDonald TL, Balmer BC, Speakman TR, Mullin KD, Rosel PE, Wells RS, Telander AC, Marcy PW, Schwacke LH 2017. Using salinity to identify common bottlenose dolphin habitat in Barataria Bay, Louisiana, USA. Endang. Species Res. 33:181-192.

IMCA. 2016. Marine Inspection for Small Workboats. A WWW document downloaded from www.imca-int.com/marine. International Marine Contractors Association. IMCA M 189 Rev 3, June 2016.

IPIECA (International Petroleum Industry Conservation Association), 1995. Biological Impacts of Oil Pollution: Rocky Shores, International Petroleum Industry Environmental Conservation Association, No. 7.

IPIECA (International Petroleum Industry Conservation Association), 2004. A guide to Oiled Wildlife Response Planning, International Petroleum Industry Conservation Association, no. 13.

ITOPF (International Tank Owners Pollution Federation), 2011. Effects of Oil Pollution on the Marine Environment. Technical Information Paper. Technical paper No. 13. The International Tank Owners Pollution Federation Limited.

IMO (International Maritime Organization) 1974, Convention for the Safety of Life at Sea (SOLAS), as amended, London.

IMO 2011. IMO guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (RESOLUTION MEPC.207(62). Adopted on 15 July 2011. http://www.imo.org/en/OurWork/Environment/Biofouling/Pages/default.aspx.

IMO. 2015. GESAMP Composite List of Hazard Profiles 2015. A WWW publication accessed at http://www.imo.org/en/OurWork/Environment/PollutionPrevention/ChemicalPollution/Documents/GESAMP%20CompList%202015.pdf.

Incardona JP, LD Gardner, TL Linbo, TL Brown, AJ Esbaugh, EM Mager, JD Stieglitz, BL French, JS Labenia, CA Laetz, M Tagal, CA Sloan, A Elizur, DD Benetti, M Grosell,. BA Block and NL Scholz 2014. Deepwater Horizon crude oil impacts the developing hearts of large predatory pelagic fish. PNAS 111(15): E1510-E1518. https://doi.org/10.1073/pnas.1320950111.

Jenssen, BM 1996. An overview of exposure to, and effects of, petroleum oil and organochlorine pollution in grey seals (Halichoerus grypus). Sci Total Environ. 1996 Jul 16;186(1-2):109-18.

Jewett, S.C., T.A. Dean, R.O. Smith, & A. Blanchard. 1999. The Exxon Valdez oil spill: impacts and recovery of the soft-bottom benthic community in and adjacent to eelgrass beds. Marine Ecology Progress Series 185:59-83.

Jones, I.S.F., 1980. Tidal and wind-driven currents in Bass Strait. Australian Journal of Marine and Freshwater Research 31: 109–117.

Jones, R. and Allen, J., 1979. A stratified archaeological site on great Glennie Island, Bass Strait. Australian Archaeology 9: 2–11.

Jones H. A. & Davies P.J. 1983. Superficial sediments of the Tasmanian continental shelf and part of Bass Strait. Bureau of Mineral Resources Bulletin 218.

Kellar NM, Speakman TR, Smith CR, Lane SM, Balmer BC, Trego ML, Catelani KN, Robbins MN, Allen CD, Wells RS, Zolman ES, Rowles TK, Schwacke LH 2017. Low reproductive success rates of common bottlenose dolphins Tursiops truncatus in the northern Gulf of Mexico following the Deepwater Horizon disaster (2010−2015). Endang. Species Res. 33:143-158.

Kirkwood, R., Pemberton, D., Gales, R., Hoskins, A.J., Mitchell, T., Shaughnessy, P.D. and Arnould, J.P.Y., 2010. Continued population recovery by Australian fur seals. Marine and Freshwater Research. 61:695-701.

Kroops, W, Jak, R. G., Van der Veen, D.P.C., 2004. Use of dispersants in oil spill response to minimize environmental damage to birds and aquatic organisms. Interspill 2004. Presentation no. 429

Klimey, AP and Anderson SD, 1996. Residency patterns of white sharks at the South Farrallone Islands, California. In Great White Sharks: The biology of *Carcharodon cacharias*. A.P. Klimey & D.G. Ainley (Eds).pp 365-373. Academic Press, New York.

Kloser RJ, Williams A, and Butler A 2001. Assessment of acoustic mapping of seabed habitats: marine biological and resource surveys South-East Region. Cooperative Program, Report 2 to the National Oceans Office. 332 pp.

Kuiter, RH 2000. Coastal Fishes of South-eastern Australia. GA Pty Ltd., Sydney Land Conservation Council (LCC). 1993. Marine and coastal special investigation descriptive report. Victorian Government, Melbourne

Laist DW, Knowlton AR, Mead JG, Collet AS & Podesta M 2001. Collisions between Ships and Whales. Marine Mammal Science, Vol. 17, Issue 1, pp 35-75.

Land Conservation Council (LCC). 1993. Marine and Coastal Development Report (special investigation) June 1993.

Langford TEL 1990. Ecological effects of thermal discharges, xi, 468p. Elsevier.

Larcombe, J and Begg, G 2008, Fishery status reports 2007: Status of fish stocks managed by the Australian Government, Bureau of Rural Sciences, Canberra.

Lawson and Treloar Pty Ltd. (1990). "Bass Strait Metocean Data, Kingfish B, Wave, Current and Wind Data". Unpublished report prepared for Esso Australia Limited. Lawson and Treloar Pty Ltd report REP1182, issued October 1987 and revised March 1990.

Lawson and Treloar Pty Ltd. (1991). "Bass Strait Metocean Data, Marlin 500mm Gas Pipeline Stability Criteria". Unpublished report prepared for Esso Australia Limited. Lawson and Treloar Report No. R1331, issued October 1990 and revised March 1991 and July 1991.

Lawson and Treloar Pty Ltd. (1994). "Blackback Oceanographic Study". Unpublished report prepared for Esso Australia Limited. Lawson and Treloar Pty Ltd report R1487, February 1994.

Lawson and Treloar, (1996). “Blackback Oceanographic Measurement Program”. Unpublished report prepared by Lawson and Treloar Pty Ltd for Esso Australia Limited, Report #J1449/R1665.

Lawson and Treloar, (1998). “Prediction of Bass Strait Cascade Currents”. Unpublished report prepared by Lawson and Treloar Pty Ltd for Esso Australia Limited, Report # Rm1030/J5146.

Lawson and Treloar, (1999a). “First Generation Platforms, Data for Riser Analysis”. Unpublished report prepared by Lawson and Treloar Pty Ltd for Esso Australia Limited, Report # Rm1039/J5158.

Lawson and Treloar, (1999b). “Oceanographic Measurements during Blackback Drilling and Completion”. Unpublished report prepared by Lawson and Treloar Pty Ltd for Esso Australia Limited, Report # Rm1039/J5158.

Lawson and Treloar, (2000). "Water Temperature in Bass Strait". Unpublished report prepared by Lawson and Treloar Pty Ltd for Esso Australia Limited, Report # Rm1055/J5170.

Leftrade Ltd. 2013. Types of fishing. A www publication accessed at Lakes Entrance Fishermen's Co-Op website: http://www.leftrade.com.au/operations/types-of-fishing.html.

Loehr L C, Beegle-Krause CJ, George K, McGee C D, Mearns AJ, Atkinson MJ 2006. The significance of dilution in evaluating possible impacts of wastewater discharges from large cruise ships. Marine Pollution Bulletin, Vol 52, pp 681–688.

Marshall, NG, 1988. A Santonian dinoflagellate assemblage from the Gippsland Basin, Southeastern Australia, Association of Australasian Palaeontologists. Memoir 5, 195–215.

McCauley, R., 1998. Radiated Underwater Noise Measured from the Drilling Rig Ocean General, Rig Tenders Pacific Ariki and Pacific Frontier, Fishing Vessel Reef Venture and Natural Sources in the Timor Sea, Northern Australia, report prepared for Shell Australia, Melbourne, July 1998.

McCauley R.D., C Jenner C., JL Bannister, DH Cato & AJ Duncan 2000. Blue whale calling in the Rottnest trench, Western Australia, and low frequency sea noise. In: Australian Acoustical Society Conference (pp. 1–6). Joondalup, Western Australia.

McCauley RD, R . Day, KM. Swadling, QP Fitzgibbon, RA Watson & JM Semmens 2017. Widely used marine seismic survey air gun operations negatively impact zooplankton. Nature Ecology & Evolution 1, 0195 (2017).

McDonald TL, Hornsby FE, Speakman TR, Zolman ES, Mullin KD, Sinclair C, Rosel PE, Thomas L, Schwacke LH 2017. Survival, density, and abundance of common bottlenose dolphins in Barataria Bay (USA) following the Deepwater Horizon oil spill. Endang. Species Res. 33:193-209.

McIntyre AD & Johnson R 1975. Effects of nutrient enrichment from sewage in the sea. In: ALH Gameson, ed. Discharge of sewage from sea outfalls. New York, Pergamon Press. pp. 131–141.

McKay MD, Morrison JD, Upton SC 1999. Evaluating prediction uncertainty in simulation models. Computer Physics Communications 117(1–2): 44-51.

Mitchell, JK, GR Holdgate, MW Wallace, SJ Gallagher (2007). Marine geology of the Quaternary Bass Canyon System, southeast Australia: A cool-water carbonate system. Marine Geology 237 (2007) 71–96.

Morrow, R. A., Jones, I. S. F., Smith, R. L. and Stabeno, P. J., 1990. Bass Strait forcing of coastal trapped waves: ACE revisited. Journal of Physical Oceanography 20: 1528–1538.

Munro P., Croce B., Moffit C., Brown N., McIntosh A., Hird S. and Stagg R. 1998. Solid-Phase Test for Comparison of Degradation Rates of Synthetic-Mud Base Fluids Used in the Off-Shore Drilling Industry. Environmental Toxicology and Chemistry 17(10): 1951-1959.

Myers, G 2008. Ultra-Deepwater Riserless Mud Circulation with Dual Gradient Drilling. Scientific Drilling, No. 6, July 2008.

National Oceans Office, 2002. Sea Country – an Indigenous perspective The South-east Regional Marine Plan Assessment Reports. Available online at http://www.environment.gov.au/system/files/resources/271c0bfc-34a2-4c6c-9b02-01204ebc0f43/files/indigenous.pdf

Neff, J.M. 2010. Fates and Effects of Water Based Drilling Muds and Cuttings in Cold-Water Environments. Prepared by Neff & Associates LLC for Shell Exploration and Production Company.

Neira, F.J., 2005. Summer and winter plankton fish assemblages around offshore oil and gas operational areas in south-eastern Australia .Estuarine, Coastal and Shelf Science. 2005, Vol.63(4), pp.589-604

NERA (National Energy Resources Australia) 2017a. Reference Case Project. Accessed online in November 2017 at https://referencecases.nopsema.gov.au/about-the-project/.

NERA 2017b. Environment Plan Reference Case – Planned discharge of sewage, putrescible waste and greey water. https://referencecases.nopsema.gov.au/assets/reference-case-project/2017-1001-Sewage-grey-water-and-putrescible-waste-discharges.pdf

Neuparth T, Costa FO & Costa MH 2002. Effects of temperature and salinity on life history of the marine amphipod *Gammarus locusta*. Implications for ecotoxicological testing. Ecotoxicology, 11, 61–73.

NNTT (National Native Title Tribunal), 2010. Native Title Determination Details - VCD2010/001 – Gunai-Kurnai People. A WWW publication accessed in September 2017 at http://www.nntt.gov.au/searchRegApps/NativeTitleClaims/Pages/Determination_details.aspx?NNTT_Fileno=VCD2010/001.

NOAA (U.S. Department of Commerce National Oceanic and Atmospheric Administration National Ocean Service Office of Response and Restoration, Emergency Response Division), 2002. Managing seafood safety after an oil spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72pp.

NOAA 2006. Special Monitoring of Applied Response Technologies (SMART). Accessed online at https://response.restoration.noaa.gov/sites/default/files/SMART_protocol.pdf.

NOAA, 2010a. Oil and sea turtles: biology planning and response. US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration, 116 pp.

NOAA, 2010b. Oil spills in coral reefs: planning and response considerations, US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration, 84 pp.

NOAA, 2010c Oil spills in mangroves: planning and response considerations. US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration, 71 pp.

NOAA 2010d. Characteristic Coastal Habitats - Choosing Spill Response Alternatives.

NOAA 2016. Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing. NOAA Technical Memorandum NMFS-OPR-55, July 2016 http://www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf.

NOO. 2002. Ecosystems - Nature's Diversity. The South-East Regional Marine Plan Assessment Reports. National Oceans Office. Hobart.

NOPTA 2018. Titleholders report - National Offshore Petroleum Titles Administrator. Accessed in May 2018 at www.nopta.gov.au/_documents/neats/titleholders-report-20180331.xlsx.

NOPSEMA 2013, Validation Guideline, N-04200-GL0525, Revision 13, April 2016. https://www.nopsema.gov.au/assets/Guidelines/A52424.pdf.

NOPSEMA, 2016. Environment plan content requirements. Guidance noteN04750-GN1344 Revision No 3 April 2016. Accessed in September 2017 at https://www.nopsema.gov.au/assets/Guidance-notes/A339814.pdf.

NOPSEMA 2016a, Validation Policy, N-04200-PL0286, Revision 9, June 2016 . https://www.nopsema.gov.au/assets/Policies/A15457-Validation-Rev-9.pdf.

NOPSEMA 2016b. Operational and Scientific Monitoring Programs – Information paper (N-04700-IP1349, Rev 2, March 2016) https://www.nopsema.gov.au/assets/Information-papers/A343826.pdf

NOPSEMA 2017a, Scope of Validation Matrix, N-04200-FM0325 (March 2017).. https://www.nopsema.gov.au/assets/Forms/A15410.pdf.

NOPSEMA 2017b. Reference case briefing, Perth, Melbourne, and Adelaide - August/September 2017. Accessed online in November 2017 at https://referencecases.nopsema.gov.au/about-the-project/ and https://www.nopsema.gov.au/assets/Presentations/A573288.pdf.

NOPSEMA, 2018.Oil pollution risk management – Guidance Note (N-04700-GN1488, Rev 2, February 2018) https://www.nopsema.gov.au/assets/Guidance-notes/A382148.pdf

NPWS (NSW National Parks and Wildlife Service), 2017a. Nadgee Nature Reserve. A WWW publication accessed at http://www.environment.nsw.gov.au/NationalParks/parkHome.aspx?id=N0458 in September 2017.

NPWS 2017b. Ben Boyd National Park. A WWW publication accessed at http://www.nationalparks.nsw.gov.au/visit-a-park/parks/ben-boyd-national-park in September 2017.

NRMNT (Natural Resource Management in Northern Tasmania) 2012. Little Waterhouse Lake Ramsar Site Ecological Character Description. Report prepared by Lloyd Environmnetal for NRMNT, March 2012. Project LE0907b. A WWW publication accessed in June 2018 at http://www.environment.gov.au/water/wetlands/publications.

NRC (National Research Council) 1989. Using oil spill dispersants on the sea. Washington DC National Academy Press. 335 p.

NSW Health 2017. Fact Sheet - PFOS and PFOA. Accessed online in November 2017 at http://www.health.nsw.gov.au/environment/factsheets/Pages/pfos.aspx.

OECD 2002. Manual for investigation of HPV chemicals . Chapter 4: Initial assessment of data. 4.2. Guidance for the Initial Assessment of Aquatic Effects.

Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cwlth).

Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (Cwlth).

Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cwlth).

OGUK. 2014. Guidance on Risk Related Decision Making. Accessed in January 2018 at http://oilandgasuk.co.uk/product/guidance-on-risk-related-decision-making-issue-2-july-2014/.

O'Hara, T and Barmby, V. 2000. Victorian Marine Species of Conservation Concern: Molluscs, Echinoderms and Decapod Crustaceans. Department of Natural Resources and Environment.

OSPAR, 2004. Report on Discharges, Spills and Emissions from Offshore Oil and Gas Installations, OSPAR Commission, 2004.

OSPAR 2012. OSPAR Guidelines in support of Recommendation 2012/5 for a Risk-based Approach to the Management of Produced Water Discharges from Offshore Installations. Source: OSPAR 12/22/1, Annex 19 (OSPAR Agreement: 2012-7, updated by OIC 2014).

ParksVic, 1998. The Lakes National Park and Gippsland Lakes Coastal Park Management Plan. Accessed in September 2017 at http://trove.nla.gov.au/work/7878610?selectedversion=NBD13768438.

ParksVic 2003. Gippsland Lakes Ramsar Site Strategic Management Plan. Accessed in September 2017 at http://parkweb.vic.gov.au/__data/assets/pdf_file/0007/313279/gippsland-lakes-ramsar-site.pdf

ParksVic 2005. Corner Inlet Ramsar Site Strategic Management Plan. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/corner-inlet-marine-national-park

ParksVic 2006. Management Plan for Cape Howe Marine National Park. A WWW publication accessed on in September 2017 at http://parkweb.vic.gov.au/explore/parks/cape-howe-marine-national-park.

ParksVic, 2017a. Point Hicks Marine National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/point-hicks-marine-national-park.

ParksVic, 2017b. Beware Reef Marine Sanctuary. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/beware-reef-marine-sanctuary.

ParksVic, 2017c. Ninety Mile Beach Marine National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/ninety-mile-beach-marine-national-park.

ParksVic, 2017d. Nooramunga Marine and Coastal Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/nooramunga-marine-and-coastal-park.

ParksVic, 2017e. Corner Inlet Marine and Coastal Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/corner-inlet-marine-and-coastal-park.

ParksVic, 2017f. Corner Inlet Marine National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/corner-inlet-marine-national-park.

ParksVic, 2017g. Wilsons Promontory Marine Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/wilsons-promontory-national-park.

ParksVic, 2017h. Croajingolong National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/croajingolong-national-park.

ParksVic, 2017i. Cape Conran Coastal Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/cape-conran-coastal-park.

ParksVic, 2017j. Gippsland Lakes Coastal Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/gippsland-lakes-coastal-park.

ParksVic, 2017k. The Lakes National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/the-lakes-national-park.

ParksVic, 2017l. Cape Howe Marine National Park. A WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/cape-howe-marine-national-park.

ParksVic, 2017m. Subtidal rocky reefs. WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/park-management/environment/ecosystems/marine/subtidal-rocky-reefs.

ParksVic, 2017n. The Lakes National Park. WWW publication accessed in September 2017 at http://parkweb.vic.gov.au/explore/parks/the-lakes-national-park/environment.

ParksVic. 2017o. Marine pests. A WWW database accessed at http://parkweb.vic.gov.au/park-management/environment/weeds-and-pests/marine-pests. Parks Victoria. Kew.

Parry, G.D., Campbell, S.J. and Hobday, D.K. 1990. Marine resources off East Gippsland, southeastern Australia. Technical Report No. 72, Marine Science Laboratories, Queenscliff, Victoria, Australia.

Passlow, V, 1997. Slope sedimentation and shelf to basin transfer: a cool-water carbonate example from the Otway Margin, Southeast Australia. In: James, N.P.C., Jonathan, A.D. (Eds.), SEPM, vol. 56. SEPM, pp. 107–125.

Patil JG, Hayes KR, Gunasekera RM, Deagle BE, McEnnulty FR, Bax NJ, & Hewitt CL 2004a. Port of Hastings National Demonstration Project – Verification of the Type II error rate of the Ballast Water Decision Support System (DSS). Final report prepared for the EPA, www.marine.csiro.au/crimp.

Patil, J, Gunasekera R, McEnnulty F, Bax, N 2004b. Development of genetic probes for the rapid assessment of the impacts of marine invasive species on native biodiversity - *Maoricolpus roseus*. Final report for the Department of Environment and Heritage by CSIRO Marine Research, November 2004.

Peel D, Smith JN & Childerhouse S. (2016) Historical Data on Australian whale vessel strikes. IWC June 2016 (SC/66b/HIM/05 Rev1). https://www.nespmarine.edu.au/document/historical-data-australian-whale-vessel-strikes-international-whaling-commission-june-2016.

Pemberton, D. & Kirkwood, R.J. 1994. Pup production and distribution of the Australian fur seal, *Arctocephalus pusillus doriferus*, in Tasmania. Wildlife Research. 21:341-352.

Pizzey, G. 2003. The Field Guide to the Birds of Australia. HarperCollins, Pymble, NSW.

PTTEP. 2013. Montara Environmental Monitoring Program. Report of Research. A WWW publication accessed at: www.au.pttep.com/sustainable-development/environmentalmonitoring. PTTEP Australasia. Perth.

Rawson, C., Gagnon, M.M. and Williams, H. 2011. Montara Well Release Olfactory Analysis of Timor Sea Fish Fillets. Curtin University, Perth, Western Australia, November 2011.

Ralf B. Schäfer, Nadine Gerner, Ben J. Kefford, Jes J. Rasmussen, Mikhail A. Beketov,Dick de Zwart, Matthias Liess, and Peter C. von der Ohe 2013. How to Characterize Chemical Exposure to Predict Ecologic Effects on Aquatic Communities?, Environmental Science and Technology, Vol 47, pp 7996-8004.

Reddy, C. M., Arey, J. S., Seewald, J. S. *et al.* (2011). Composition and fate of gas and oil released to the water column during the Deepwater Horizon oil spill. Proceedings of the National Academy of Sciences. DOI 10.1073.

Reich KJ, López-Castro MC, Shaver DJ, Iseton C, Hart KM, Hooper MJ, Schmitt CJ 2017. δ13C and d15N in the endangered Kemp's ridley sea turtle Lepidochelys kempii after the Deepwater Horizon oil spill. Endang. Species Res. 33:281-289.

Reilly & York. (2001). Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. Environmental Health Perspectives 119:1062-1069 (2011).

Rice DW 1998. Marine mammals of the world. Systematics and distribution. Special publication number 4. Kansas: Society for Marine Mammalogy.

Rochford, DJ 1975. The physical setting. In "Resources of the Sea" (Eds. MR Banks and TG Dix). Symposium Bicheno, Tasmania (Royal Society of Tasmania: Hobart).

Rodríguez A, Burgan G, Dann P, Jessop R, Negro JJ, Chiaradia A 2014. Fatal attraction of short-tailed shearwaters to artificial lights. PLoS One 9(10):e110114.

Rosel PE, Wilcox LA, Sinclair C, Speakman TR, Tumlin MC, Litz JA, Zolman ES 2017. Genetic assignment to stock of stranded common bottlenose dolphins in southeastern Louisiana after the Deepwater Horizon oil spill. Endang. Species Res. 33:221-234.

Rowe, G.T., Polloni, P.T., Haedrich, R.L., 1982. The deep-sea macrobenthos on the continental margin of the Northwest Atlantic Ocean. Deep-Sea Research 29, 257-278.

RPS 2009. Effects of a desalination plant discharge on the marine environment of Barrow Island. Prepared by RPS for Chevron Australia Pty Ltd.

RPS 2017. Appendix 1: ConocoPhillips Barossa Project Cooling Water Dispersion Modelling. Prepared by RPS for Conocophillips Australia. Report Number: MAQ0540J.000, 7 March 2017.

Rudd HJ & NA Hill 2001. Measures to Reduce Emissions of VOCs during Loading and Unloading of Ships in the EU. A report produced for the European Commission, Directorate General – Environment. AEAT/ENV/R/0469 Issue 2. August 2001. Accessed in January 2018 at ec.europa.eu/environment/air/pdf/vocloading.pdf.

Ryerson TB, KC Aikin, WM Angevine, EL Atlas, DR Blake, CA Brock, FC Fehsenfeld, RS Gao, JA de Gouw, DW Fahey, JS Holloway, DA Lack, RA Lueb, S Meinardi, AM Middlebrook, DM Murphy, JA Neuman, JB Nowak, DD Parrish, J Peischl, AE Perring, IB Pollack, AR Ravishankara, JM Roberts, JP Schwarz, R Spackman, H Stark, C Warneke and LA Watts 2011. Atmospheric emissions from the Deepwater Horizon spill constrain air–water partitioning, hydrocarbon fate, and leak rate. Geophys. Res. Lett. 38 L07803 http://onlinelibrary.wiley.com/doi/10.1029/2011GL046726/pdf.

Sabri Y., Ippolito S, Tardio J and Bhargava S 2012. Understanding mercury accumulation in MEG and its fate in the MEG regeneration process. A report for Esso by the Research Laboratory for Mercury Sensing and Abatement, Centre for Advanced Materials and Industrial Chemistry (AMIC), RMIT.

Sause BL. Gwyther D, Hanna PJ and O'Connor NA 1987. Evidence for winter – spring spawning of the scallop Pectan alba (Tate) in Port Phillip bay, Victoria, Australia, J. Mar. Freshwat. Res. 38: 329-337.

Schaanning MT, K Hylland, GØ Eriksen, TD Bergan, JS Gunnarson and J Skei. 1996. Interactions between eutrophication and contaminants II. Mobilization and bioaccumulation of Hg and Cd from marine sediments. Mar. Pollut. Bull. 33:71-79.

Scholten, M.C.Th., Kaag, N.H.B.M., Dokkum, H.P. van, Jak, R.G., Schobben, H.P.M., and Slob, W., 1996. Toxische effecten van olie in het aquatische milieu, TNO report TNO-MEP – R96/230, Den Helder, The Netherlands.

Scholz, D., Michael, J. Shigenaka, G. and Hoff, R., 1992. Biological resources, In: An introduction to coastal habitats and biological resources for oil spill response, Report HMRAD 92-4, NOAA Hazardous Materials Response and Assessment Division, Seattle.

Schlacher, T.A., Schlacher-Hoenlinger, M.A., Williams, A., Althaus, F., Hooper, J.N.A., Kloser, R., 2007. Richness and distribution of sponge megabenthos in continental margin canyons off southeastern Australia. Marine Ecology Progress Series 340, 73-88.

Schwacke LH, Thomas L, Wells RS, McFee WE, Hohn AA, Mullin KD, Zolman ES, Quigley BM, Rowles TK, Schwacke JH 2017. Quantifying injury to common bottlenose dolphins from the Deepwater Horizon oil spill using an age-, sex- and class-structured population model. Endang. Species Res. 33:265-279.

Shaughnessy PD 1999 The Action Plan for Australian Seals. Environment Australia. April 1999.

Shen W & Xing G 2017. Study on Vessel Sewage Treatment Technologies. AIP Conference Proceedings 1890, 040041 (2017).

Shepherd SA and Edgar GJ (2013). Ecology of Australian temperate reefs : the unique South. CSIRO Publishing.

Simmonds M, Dolman S. Weilgart L (eds.) 2004. Oceans of noise A Whale and Dolphin Conservation Society WDCS Science report. https://uk.whales.org/sites/default/files/oceans-of-noise.pdf.

Smit MGD, RK. Bechmann, AJ Hendriks, A Skadsheim, BK. Larsen, T Baussant, A Bamber and S Sanni, 2009. Relating biomarkers to whole-organism effects using species sensitivity distributions: a pilot study for marine species exposed to oil. Env Tox Chem 28(5):1104–1109.

Stevens, J.D., Pillans, R.D. and Salini, J., 2005. Conservation Assessment of *Glyphis* sp. A (Speartooth Shark), *Glyphis* sp. C (Northern River Shark), *Pristis microdon* (Freshwater Sawfish) and *Pristis zijsron* (Green Sawfish). [Online]. Hobart, Tasmania: CSIRO Marine Research. Available from: http://www.environment.gov.au/resource/conservation-assessment-glyphis-sp-speartooth-shark-glyphis-sp-c-northern-river-shark.

Stewart K, Crozier J, Gilmour P and Edmunds M (2007). Victorian Subtidal Reef Monitoring Program: The Reef Biota at Bunurong Marine National Park. Parks Victoria Technical Series No. 48. Parks Victoria, Melbourne.

Stivala, J. (2005) Statement of Management Arrangements for the Victorian Commercial Scallop (*Pecten fumatus*) Fishery. Fisheries Victoria, Department of Primary Industries.

Swan, J.M., Neff, J.M. and Young, P.C. (Eds.), 1994. Environmental Implications of Offshore Oil and Gas Development in Australia, The Findings of an Independent Scientific Review. Australian Petroleum Exploration Association (APEA), Energy Research and Development Corporation (ERDC), Australia.

Takeuchi, I., Miyoshi, N., *et al*. (2009). Biomagnification profiles of polycyclic aromatic hydrocarbons, alkylphenols and polychlorinated biphenyls in Tokyo Bay elucidated by d13C and d 15N isotope ratios as guides to trophic web structure. Mar Poll Bull 58:663-671.

Thomas L, Booth CG, Rosel PE, Hohn A, Litz J, Schwacke LH 2017. Where were they from? Modelling the source stock of dolphins stranded after the Deepwater Horizon oil spill using genetic and stable isotope data. Endang. Species Res. 33:253-264.

TPWS (Tasmania Parks and Wildlife Service), 2017a. Kent Group Marine Reserve. A WWW publication accessed in September 2017 at http://www.parks.tas.gov.au/index.aspx?base=3110.

TPWS 2017b. Strzelecki National Park. A WWW publication accessed in September 2017 at http://www.parks.tas.gov.au/?base=3834.

TPWS 2017c. Mt William National Park. A WWW publication accessed in September 2017 at http://www.parks.tas.gov.au/index.aspx?base=3634.

TSSC (Threatened Species Scientific Committee), 2009. Commonwealth Listing Advice on *Galeorhinus galeus under EPBC Act 1999*. A WWW publication accessed in September 2017 at http://www.environment.gov.au/biodiversity/threatened/species/pubs/68453-listing-advice.pdf.

Tomczak, M. Jr 1985. The Bass Strait water cascade during winter 1981. Continental Shelf Research 4, 255-278.

Tourism Victoria, 2017. Visit Melbourne. A WWW publication accessed in September 2017 at www.visitmelbourne.com/Regions/Gippsland.aspx.

TriSurv 2008. Dory-1 Site Survey. Prepared for Apache Energy Limited by Tri-Surv Pty Ltd Western Australia. Report No.: 8A270-RR-001-R0. August 2008.

UNEP (United Nations Environment Programme) 1985. GESAMP: Thermal discharges in the marine environment. UNEP Regional Seas Reports and Studies No. 45.

UNEP 1999. Seawater Cooling Overboard Discharge: Nature of Discharge - Phase I Final Rule and Technical Development Document of Uniform National Discharge Standards (UNDS). Published in April 1999. Reference number: EPA-842-R-99-001.

USEPA (United States Environmental Protection Agency). 2000. Environmental assessment of final effluent limitations guidelines and standards for synthetic-based drilling fluids and other non-aqueous drilling fluids in the oil and gas extraction point source category. United States Environmental Protection Agency, Washington.

US-EPA 2002. Cruise Ship Plume Tracking Survey Report. EPA842-R-02-001, September 2002.

VEAC (Victorian Environmental Assessment Council) 2014. Marine Investigation Final Report. A WWW publication accessed in September 2017 at https://www.parliament.vic.gov.au/file_uploads/VEAC_Marine_Investigation_Final_Report_int_Rq704ZkR.pdf.

Vetter, E.W., Dayton, P.K., 1998. Macrofaunal communities within and adjacent to a detritus-rich submarine canyon. Deep Sea Research II 45, 25-54.

Vetter, E.W., Dayton, P.K., 1999. Organic enrichment by macrophyte detritus, and abundance patterns of megafaunal populations in submarine canyons. Marine Ecology Progress Series 186, 137-148.

Vetter, E.W., Smith, C.R., De Leo, F.C., 2010. Hawaiian Hotspots: Enhanced Megafaunal Abundance and Diversity in Submarine Canyons on the Oceanic Islands of Hawaii. Marine Ecology 31, 183-199.

VFA (Victorian Fisheries Authority) 2017a. Abalone Disease. A WWW publication accessed in September 2017 at https://vfa.vic.gov.au/operational-policy/marine-pests-and-diseases/abalone-disease.

VFA 2017b. Victorian Fish Stock Status Report. A WWW publication accessed in September 2017 at https://vfa.vic.gov.au/operational-policy/publications-and-resources/status-of-victorian-fisheries.

Volkman, J. K., Miller, G. J., Revill, A. T. and Connell, D. W. (1994). Oil spills. In Environmental implications of offshore oil and gas development in Australia. Swan, J. M., Neff, J. M. and Young, P. C. (eds). Australian Petroleum Exploration Association, Sydney, pp. 509-695.

URS, 2000. Blackback Seabed Monitoring Programme. Report prepared for Esso Australia Pty Ltd.

URS, 2001. Review of Environmental Impacts of Petroleum Exploration and Appraisal Activities in Commonwealth Waters. Report prepared for the Department of Science and Resources.

URS 2009. Ichthys Gas Field Development Project EIS Appendix 15: Review of Literature on Sound in the Ocean and Effects of Noise on Marine Fauna. Prepared for INPEX Browse, Ltd. Doc No. C036-AH-REP-0020, Rev 2. 27 July 2009.

USEPA 2002. Cruise Ship Plume Tracking Survey Report. Report EPA842-R-02-001, Office of Water, Washington, DC.

Vikebø FB, P Rønningen, VS Lien, S Meier, M Reed, B Adlandsvik and T Kristiansen, 2014. Spatio-temporal overlap of oil spills and early life stages of fish International Council for the Exploration of the Sea (ICES) Journal of Marine Science 71(4): 970–981.

Visit NSW, 2017. South Coast. A WWW publication accessed in September 2017 at http://www.visitnsw.com/destinations/south-coast.

Walker DI and McComb AJ 1990. Salinity response of the seagrass *Amphibolis Antarctica* (Labill.) Sonder et Aschers: an experimental validation of field results. Aquat Bot. 36:359–366.

Walker, T. I., Taylor, B. L., and Hudon, R. J, 2001. Southern shark catch and effort 1970–2000. Report to Australian Fisheries Management Authority. July 2001. Marine and Freshwater Resources Institute.

Wallace BP, Brosnan T, McLamb D, Rowles T, Ruder E, Schroeder B, Schwacke L, Stacy B, Sullivan L, Takeshita R, Wehner D 2017. Overview: Effects of the Deepwater Horizon oil spill on protected marine species. Endang. Species Res. 33:1-7.

Walraven E. (1992). Rescue and Rehabilitation of Oiled Birds (Pub. Zoological Parks Board of NSW, Taronga Zoo Sydney).

Wan Y, Jin X, Hu J, Jin F. (2007). Trophic dilution of polycyclic aromatic hydrocarbons (PAHs) in a marine food web from Bohai Bay, North China. Environ Sci Technol 41:3109-3114

Warneke, R.M., 1995. Family Otariidae. In: Mammals of Victoria; distribution, ecology and conservation. pp 251-256.

WateReuse Association (2011). Desalination Plant Intakes – Impingement and Entrainment Impacts and Solutions. White Paper March 2011, Revised June 2011. A WWW publication accessed in November 2017 at https://www3.epa.gov/region1/npdes/schillerstation/pdfs/AR-026.pdf.

Watson, GF, and Chaloupka, M. Y., 1982. Zooplankton of Bass Strait: Species composition, systematics and artificial key to species. Victorian Institute of Marine Science Technical Report No. 1. 1–128.

Watson JEM, Joseph LN. & Watson AWT 2009). A Rapid Assessment of the Impacts of the Montara Oil Leak on Birds, Cetaceans and Marine Reptiles. Prepared on behalf of the Department of the Environment, Water, Heritage and the Arts by the Spatial Ecology Laboratory, University of Queensland, Brisbane.

Weise, FK, Montevecchi WA, Davoren GK, Huettmanns F, Diamond AW and Linke J (2001. Seabirds at risk around offshore oil platforms in the North-west Atlantic. Mar Poll Bull 42(12): 1285-1290. www.opc.ca.gov/webmaster/_media_library/2016/01/Wiese-et-al-2001-offshore-lighting-and-seabirds.pdf.

Wells RS, Schwacke LH, Rowles TK, Balmer BC, Zolman E, Speakman T, Townsend FI, Tumlin MC, Barleycorn A, Wilkinson KA 2017. Ranging patterns of common bottlenose dolphins Tursiops truncatus in Barataria Bay, Louisiana, following the Deepwater Horizon oil spill. Endang. Species Res. 33:159-180.

Wildwell Control 2017a. Licence VIC/P70 Hairtail-1 Relief Well and Dynamic Kill Analysis. Report prepared by Willdwell Control for ExxonMobil. Report 2017-296, November 2017.

Wildwell Control 2017b. Gas dispersion and radiant heat study - Hairtail-1 Well. Document Number: 2017-296-001R-A. Report prepared by Willdwell Control for ExxonMobil. December 2017.

Wildwell Control 2018a. Capping Stack Interface Check Ocean Monarch. Report prepared by Willdwell Control. Document No: WC-CS-ALL-INT. January 2018.

Wildwell Control 2018b. WellCONTAINED™ Subsea Containment Solutions. http://wildwell.com/wellcontained/.

Wildwell Control 2019a. Subsea plume and gas dispersion study Sculpin-1 Well. Document Number: 2019-062-00IR-A. Report prepared by Willdwell Control for ExxonMobil. 12 February 2019.

Wildwell Control 2019b. Sculpin-1 Relief Well Planning and Dynamic Kill Analysis. Report prepared by Willdwell Control for ExxonMobil. WW Job Number: 2019-062. 17 February 2019.

Williams A, Bax NJ, Kloser RJ, Althaus F, Barker B and Keith G 2009. Australia's deep-water reserve network: implications of false homogeneity for classifying abiotic surrogates of biodiversity ICES J Mar Sci 66: 214–224.

Wilson MJ, S Frickel, D Nguyen, T Bui, S Echsner, BR Simon JL Howard, K Miller and JK Wickliffe, 2016, A Targeted Health Risk Assessment Following the Deepwater Horizon Oil Spill: Polycyclic Aromatic Hydrocarbon Exposure in Vietnamese-American Shrimp Consumers. Environmental Health Perspectives 123(2): 152-159. February 2015. http://dx.doi.org/10.1289/ehp.1408684.

Worley Parsons, 2013. Mercury Dispersion Modelling WTN & MLA and B Operational areas. Report prepared for Esso Kipper Mercury Removal Project – FEED.

Yakovis EL, AV. Artemieva, MV. Fokin, AV. Grishankov, NN. Shunatova 2005. Patches of barnacles and ascidians in soft bottoms: Associated motile fauna in relation to the surrounding assemblage. J Exp. Mar. Biol. Ecol 327(2):210-224.

Yender R. Michel J & C. Lord C. 2002. Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Ylitalo GM, MM Krahn, WW Dickhoff, JE Steina, CC Walker, CL Lassitterb, ES Garrett, LL. Desfosse, KM. Mitchell, BT. Noblec, S Wilson, NB Becke, RA. Benner, PN Koufopoulos and RW Dickey 2012. Federal seafood safety response to the Deepwater Horizon oil spill. Proceedings of the National Academy of Sciences of the USA (PNAS) 109(50): 20274–20279. December 2012.

Ylitalo GM, Collier TK, Anulacion BF, Juaire K, Boyer RH, da Silva DAM, Keene JL, Stacy BA 2017. Determining oil and dispersant exposure in sea turtles from the northern Gulf of Mexico resulting from the Deepwater Horizon oil spill. Endang. Species Res. 33:9-24.

Zieman, J.C.O., Phillips, R.C., Thayer, G., Thorhaug, A., 1984. The effects on seagrass ecosystems. Restoration of habitats impacted by Oil Spills. JB Cairns, AL Boston, Butterworth: 37-64.

Appendix A – Consultation Log Summary

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
3	**1166**	15-Nov-17	[redacted] completed oil spill modelling for Baldfish and G&G EEps	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
3	**2623**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
122	**2550**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
88	**2566**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
66	**2579**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
118	**2553**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1450**	05-Sep-17	Summary of fishing data and publications available online. Further data can be requested through Data Request Form.	Data Request form

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1451**	06-Sep-17	Review of available data. Acknowledgement of Generic Email Petroleum <petroleum@[redacted].gov.au>. Request for Data Request Form.	Data Request form

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1452**	12-Sep-17	Submission Data Request form fishing activity in Block VICP70	Data Request form

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1453**	03-Oct-17	Follow up on Email 12/09/2017; no response received after that email. Request for telephone conversation.	Fishing activity in Block VICP70 Awaiting [redacted] Response to determine fishing activity in area

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1160**	26-Oct-17	[redacted] (EAPL) had phone call with [redacted] regarding: [redacted] enquired if we had spoken with [redacted] I responded that we have provided written information by Email, that we will follow up with telephone conversations shortly, as well as face to face discussions and have invited them to Lakes Entrance Meeting. [redacted] re-stated previous, that data are confidential, that only info on an area with less than 5 boats can be released, and that this determines minimum area they can release info on. I confirmed that we have studied ABARE data, that these are very useful, but that they do not provide adequate resolution on fishing activity in Block VIC/P70 [redacted] stated that she will request info on 1 degree square as minimum (60 x 60 NM). I confirmed that we are happy to receive what every resolution they are comfortable releasing [redacted] will independently advise regulators also on fishing activity in Block VICP70, as a matter of routine. [redacted] will get quote to us ASAP.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**139**	06-Nov-17	Email sent by [redacted] (EAPL) requesting a status update on fishing data. Awaiting response.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
4	**1161**	14-Nov-17	[redacted] (EAPL) sent email to [redacted] regarding summarising [redacted] data in the EP and EP summary review.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
4	**1162**	14-Nov-17	[redacted] responded to [redacted] (EAPL) that [redacted] are interested in reviewing the EP Summary to ensure confidentiality.	ISSUE: Provide [redacted] with Baldfish EP summary prior to submission to NOPSEMA. MERIT: Agree Provide [redacted] with Baldfish EP summary prior to submission to NOPSEMA. MERIT: EP Summary sent to [redacted]

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
4	**1998**	09-Jul-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], In discussions with [redacted] you asked for a copy of our EP summary prior to submission to NOPSEMA. Here is our draft of the EP Summary – it is large but is consistent with recent EP summaries and NOPSEMA expectations we believe. The section on fishing is in section 3.8. We need to submit this to NOPSEMA by Thursday this week, there is only a 10 day allowance between acceptance of an EP and having to submit a summary so apologies for the short timeframe. Any questions, issues please let me know.	

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
4	**2622**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
4	**3002**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
125	**1827**	05-Oct-17	Temporary Fairways	ISSUE: Interference with commercial shipping - Provide further details to [redacted] [redacted] supports a Preliminary notice to mariners (6-8 weeks in advance) informing about the upcoming introduction of a two-way routing measure followed up by a Temporary notice while effective The ENCs will have the feature added and removed accordingly. Esso to confirm all the details including starting and ending date, coordinates, purpose of the routeing measure, etc. The [redacted] POC for this matter is Glen Cook (glen.cook@defence.gov.au - Manager of the chart maintenance section). MERIT: See ID_1473

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
125	**1826**	06-Nov-17	Being dealt with through [redacted] - no further consultation required	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
125	**1817**	09-Feb-18	Email sent from [redacted] to [redacted] (EAPL): Hello Sjaak0812, Please find your Notice to Mariners for your registered charts below. If you experience any p[redacted]lems, please send an email to [redacted]. This message is to alert you to the latest Notice to Mariners that affect the charts that you have registered under the eNotices Service. The offical copy of Notice to Mariners including any block corrections and tracings can be found at www.hydro.gov.au and should be used as the official source for updating [redacted] products. *IMPORTANT NOTICE* This edition of Notices to Mariners includes all significant information affecting [redacted] products which the [redacted] has become aware of since the last edition. All reasonable efforts have been made to ensure the accuracy and completeness of the information, including third party information, on which these updates are based. The [redacted] regards third parties from which it receives information as reliable, however the [redacted] cannot verify all such information and errors may therefore exist. The [redacted] does not accept liability for errors in third party information. **eNotices Information and News** Please note that you are able to login and register to receive eNotices for [redacted] Products including Seafarer's Handbook for Australian Waters, Annual Notices to Mariners and ANTT's. If you have any suggestions on what you would like to see in eNotices, please feel free to submit comments via our feedback forms or send email to [redacted]. If you no longer wish to receive eNotices emails from the [redacted] please email [redacted] with the subject "Unsubscribe eNotices". --- General Notice to Mariners Links: --- Direct access to Edition Blocks & Tracings: http://www.hydro.gov.au/n2m/notices.htm#view --- NOTICES TO MARINERS for Aus357 --- 126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards. Australian Maritime Safety Authority Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows: Direction Coordinates Westbound lane 38° 38'.41 S 148° 17'.58 E	[redacted]>[redacted], [redacted] /C <[redacted].[redacted]C [redacted]

38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus357 [NE 19/11/10]

NOTICES TO MARINERS for Aus487

126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards.
Australian Maritime Safety Authority
Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows:
Direction
Coordinates

Westbound lane
38° 38'.41 S 148° 17'.58 E
38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus487 [NC 07/01/05]

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**1809**	18-Jun-18	Email sent from [redacted] (EAPL) to [redacted]: Good Afternoon, Please find attached Notice A604295 which establishes a Petroleum Safety Zone around the locations known as Baldfish-1 and Hartail-1. Could you please review, and issue the appropriate Notice to Mariners to draw attention to the existence of the PSZ which has been established. If you have any questions, please do not hesitate to contact me.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**2108**	16-Aug-18	Notification of tow and mooring at Baldfish	

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**2121**	26-Sep-18	Notification to [redacted]/RCC/Hydro of rig move to Hairtail	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**2123**	29-Sep-18	Email from [redacted] (Ocean Monarch): Arrival notice for Hairtail-1	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**2547**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
125	**3003**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
1	**1165**	15-Dec-17	Meeting at Esso House with [redacted] where oil spill modelling and OPEPs for Baldfish and GG campaign were discussed.	ISSUE: Copy of OPEPs to be provided to [redacted] to review. Merit: Yes and OPEP subsequently provided

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
1	1291	18-Dec-17	[redacted] (EAPL) email [redacted]: Further to our discussion last week, can you please have someone in [redacted] conduct a high level review of the OPEP for the Baldfish Drilling and Bass Strait G&G program, in particular for any items related to support from [redacted].	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
1	1469	21-Dec-17	Letter received from [redacted] advising [redacted] have reviewed the Baldfish Drilling OPEP and have noted the following: [redacted] is aware of the stipulated OPEP requirements for the activation, mobilization and utilization of [redacted] staff, equipment and capabilities. In particular, and noting the OPEP requirements for [redacted] under this plan, [redacted] will provide (through a Service Contract) direct support through: - provision of [redacted] personnel as required - provision of [redacted] equipment as required - coordination of Australian industry mutual aid including equipment and personnel resouces (Core Group) - noting that mutual aid is contingent on these resources being released from [redacted] member companies - coordination of overseas involvement to the extent detailed in the OSRL/[redacted] alliance agreement, and - general advice and inter-agency coodination with industry advisor and external agencies. Please note that the only issue noted is an overstatement of [redacted] involvement in assistance with the incoming international equipment and personnel from OSRL. Specifically, on page 25 in the section outlining the activation of OSRL it suggests that "...[redacted] will provide support in acquiring landing approval for aircraft, support with customs clearance, immigration support, etc". This section needs to be consistent with OSRL/[redacted] alliance agreement. I trust this letter will serve as consultation within the OPEP framework for EAPL. Additionally, [redacted] would appreciate a copy of the accepted OPEP in order to update our records.	ISSUE: overstatement of [redacted] involvement in assistance with the incoming international equipment and personnel from OSRL. Specifically, on page 25 in the section outlining the activation of OSRL it suggests that "...[redacted] will provide support in acquiring landing approval for aircraft, support with customs clearance, immigration support, etc". This section needs to be consistent with OSRL/[redacted] alliance agreement. MERIT: Yes and issue has been updated in the OPEP

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
1	2625	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	1424	16-Aug-17	Contacted [redacted] to talk about the proposal and to manage the interaction between Baldfish drilling and shipping	Normal [redacted] c[redacted]. Also [redacted]

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	1426	01-Sep-17	Data on shipping activity through Bass Strait Marine Traffic Separation Lanes	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	1425	01-Sep-17	[redacted] contact for • Shipping activity in Block VIC/P70, through Bass Strait Marine Traffic Separation Lanes • Procedures and timeframes for establishment of temporary Petroleum Safety Zone around proposed exploration activities in newly acquired Block VIC/P70	No objections, claims or issues raised
2	1427	04-Sep-17	[redacted] Spatial@[redacted] website contains monthly vessel traffic GIS datasets that cover this area.	Access to data
2	1428	04-Sep-17	Online data between Jun2016-Sept 2016 show only 9 vessels passing through separation lanehttps://www.operations.[redacted].gov.au/Spatial/CraftTrackingRequest on page: https://www.operations.[redacted].gov.au/Spatial/	Request clarification Esso GIS ([redacted]) is following up with [redacted].
2	1429	04-Sep-17	Online data between Jun2016-Sept 2016 show only 9 vessels passing through separation lane	ISSUE: Poor data on shipping. [redacted] is plotting monthly data on shipping activity (approx dozen vessels a day through separation lane) MERIT: GID data not very good. Discussions with [redacted] indicate high shipping levels and Temporary Fairways have been established via Notice to Mariners 126(T)2018.
2	1432	05-Sep-17	Block VIC/P70, Bass Strait Traffic Separation Scheme (TSS).	[redacted] is reviewing request
2	1430	05-Sep-17	Summary of fishing data and publications available online. Further data can be requested through Data Request Form.	Data Request form
2	1431	05-Sep-17	[redacted] Contact for Shipping activity in Block VIC/P70 & temporary Petroleum Safety Zone	[redacted] Contact
2	1433	06-Sep-17	Review of available data. Acknowledgement of Generic Email Petroleum <petroleum@[redacted].gov.au>. Request for Data Request Form.	Data Request form
2	1434	07-Sep-17	Detailed response, warning against any petroleum activities in or near TSS	ISSUE: Concern raised by [redacted] about drilling in a shipping lane near the TSS MERIT: Esso agree that risk needs to be managed
2	1435	12-Sep-17	Submission Data Request form fishing activity in Block VICP70	Data Request form
2	1437	18-Sep-17	Follow up on email 18 Sept 17	Follow up on email 18 Sept 17
2	1436	18-Sep-17	Detailed response to [redacted] Email of 7 Sept 17 re petroleum activities near TSS	Esso response and request for further details

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	1438	19-Sep-17	[redacted] sent follow up on email 18 Sept 17	No objections, claims or issues raised
2	1439	19-Sep-17	[redacted] made follow up on phone call and email 20 Sept 17 [redacted] Proposed establishment of Temporary Safety Fairway around Baldfish location	No objections, claims or issues raised
2	1442	20-Sep-17	[redacted] made follow up on phone call 20 Sept 17 [redacted] Proposed establishment of Temporary Safety Fairway around Baldfish location	No objections, claims or issues raised
2	1440	20-Sep-17	[redacted] sent follow up on email 18 Sept 17	No objections, claims or issues raised
2	1441	20-Sep-17	[redacted] sent Follow up on email 18 Sept 17 Discussed access to shipping data around TSS; [redacted] Proposed establishment of Temporary Safety Fairway around Baldfish location	No objections, claims or issues raised
2	1443	22-Sep-17	Proposed temporary safety fairways - sketch [redacted] Proposed establishment of Temporary Safety Fairway around Baldfish location	No objections, claims or issues raised
2	1444	27-Sep-17	Proposed temporary safety fairways - follow up and Australian Hydrographic Office input ([redacted] [redacted])	No objections, claims or issues raised
2	1445	03-Oct-17	[redacted] sent follow up on Email 12/09/2017; no response received after that email. Request for telephone conversation.	Data Request form

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1153**	05-Oct-17	Teleconference with Esso, [redacted], [redacted] and [redacted] re: Temporary fairway around Baldfish drill location in block VIC/P70. Summary of points: Point of Contact Temporary Fairway Timing Safety Measures Action items	ISSUES: • [redacted] to provide Esso with copy of [redacted] SHIP STATIC AND VOYAGE RELATED DATA (MESSAGE 5)* test report (based on trial in SW Australia) • [redacted] to confirm that 2NM radius is adequate to allow for anchor movements when moving on and off well location (two wells) • Esso to confirm final well locations (final locations subject to confirmation of WDB (Well Design Basis) review-18th Oct) • Esso & [redacted] evaluate use of ATON Systems such as buoys, radar transponder beacons (racons), [redacted], Message 5. LIDO (Aids to navigation: https://www.[redacted].gov.au/navigation/services/aton/). • Esso & [redacted] to resolve need to Guard vessel (SERV Matrix, Safety Case requirements) • Address safety considerations internally (Esso, [redacted]) during scheduled Environmental Risk Assessment on 25th of October (see “Other Safety Measures”) • Follow up during detailed safety workshop in January 2018. • [redacted] and [redacted] to agree on NTM (Notice to Mariner) schedule prior, during and on completion of campaign. Note: Not relevant to G&G EP. MERIT: closed out with ENVID

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1448**	05-Oct-17	[redacted]	ISSUES: Interference with commercial shipping • [redacted] to provide Esso with a copy of an [redacted] addressed message (Message 12) trial report • [redacted] to confirm that 2NM radius is adequate • Esso to confirm final well locations • Esso & [redacted] evaluate use of ATON Systems • Esso & [redacted] to resolve need to Guard vessel • Address safety considerations during ENVID 25th of October • Detailed safety workhop in January 2018. • Agree on NTM (Notice to Mariner) schedule Refer meeting notes

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1446**	05-Oct-17	Temporary Fairways	ISSUE: Interference with commercial shipping [redacted] supports a Preliminary notice to mariners (6-8 weeks in advance) informing about the upcoming introduction of a two-way routing measure followed up by a Temporary notice while effective.The ENCs will have the feature added and removed accordingly. MERIT: Yes - Esso agree with notice to mariners and project will proceed on this basis

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1155**	17-Oct-17	Email received from [redacted] re [redacted] traffic plots, temporary shipping fairways, use of guard vessel, transmitting messages to vessels and radio-navigation warnings.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**108**	06-Nov-17	follow up email sent by [redacted] (EAPL) asking if further consultation with the shipping community on this matter is required or advisable. Awaiting response.	ISSUE: follow up email sent by [redacted] (EAPL) asking if further consultation with the shipping community on this matter is required or advisable. Awaiting response. 15/2/17: [redacted] ([redacted]) responded to [redacted] (EAPL) that consultation with the entire shipping community would be too complex. He suggested contacting the Harbour Masters of Ports: Portland, Geelong, Melbourne and Transport Safety Victoria. MERIT: [redacted] (EAPL) has contacted the Harbour Masters of Ports: Portland, Geelong, Melbourne and Transport Safety Victoria.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1156**	09-Nov-17	Email from [redacted] (EAPL) regarding WDB review for Baldfish Drilling Campaign and agreed coordinates.	Confirm [redacted] received revised coordinates.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**109**	15-Nov-17	[redacted] responded to [redacted] (EAPL) that consultation with the entire shipping community would be too complex. He suggested contacting the Harbour Masters of Ports: Portland, Geelong, Melbourne and Transport Safety Victoria.	ISSUE: Interference with commercial shipping - [redacted] responded to [redacted] (EAPL) that consultation with the entire shipping community would be too complex. He suggested contacting the Harbour Masters of Ports: Portland, Geelong, Melbourne and Transport Safety Victoria. MERIT: Yes and [redacted] (EAPL) has contacted the Harbour Masters of Ports: Portland, Geelong, Melbourne and Transport Safety Victoria.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1459**	18-Jan-18	Email sent from [redacted] (EAPL): Can you please provide an update on progress on establishing temporary fairways around proposed Baldfish drill locations? (file attached) Is [redacted] happy for Esso to make a map of proposed fairway locations (as per attached), or an updated version, available to NOPSEMA?	ISSUE 1: Interference with commercial shipping - establish temporary fairways around proposed Baldfish drill locations MERIT: Yes - [redacted] to follow up with with [redacted] on progress on establishing temporary fairways around proposed Baldfish drill locations.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1463**	22-Jan-18	[redacted] (EAPL) received email from [redacted] ([redacted]): I've spoken with the Australian Hydrographic Office, who have confirmed that the temporary fairways will be published as a preliminary notice to mariners in February, before coming into effect in March. I see no issue with Esso providing the map of the proposed fairways to NOPSEMA. I've also included a shapefile of the fairways for use in GIS software. (SEE ATTACHMENT)	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1464**	22-Jan-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]) and [redacted]: Thanks [redacted], Much appreciated. As you are aware, there is an existing field – Blackback - immediately to the north of the Baldfish wells (VIC/L20 Blackback subsea facility (BKA) Lat 38° 32' 26" south, Long 148° 33' 16" east). We are currently exploring the option of also decommissioning these two wells at the end of the Baldfish campaign"if time permits. " That would require the northern lane to be moved a few degrees northward, to run along the boundary of "The area to be avoided" (SEE ATTACHMENT). While we are reluctant to make any last minute changes to the plans [redacted] proposed, it would be prudent to run this past [redacted], rather than change temporary fairways after they have been in place for several months. Your thoughts on this would be much appreciated. Perhaps we can discuss this by phone when convenient?	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1472**	08-Feb-18	Email sent from [redacted] ([redacted]) to [redacted] (EAPL): Attached is a revised proposal for the temporary fairways in Bass Strait. Is there a time today I could give you a call to discuss further?	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1579**	19-Mar-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], I am following up on NTM 126(T)/2018 (see below) and wonder how long it will be before we can see that these measures for Temporary Fairways are working. I note that Latest Digital Vessel Tracking Data are of December 2017, so assume it will be a few months before we can expect Feb-Mar18 data to be available online (although I note that "Historic Vessel Tracking Request" may be within 2 weeks old). Will [redacted] notify Esso once they have reviewed effectiveness of Temporary Fairways, or must we submit a formal request for this? Subject: eNotices Update Edition 3, February 9, 2018 --- NOTICES TO MARINERS for Aus357 --- 126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards. Australian Maritime Safety Authority Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows: Direction Coordinates Westbound lane 38° 38'.41 S 148° 17'.58 E 38° 23'.68 S 148° 40'.29 E 38° 25'.42 S 148° 42'.28 E 38° 40'.80 S 148° 19'.72 E. Eastbound lane 38° 42'.02 S 148° 20'.84 E 38° 35'.93 S 148° 40'.69 E 38° 38'.92 S 148° 40'.68 E 38° 44'.51 S 148° 23'.08 E. Aus357 [NE 19/11/10]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1592**	19-Mar-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], I am following up on NTM 126(T)/2018 (see below) and wonder how long it will be before we can see that these measures for Temporary Fairways are working. I note that Latest Digital Vessel Tracking Data are of December 2017, so assume it will be a few months before we can expect Feb-Mar18 data to be available online (although I note that "Historic Vessel Tracking Request" may be within 2 weeks old). Will [redacted] notify Esso once they have reviewed effectiveness of Temporary Fairways, or must we submit a formal request for this? Thanks, [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1587**	09-Apr-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], The rig used for Baldfish Drilling is in the process of finalising their Safety Case Revision. They completed a workshop in support of this early in February and arrived at the following navigation safety measures for the Baldfish campaign. Is [redacted] in the position to review the below and confirm that it consider these measures adequate, so that we can close this matter out? Thanks in advance. Regard, [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1588**	13-Apr-18	Email received from [redacted] ([redacted]) to [redacted] (EAPL): Good afternoon [redacted], Thank you for the email regarding the navigational safety measures for the Ocean Monarch. [redacted] note the implementation points to address the risk of passing marine vessel traffic. The implementation of these options is consistent with [redacted] previous advice on measures aimed at reducing the navigational risk for the area. It is assessed that these measures will have a positive impact on navigation practices in the area. [redacted] will continue to monitor shipping traffic in the area in the lead up to the Ocean Monarch arriving and provide any relevant feedback that may be appropriate to her operations. Kind regards, [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1597**	26-Apr-18	Phonecall made from [redacted] (EAPL) to [redacted]: I've given [redacted] a call to discuss access to their fixed wing remote sensing resources. Unfortunately both the person I normally deal with ([redacted]) and their aviation specialist are away until Monday. It was suggested that it would be best to discuss with them directly so I'll follow up next week.	ISSUE: EAPL to identify and confirm the fixed wing / remote sensing resources available within [redacted] and how EAPL could utilize then in the event of an oil spill.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**1638**	04-Jun-18	Email from [redacted] (EAPL) to [redacted] ([redacted]): [redacted], An update on Baldfish and Blackback activities: - Baldfish has been pushed back until [redacted] has completed their scope. We are now looking at Q4. EP is with NOPSEMA for acceptance. - Blackback Plug and Abandonment (P&A) has been given the go-ahead. It will be undertaken on completion of Baldfish (starting late 2018) and may take up to 83 days (i.e. completion in Q1, 2019). - Petroleum Safety Zone (PSZ) around Baldfish wells were gazetted in April 2018 (NOPSEMA Notice: A604295 of 17 April 2018) - Can you confirm that temporary fairways will be in place until completion of above activities (i.e. until Q1, 2019). - The Blackback wells are outside the northern temporary fairway (see attached). However, anchoring will require access to the temporary fairways (but well within the 2 NM buffer zone). Anchoring and retrieval is a brief activity. Nonetheless, it requires careful planning in order to minimise shipping interference. We would appreciate AMSAs view on this. - Terahiki-1 and Gudgeon-1 are outside current P&A scope because of location in or across Temporary Fairway. - Esso will apply for a PSZ around the Blackback wells later in the year (Q3, 2018). [redacted], Regulatory Lead, is responsible for PSZ applications.- I am copying in [redacted], Esso Marine Advisor. [redacted] will oversee shipping-related aspects during Baldfish and Blackback. Please do not hesitate to contact us if you require further information.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**1741**	12-Jun-18	Email received from [redacted] ([redacted]) to [redacted] (EAPL): Good morning [redacted], Thank you for the email providing an update on the Baldfish and Blackback activities whereby activities are delayed by six months. We appreciate Esso keeping us informed. The temporary fairways came into effect as NtM 126(T)/2018 dated 06 Apr 2018, in Edition #7 of the AHO's NTMs 267 – 308, and remain in effect as a temporary notice. With regard to the anchoring and retrieval activities that will take place for the Blackback wells - [redacted] requires more information on the location of the anchors and how far the anchor laying vessel will venture into the temporary fairway, and for how long. To be specific, please provide the: •proposed coordinates for the anchor locations and where the vessels will operate to lay the anchors (if different from anchor location), •proposed timings and duration of anchor laying and retrieval activities, and •proposed location of the buoys if anchors are to be laid prior to the MODU arriving. An Auscoast warning will need to be issued if the anchor handling vessel is operating in or near to the temporary fairway as this is likely to represent an increased risk to other vessels using the fairways. It would also be expected that the vessels involved in laying anchors would display the appropriate day shapes/ lights applicable to the nature of work. As [redacted] has previously stated, the MODU can expect to encounter approximately 12 vessels per day using the TSS, with over 90% comprised of cargo vessels, such as container ships and bulk carriers, or tankers. Could you please confirm that the additional 'location specific AtoN System' was installed between 24 – 26th April as noted below? We will continue to monitor shipping traffic in the area in the lead up to the Ocean Monarch arriving, and can provide further advice as required. Thanks very much for the update.	EAPL to provide [redacted] with Blackback info on: - proposed coordinates for the anchor locations and where the vessels will operate to lay the anchors (if different from anchor location), - proposed timings and duration of anchor laying and retrieval activities, and - proposed location of the buoys if anchors are to be laid prior to the MODU arriving. EAPL to confirm confirm that the additional 'location specific AtoN System' was installed between 24 – 26th April. MERIT: EAPL notified [redacted]/[redacted] on 9 April that additional navigation safety measures were approved for Baldfish. [redacted] confirmed that these measures are consistent with [redacted] previous advice. - EAPL notified [redacted]/[redacted] on 4 June that Baldfish was delayed due to change in [redacted] Scope, possibly to Q4, 2018. - On 16 August we discussed further tools to ensure safe navigation by installation of Racon. Esso offered to share its experience on use of dual RACON. - Additional RACON was installed on Ocean Monarch in August 2018.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2106**	16-Aug-18	Email received by [redacted] (EAPL) from [redacted] ([redacted]): Good morning [redacted], Thanks for your time on the phone yesterday to discuss the installation of racon on the Ocean Monarch. As discussed, [redacted] have concerns about the possible interference that may be created by having two racons operating within 100 metres of each other. We understand that the decision to install two was based on your contractors advice that this would be the most effective method to achieve 360° coverage. I agree with your assessment that the greater risk is from vessels transiting through the Traffic Separation Scheme in a north-easterly direction, and who fail to alter onto a more easterly course on the temporary fairway. [redacted] notes that there will be two offshore support vessels, able to act as guard vessels during the Ocean Monarch's mooring phase. Having two racon operate within such a close proximity has the potential to be very effective, or alternately create interference and clutter. [redacted] is interested in any feedback from the support vessels on how the two operational racon present on their radars (and possibly ECDIS radar overlay), and whether there are concerns with interference and clutter. We would be grateful for any supporting commentary and screenshots of their navigational equipment to either support or disprove potential interference concerns or highlight the effectiveness of this initiative. Such information would be invaluable for taking to the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) to incorporate into the revision of international standards. If ExxonMobil is able to provide this assistance it would be greatly appreciated.	ISSUE: [redacted] is interested in any feedback from the support vessels on how the two operational racon present on their radars (and possibly ECDIS radar overlay), and whether there are concerns with interference and clutter. MERIT: The effect of the second RACON will be carefully monitored once it is established and the functionality of both units will be tested from all bearings, and various ranges. We will work with the vessels' operator, utilizing the vessels available in field, to collect the information available and assess its effectiveness or otherwise. (See ID_2107)

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2107**	16-Aug-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Thanks for your call yesterday and feedback on the traffic. The effect of the second RACON will be carefully monitored once it is established and the functionality of both units will be tested from all bearings, and various ranges. We will work with the vessels' operator, utilizing the vessels available in field, to collect the information available and assess its effectiveness or otherwise. Please don't hesitate to contact me if you have further questions, otherwise I'll provide an update once it has been installed.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2120**	26-Sep-18	Notification to [redacted]/RCC/Hydro of rig move to Hairtail	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2122**	29-Sep-18	Email from [redacted] (Ocean Monarch): Arrival notice for Hairtail-1	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**2125**	09-Oct-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): [redacted], Following up on your email, and to provide further update: Current operations • As previously advised by [redacted] Offshore, the Ocean Monarch completed drilling at Baldfish-1 and relocated to Hairtail-1 on 27th/28th September. • The Ocean Monarch continues to utilize the AtoN and RACON systems and is monitoring traffic movements in and near the temporary fairway. A copy of the latest available traffic data is attached showing the first week of operations at Baldfish-1. Blackback • The Blackback P&A program timing is currently targeting a commencement in Q1 or Q2 2019. Any further changes in timing will be advised. • A short ROV inspection campaign of approximately 7 days is planned for November 2018. The vessel will be operating outside of the temporary fairway during this campaign. • An application for a PSZ at Blackback A1/A2/A3 will be sent today. • The current proposed Blackback mooring design is attached o There will be no pre-lay activities or use of buoys in the mooring system. o The design utilizes a 30°/60°. This design minimizes the incursion into the temporary fairway. Leg 5 anchor position is approximately 0.5Nm inside the temporary fairway Leg 6 anchor position is approximately 0.2Nm inside the temporary fairway. o The ring around the anchor pattern indicates an estimate of vessel position at its furthest extent to place the anchor in position. o The timings and duration of anchor handling operations is still being developed and will be forwarded to [redacted] once finalised. If you have any questions or comments, please do not hesitate to contact me.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
2	**2624**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	Response from [redacted] ([redacted]): [redacted] Many thanks for informing [redacted] that Esso Australia has completed its VIC/P70 drilling campaign and that the Ocean Monarch and anchor handling vessels have been demobilized.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2628**	13-Nov-18	Email sent from [redacted] ([redacted]) to [redacted] (EAPL): Please confirm that the temporary fairways are no longer required on the eastern side of the IMO-adopted Traffic Separation Scheme (TSS) offshore Gippsland, Victoria. Once confirmed, [redacted] will contact the Australian Hydrographic Office to close the temporary Notices to Mariners (NtM) number 126(T)/2018. The content of NtM 126(T)/2018 is: 126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards Australian Maritime Safety Authority Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows: Direction Coordinates Westbound lane 38° 38'.41 S 148° 17'.58 E 38° 23'.68 S 148° 40'.29 E 38° 25'.42 S 148° 42'.28 E 38° 40'.80 S 148° 19'.72 E. Eastbound lane 38° 42'.02 S 148° 20'.84 E 38° 35'.93 S 148° 40'.69 E 38° 38'.92 S 148° 40'.68 E 38° 44'.51 S 148° 23'.08 E. Chart temporarily affected - Aus 357 - Aus 487	Response from [redacted] (EAPL) to [redacted] ([redacted]): Thanks for your response to our email regarding the completion of the VICP70 drilling campaign. I am confirming that the temporary fairways on the eastern side of the IMO-adopted Traffic Separation Scheme (TSS) offshore Gippsland, Victoria, must remain in place until the completion of the Blackback Project. This is to ensure the flow of traffic doesn't impact the safety of the rig and support vessels around Blackback. Please ensure the temporary fairways remain in place until notified by Esso Australia. Response from [redacted] ([redacted]) to [redacted] (EAPL): Thank you for clarifying that the temporary fairways must remain in place on the eastern side of the IMO-adopted Traffic Separation Scheme (TSS) offshore Gippsland, Victoria. [redacted] will await notification of the completion of the Blackback project by Esso Australia

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2733**	06-Jan-19	Email from [redacted] (EAPL) to [redacted]: Esso is currently considering the Sculpin-1 exploration drilling campaign in position 38° 41’ 42.3” S 148° 44’ 50.5’ E (WGS 84), located in approximately 2300m of water. If a decision to proceed with the campaign is made, the timing of the activity is currently estimated for Q3 2019. The attached diagram shows the location of Sculpin-1 relative to the Eastern Bass Strait TSS, and Temporary Fairway established for Baldfish/Hairtail/Blackback. The Temporary Fairway is still currently required to assist with managing passing traffic for the upcoming Blackback P&A program which is expected to be conducted between February and May 2019. Esso will seek further consultation with [redacted] in Q1/Q2 2019, to consider ending the Temporary Fairway once Blackback is completed and a decision to proceed with Sculpin-1 has been made. The intention is to direct North-East bound traffic further from the proposed Sculpin-1 drilling activity by utilizing the IMO established TSS.. If you have any questions or concerns, please do not hesitate to contact me.	RESPONSE: Thank you for providing information on the proposed Sculpin-1 exploration well offshore Gippsland, Victoria. Please find attached the following 3 chartlets: 1) ESSO_Sculpin-1_well-Nov2018.PDF – showing 1 month of [redacted] data at a scale of 1:300,000 2) ESSO_Sculpin-1_well-Sep_to_Nov2018.PDF – showing 3 months of [redacted] data at a scale of 1:300,000 3) ESSO_Sculpin-1_well_750k.PDF – showing 3 months of [redacted] data at a scale of 1:750,000 Note that the 3rd chartlet does show that some heavy vessel traffic travelling to and from Tasmania does pass through permit block VIC/P70 and in the vicinity of the proposed Sculpin-1 exploration well. If the drilling activity goes ahead, please have the lead vessel notify [redacted] Joint Rescue Coordination Centre (JRCC) [redacted] 48 hours before operations commence. [redacted] JRCC will require the vessel details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end. Also, the [redacted]e must be contacted through [redacted] no less than four working weeks before operations commence for the promulgation of related notices to mariners. We look forward to future correspondence on this proposal and discussions on the temporary fairways once activities have been completed at Blackback.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**2826**	09-Jan-19	Email from [redacted] (EAPL) to [redacted] ([redacted]): Thank you for your advice and input. The traffic data and overlay is very useful. The Tasmanian traffic is noted, and appears to support the removal of the Temporary Fairway on completion of the Blackback P&A. By doing this, it may assist in avoiding conflicting traffic paths near the end of the Temporary Fairway and Sculpin. Esso is also considering the use of a 2 Nm clearance area around the Sculpin drilling activities to assist in managing the passing traffic. This would be promulgated as you have recommended. Thanks again for your input. We will continue to keep you informed of plans and activities near the TSS.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**3004**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	RESPONSE 17/05/19 from [redacted] ([redacted]): Many thanks for the update and we look forward to receiving your revision to the Geophysical and Geotechnical survey EP for areas within and just outside the Gippsland ATBA.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
2	**3041**	20-May-19	[redacted] (EAPL) called [redacted] ([redacted]) to discuss her request to receive the revision to the Geophysical and Geotechnical survey EP. [redacted] advised [redacted] that she doesn't want to receive the EP, just to continue receiving our general Stakeholder updates.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
81	**2572**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
81	**3005**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
121	**2551**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
87	**2567**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
87	**3006**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
26	**2607**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
26	**3007**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
7	**2621**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
107	**2558**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
61	**2583**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
9	**2619**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
76	**2575**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
34	**2600**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
34	**3008**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
83	**2570**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
128	**2458**	06-Feb-18	Minutes from [redacted]: Esso's operations update. [redacted] tabled a series of documents and included an update on Esso's offshore projects in particular Hairtail / Baldfish program and the West Barracouta program.	

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
128	**2951**	18-Feb-19	[redacted] Esso Summary of Activities 2019 PROJECT SUMMARY 5 yearly EP update Esso iscurrently conducting a 5 yearly review of our existing Environment Plans for platforms operating in Bass Strait. The revised plans will be submitted to the regulator (NOPSEMA) in September 2019. In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with our ongoing operations, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP) and acceptable levels. Esso undertakes regular and continuing consultation with our stakeholders regarding impacts and risks to the environment from our operations and the control measures in place to prevent or mitigate these impacts and risks. Your feedback is sought and welcomed regarding any of our activities in Bass Strait. Blackback update Esso is undertaking a project to secure the Blackback wells using the Ocean Monarch MODU. The program started in February 2019 and will last approximately 90 days. (Well coordinates: Latitude 38° 32’ south, Longitude 148° 33’ east). BTW update / Kipper A geotechnical survey will be completed at a number of locations in Bass Strait including the BTW proposed well locations, Seahorse, Tarwhine and Kipper subsea facilities. The vessel to be used and timing are still being	

negotiated, but will be communicated to our stakeholders as soon as possible. Earliest start date will be April and latest start date will be July this year. The geotechnical campaign will take approximately 10 days.
 An ROV vessel will be contracted to complete inspection activities on the BTA450 approximately 400m from BTA (ie within the PSZ) at the proposed BTW hot tap location. The inspection activities will commence at the earliest mid-May for a duration of less than 10 days.
 Drilling EP preparation has commenced for BTW and KPA. Further details about the environmental impacts and risks from the drilling activity will be communicated separately. The earliest start date for drilling of BTW is January 2020.
 A ROV vessel will be conducting early inspection works at the KPA subsea facilities at the earliest June for a duration of 2 weeks.
 Another vessel will be contracted to continue the remaining geophysical survey in accordance with the Gippsland Basin Geophysical and Geotechnical Investigations EP.
 Esso will advise LEFCOL the start dates once confirmed.
Cobia PRP
update
The Subsea 7 "Seven Eagle" Dive Support Vessel safely and successfully replaced the Cobia-to-Halibut 300mm diameter oil export pipeline with a new 150mm flexible pipeline.

The offshore installation work started on Christmas Eve and lasted about 10 days. It took 20,000 work hours involving saturation divers and ROV activities to lay approximately 5.5 kilometres of flexible pipeline and tie it in to the Cobia and Halibut platforms.

The work was completed with zero safety or environmental incidents.

Teams are preparing Cobia's facilities to return to production after about four years offline and Halibut platform is being prepared to receive oil-flow from Cobia. This preparation work includes pressure vessel inspections and repairs, piping inspections and replacements, valve checks and overhauls, instrumentation and electrical system works.

Compressor and pump machinery will be reinstated, plugs removed from the wells with a wireline campaign and then finally commissioning and starting-up the facilities.
Mackerel
Platform
Mackerel platform has reached the end of its producing life. The wells will be secured in 2019. Navigation lights and corrosion protection for the structure will be maintained until the decommissioning plan is approved and executed.
Sculpin-1
Esso is planning to drill the Sculpin-1 exploration well in block Vic P/70, about 90 km offshore in 2,300 m water depth. The target is a potential gas reservoir

(with limited condensate)
Drilling is scheduled to commence as early as June, 2019, utilising the Ocean

Monarch MODU. The offshore activities are expected to take about 2 months.
Seahorse /
Tarwhine
Esso is reviewing options to secure the Seahorse and Tarwhine wells using a jack-up drilling rig in 2020
Perch /
Dolphin /
Whiting
Esso is reviewing options to secure the Perch, Dolphin and Whiting wells using a jack-up drilling rig in 2020/21
50 years in
Bass Strait
This year we will be celebrating two key milestones for our business – the 50th anniversary of first production from our Gippsland operations and the 70th anniversary of the opening of our Altona Refinery.

These milestones will be celebrated with community sessions later in the year.

[redacted]

[redacted]
CHAIRMAN

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
8	**2620**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
127	**2626**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Coresp Date	Summary	Response
127	**2943**	02-Apr-19	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): The Ocean Monarch is currently at our Blackback facilities conducting a plug and abandonment campaign on the three subsea wells. This followed on from the Baldfish Hairtail drilling campaign last year and a couple of months while the Ocean Monarch was in the Derwent Estuary. Whilst in the Dewent the vessel was ROV inspected by Biofouling Solution (BFS) to assess if there was a risk of Dydenum(spelling ?). While the inspection found a couple of white sea squirt types it was not possible to confirm the exact species. [redacted] was aware of this and had seen the report he also added that some areas of the hull / rig had not been possible to inspect. I agreed and we discussed that BFS had however concluded that there was not a significant IMS risk to the Derwent estuary. I also told him that prior to leaving the Derwent we had also engaged BFS to conduct a review of the IMS species present in the Derwent, if these could have colonized the Ocean Monarch, if they could survive the transit to Blackback and if so what level of risk they potentially posed to Bass Strait and Victoria, this study by BFS concluded the risk to Bass Strait at the time was Low. [redacted] said that he would be interested to see this report and details of the Ocean Monarchs Anti Fouling coating – I informed him that the Ocean Monarch does not have an AFC and he acknowledged that he did know that. Once the Ocean Monarch completes the Blackback work she will be contracted by [redacted] and our expectation is she will move to the Otway Basin to do some work. Following that she will return to the Gippsland Basin and will drill an exploration well (Sculpin) further offshore than all our existing facilities and beyond the shipping lanes in about 2400m of water. Prior to its return we will re-assess the IMS risk posed by the Ocean Monarch. Given the location of Sculpin and that there are no planned port visits we expect the IMS risk will continue to be Low from the Ocean Monarch activities. The Ocean Monarch will be supported by a number of other vessels, p[redacted]ably the same ones we are currently using. These have also been subject to IMS risk assessments which indicate they currently pose a low risk and the risk they pose will also be re-evaluated prior to Sculpin. These vessels have AFC. I said I would follow the phone call up with an email this afternoon, covering the campaign and our management of IMS. [redacted] thanked me for this and said that while he has changed roles, he will make sure he shares the email and discusses our campaign with a colleague who may then get back to us. Based on our discussion [redacted] thought we were managing IMS appropriately and that [redacted] would have no concerns	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
127	**2946**	02-Apr-19	Email from [redacted] (EAPL) to [redacted] ([redacted]): Thanks for taking my call and your time discussing the Ocean Monarch and Sculpin campaign. Here is an overview of the campaign. The Ocean Monarch is currently at our Blackback facilities conducting a plug and abandonment campaign on the three existing subsea wells. This followed on from the VIC/P70 Baldfish / Hairtail drilling campaign last year and a couple of months while the Ocean Monarch was moored in the Derwent Estuary. Whilst in the Derwent the vessel was ROV inspected by Biofouling Solution (BFS) to assess if there was a risk of Didemnum perlucidum. Three white sea squirts types were observed, however the exact species could not be confirmed and they could be any of a number of sea squirt species (including a number of native species). They didn't display any invasive growth characteristics. BFS concluded that these colonies were unlikely to pose an immediate biosecurity risk to the Derwent River, and that the colonies were unlikely to reproduce via sexual (viable larvae) or via asexual reproduction (fragmentation) to result in a successful establishment. Following this inspection and prior to activities at Blackback Esso also commissioned BFS to assess the IMS species present in the Derwent, the likelihood of them having colonized the Ocean Monarch, surviving the transit and then colonizing Bass Strait. This assessment concluded that the risk was low and acceptable. Once the Ocean Monarch completes the Blackback work she will be contracted by [redacted] and our expectation is she will move to the Otway Basin to do some work there. Following that she will return to the Gippsland Basin and will drill an exploration well called Sculpin for Esso also in VIC/P70. Sculpin is further offshore than the existing Bass Strait facilities and is beyond the shipping lane in about 2400m of water. Prior to its return we will re-assess the IMS risk posed by the Ocean Monarch. Given the location of Sculpin and that there are no planned port visits by the Ocean Monarch we expect the IMS risk will continue to be Low from the Sculpin activities. The Ocean Monarch will be supported by a number of other vessels, p[redacted]ably the same ones we are currently using. These have also been subject to IMS risk assessments which indicate they currently pose a low risk, however the risk they pose will also be re-evaluated prior to Sculpin. As discussed the IMS risk from activities at Sculpin is expected to be Low and acceptable, particularly given the water depth and location some 100km offshore. An Environment Plan addressing the Sculpin drilling activities has been submitted to NOPSEMA and this covers IMS risk due to biofouling and ballast water discharge along with other potential impacts and risks to the environment from this activity. If you want any additional details please contact me.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
104	**1455**	05-Oct-17	Temporary Fairways	ISSUE: Interference with commercial shipping - Provide further details to [redacted] [redacted] supports a Preliminary notice to mariners (6-8 weeks in advance) informing about the upcoming introduction of a two-way routing measure followed up by a Temporary notice while effective The ENCs will have the feature added and removed accordingly. Esso to confirm all the details including starting and ending date, coordinates, purpose of the routeing measure, etc. The [redacted] POC for this matter is Glen Cook (glen.cook@defence.gov.au - Manager of the chart maintenance section). MERIT: See ID_1473

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
104	**300**	06-Nov-17	Being dealt with through [redacted] - no further consultation required	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
104	**1474**	09-Feb-18	Email sent from [redacted] to [redacted] (EAPL): Hello [redacted], Please find your Notice to Mariners for your registered charts below. If you experience any p[redacted]lems, please send an email to [redacted]. This message is to alert you to the latest Notice to Mariners that affect the charts that you have registered under the eNotices Service. The offical copy of Notice to Mariners including any block corrections and tracings can be found at www.hydro.gov.au and should be used as the official source for updating [redacted] products. *IMPORTANT NOTICE* This edition of Notices to Mariners includes all significant information affecting [redacted] products which the [redacted] has become aware of since the last edition. All reasonable efforts have been made to ensure the accuracy and completeness of the information, including third party information, on which these updates are based. The [redacted] regards third parties from which it receives information as reliable, however the [redacted] cannot verify all such information and errors may therefore exist. The [redacted] does not accept liability for errors in third party information. **eNotices Information and News** Please note that you are able to login and register to receive eNotices for [redacted] Products including Seafarer's Handbook for Australian Waters, Annual Notices to Mariners and ANTT's. If you have any suggestions on what you would like to see in eNotices, please feel free to submit comments via our feedback forms or send email to [redacted]. If you no longer wish to receive eNotices emails from the [redacted] please email [redacted] with the subject "Unsubscribe eNotices". --- General Notice to Mariners Links: --- Direct access to Edition Blocks & Tracings: http://www.hydro.gov.au/n2m/notices.htm#view --- NOTICES TO MARINERS for Aus357 --- 126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards. Australian Maritime Safety Authority Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows: Direction Coordinates	No objections, claims or issues raised

Westbound lane
38° 38'.41 S 148° 17'.58 E
38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus357 [NE 19/11/10]

NOTICES TO MARINERS for Aus487

126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards.
Australian Maritime Safety Authority
Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows:
Direction
Coordinates

Westbound lane
38° 38'.41 S 148° 17'.58 E
38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus487 [NC 07/01/05]

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
104	**1746**	18-Jun-18	Email sent from [redacted] (EAPL) to [redacted]: Good Afternoon, Please find attached Notice A604295 which establishes a Petroleum Safety Zone around the locations known as Baldfish-1 and Hartail-1. Could you please review, and issue the appropriate Notice to Mariners to draw attention to the existence of the PSZ which has been established. If you have any questions, please do not hesitate to contact me.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
104	**2560**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1596**	24-Apr-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Here is the oil spill modelling report and two additional figures showing the potential extent of entrained oil above a PNEC of [redacted] for [redacted] Modelling has been done for a worst case spill from the Hairtail well and also for a worst case spill of MDO from a supply vessel, figures showing surface oil, dissolved and other entrained thresholds are contained within the report.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1598**	24-Apr-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): As discussed Esso are planning a couple of exploration wells in Bass Strait, called Baldfish and Hairtail. These wells are located about 90km offshore and are expected to be gas wells with some associated condensate. The attached flyer provides a map showing the location and co-ordinates of the two wells. As part of our Environment Plan development we have had oil spill modelling conducted based on a worst case blowout. This modelling indicated that surface, entrained and dissolved oil levels that could result in an environmental impact will be confined to commonwealth waters. Lower levels of hydrocarbon, particularly entrained hydrocarbons may however be experienced in state waters. Futher oil spill modelling indicates that shorelines from Wilsons Prom in Victoria, to Ulladulla in NSW and north east parts of the Tasmanian coast could experience entrained oil at levels above the ANZEC threshold of [redacted] for [redacted] This level is not anticipated to cause any significant impact, but may exceed the water quality targets for these areas. I'll send the oil spill modelling report and some additional plots separately for your information. In the very unlikely event of a blowout Esso will implement an OPEP and will notify state departments as appropriate. Where oil is predicted to impact state waters we will look to have a state liaison representative involved with the Esso OSRT to ensure any required state response is informed and any actions are appropriately aligned. We would be happy to discuss the project, the oil spill modelling and how we can best interface with any other state requirements further. If you could help us arrange a coordinated meeting with the other Victorian state departments that might be interested that would also be much appreciated and we can discuss both this drilling campaign and also our base business operations	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1595**	24-Apr-18	Phone call made by [redacted] (EAPL) to [redacted] ([redacted]): I spoke with [redacted] on Tuesday to give her an overview of the Baldfish campaign and the results of the oil spill modelling. [redacted] was interested to discuss the project and I informed here that the oil spill modelling indicated that there would be little if any impact to state waters based on our thresholds for dissolved, entrained and surface oil. I discussed the fact that NOPSEMA had asked us to assess the impact outside these thresholds and as such we had conducted additional modelling down to [redacted] for [redacted]hrs in line with ANZECC criteria. This showed that these levels may be experienced between Wilsons Prom to Ulladulla and also along the north Tasmanian coast. As per our base business OPEP we would notify state departments of a release and where impacts to state waters were predicted we would look to have an interface officer join our OSRT to help ensure issues were understood and response arrangements between Esso and State aligned. [redacted] said that that was good practice and offered to help set up a meeting with the other Vic state departments that might be interested. She also asked for a copy of the oil spill modelling. After the phone call I sent her an email summarizing the above and also send the RPS oil spill modelling report and figures showing the extent of the [redacted]for [redacted] entrained oil.	REQUEST: [redacted] ([redacted]) requested a copy of the oil spill modelling. This was provided by [redacted] (EAPL) (see ID 1596 & 1598) ISSUE: set up a meeting with [redacted] and the other Vic state departments that might be interested. (see ID_1625) MERIT: A meeting between EAPL base business, EAPL projects and Vic State departments has value and should be planned. [redacted] is arranging this with [redacted] (see ID_1992)

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1625**	16-May-18	[redacted] (EAPL) called [redacted] ([redacted]): they discusssed setting up a meeting with Vic State departments. [redacted] asked for the information to be sent again and that she would be happy to arrange a meeting but that schedules can be busy. [redacted] indicated that campaign had slipped to August 2018.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1626**	16-May-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], As discussed this morning. The Baldfish drilling campaign has slipped a couple of months and is unlikely to start before August. Attached is the oil spill modelling report and some additional figures showing the extent of entrained oil at some additional lower thresholds. If you could help arrange a meeting with the relevant state departments / working groups that would be appreciated and we can further discuss how this campaign aligns and falls within with our existing Bass Strait oil spill response arrangements.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1631**	16-May-18	Email received by [redacted] (EAPL) from [redacted] ([redacted]): Hi [redacted] received this email and one other which was the [redacted] one cheers [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1630**	16-May-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi again [redacted], I sent an email with a couple of attachments just now, one of them was about [redacted] so if your email system rejects / you don't receive it please let me know. Regards, [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1992**	09-Jul-18	Email received by [redacted] (EAPL) from [redacted] ([redacted]): Hi [redacted], I was just talking to [redacted] about the Baldfish work and arrangements more generally. [redacted] suggested a meeting between the three of us, and any other interested parties from state government ([redacted] to discuss the work you have coming up in the next year or so, and I think that would be useful, certainly from my point of view to get me up to speed. Could you please let me know what your availability is like in the next few weeks and I'll set something up?	ISSUE: meeting to be arranged between EAPL, [redacted], [redacted], [redacted], [redacted], [redacted] MERIT: A meeting between EAPL base business, EAPL projects and Vic State departments was held on 23 August 2018.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**1993**	09-Jul-18	Phone conversation between [redacted] (EAPL) and [redacted] ([redacted]): I spoke with him this morning at a high level about Baldfish and we covered the following points; [redacted] is trying to set up the meeting that [redacted] was looking to arrange to discuss Baldfish this should involve [redacted]. [redacted] sent the attached email following the phone call. Baldfish EP has been accepted but we are still keen to consult with Vic departments and ensure a common understanding and working relationship. Oil spill modelling shows no actionable impact to Vic State waters from a Baldfish spill based on industry recognized thresholds. Entrained thresholds above ANZECC criteria will potentially be seen in Vic waters. As per standard EAPL Oil Spill Response we would be notifying ECODEV in the event of a spill and would be looking to have a liason officer involved in the response.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
44	**2592**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2546**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**2593**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
45	**2591**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2783**	08-Jan-19	Dear Stakeholder, Please be advised that Esso will be conducting offshore work at the Blackback subsea complex, over approximately 90 days, starting around the 6th February 2019. This work will be carried out by the Ocean Monarch MODU, supported by up to three vessels. Petroleum Safety Zones have been established extending 500m from the Pipeline Termination Assembly (38° 32’ 26.8” south 148° 33’ 15.2” east) and Well A-3 (38° 32’ 25.3” south 148° 33’ 16.5” east). An environment plan covering the activity was accepted by NOPSEMA in November 2018 and a notice to mariners has been issued. Esso thanks you for your consideration and 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.	RESPONSE: Thanks very much for the update. I have a couple of queries regarding these operations. Firstly, are you aware of where the Ocean Monarch intends to go once these operations are completed in the Blackbuck subsea complex? My second query relates to the support vessels. Are you able to let me know where they will be mobilising from and where they will go following the operation? CLOSED: Refer to ID_2829 & ID_2830

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2830**	16-Jan-19	Email from [redacted] (EAPL) to [redacted] ([redacted] - IMS): The two AHTS vessels Far Senator and Far Saracen will be involved in the tow from Blackback once the scope is completed. It would be reasonable to expect they will continue service with the Ocean Monarch. The PSV to be used will be the MMA Responder, not the Sea Swan. This vessel was mobilized from Darwin in late 2018 to support Esso Production. The vessel is expected to return to Production service on completion of the Blackback scope.	RESPONSE: Email from [redacted] ([redacted]): Thanks for the information regarding the Ocean Monarch and its support vessels, it’s much appreciated.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2829**	16-Jan-19	Email from [redacted] (EAPL) to [redacted] ([redacted] - IMS): Two answers: 1. Ocean Monarch has been operating in Australian waters since mid-2015. On completion of BKA P&A Operations, [redacted] has contracted the MODU. [redacted] operates fields in Otway and Gippsland Basins. 2. Support vessels (Far Senator, Far Saracen and Sea Swan) have been operating in Australian waters for an extended period and are scheduled to continue support Ocean Monarch activities in Australia on completion of the BKA scope. [redacted], Marine Advisor, can provide further details on vessel movements.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
43	**2928**	24-Jan-19	Email sent from [redacted] EAPL) to [redacted]: As you may be aware Esso completed the Baldfish exploration drilling campaign last year and we are now looking at drilling another prospect in the same licence block (VIC/P70), that will be called Sculpin-1 well. Sculpin-1 is on the edge of the continental shelf in Bass Strait and in deep water. We have completed oil spill modelling for the well and would be happy to discuss the results and other issues associated with the campaign, that will be detailed within a revision to the Baldfish (VIC/P70) Environment Plan we are preparing for NOPSEMA. Below is a brief summary of the oil spill results. The Sculpin prospect is a gas reservoir with associated condensate. The modeling conducted by RPS predicts that in the unlikely case of an uncontrolled blowout scenario from the Sculpin-1 well, there is no impact from surface hydrocarbons to any of the shorelines, nor is any dissolved hydrocarbon predicted to reach the shore. [redacted] [redacted] [redacted] We would be happy to present additional information and discuss the Environment Plan and associated Oil Pollution Emergency Plan arrangements in further detail if you would like. Not that the OPEP and response arrangements will be similar and consistent with the Baldfish OPEP and the current Base business arrangements for the rest of our Bass Strait facilities.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2923**	29-Jan-19	Email sent from EAPL to Blackback Stakeholders: Please be advised that Esso will be commencing offshore work at the Blackback subsea complex, over approximately 90 days, starting around the 4th February 2019. This work will be carried out by the Ocean Monarch MODU, supported by up to three vessels. Petroleum Safety Zones have been established extending 500m from the Pipeline Termination Assembly (38° 32’ 26.8” south 148° 33’ 15.2” east) and Well A-3 (38° 32’ 25.3” south 148° 33’ 16.5” east). An environment plan covering the activity was accepted by NOPSEMA in November 2018 and a notice to mariners has been issued. Esso thanks you for your consideration and 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.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**2952**	02-Apr-19	Phone call & email between [redacted] (EAPL) and [redacted] ([redacted]): Just spoke with [redacted]. Summary of discussion for the stakeholder database below – will follow this up with an email to [redacted] that I will also cc you in on. Cut and paste the following in as appropriate noting the yellow section – happy to discuss. The Ocean Monarch is currently at our Blackback facilities conducting a plug and abandonment campaign on the three subsea wells. This followed on from the Baldfish Hairtail drilling campaign last year and a couple of months while the Ocean Monarch was in the Derwent Estuary. Whilst in the Dewent the vessel was ROV inspected by Biofouling Solution (BFS) to assess if there was a risk of Dydenum(spelling ?). While the inspection found a couple of white sea squirt types it was not possible to confirm the exact species. BFS concluded that this presence did not present a significant IMS risk to the Derwent estuary. [redacted] was aware of this and knows about the Ocean Monarch and this inspection. I also told him that prior to leaving the Derwent we also engaged BFS to conduct a review of the IMS species present in the Derwent, if these could have colonized the Ocean Monarch, if they could survive the transit to Blackback and if so what level of risk they potentially posed to Bass Strait and Victoria, this study by BFS concluded the risk to Bass Strait at the time was Low. Once the Ocean Monarch completes the Blackback work she will be contracted by [redacted] and our expectation is she will move to the Otway Basin to do some work. Following that she will return to the Gippsland Basin and will drill an exploration well called Sculpin for us. Sculpin is further offshore than all our existing facilities and is beyond the shipping lanes in about 2400m of water. Prior to its return we will re-assess the IMS risk posed by the Ocean Monarch. Given the location of Sculpin and there are no planned port visits we expect the IMS risk will continue to be Low from the Ocean Monarch activities. The Ocean Monarch will be supported by a number of other vessels, p[redacted]ably the same ones we are currently using. These have also been subject to IMS risk assessments which indicate they currently pose a low risk and the risk they pose will also be re-evaluated prior to Sculpin. [redacted] asked if the Ocean Monarch would visit port I indicated that this was very unlikely but if it did this would form part of the IMS RA we will conduct prior to its return. [redacted] indicated that based on this the risk should be acceptable and expressed no concerns. [redacted] also asked about the vessels and indicated that he knew of them and had been involved with assessment of them. [redacted] is currently doing some work for [redacted] and reviewing their IMS RA procedure. I asked if he would be interested in seeing the Esso IMS RAP he indicated he would be and I said I would discuss internally with a view to sending him a copy once we had revised it internally.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**2941**	02-Apr-19	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): The Ocean Monarch is currently at our Blackback facilities conducting a plug and abandonment campaign on the three subsea wells. This followed on from the Baldfish Hairtail drilling campaign last year and a couple of months while the Ocean Monarch was in the Derwent Estuary.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
126	**2944**	02-Apr-19	Email from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], As discussed just now here is a brief summary of our proposed Sculpin activities; The Ocean Monarch is currently at our Blackback facilities conducting a plug and abandonment campaign on the three subsea wells. This followed on from the VIC/P70 Baldfish / Hairtail drilling campaign last year and a couple of months while the Ocean Monarch was in the Derwent Estuary. Whilst in the Derwent the vessel was ROV inspected by Biofouling Solution (BFS) to assess if there was a risk of Didemnum perlucidum. Three white sea squirts types were observed, however the exact species could not be confirmed and they could be any of a number of sea squirt species (including a number of native species). They didn't display any invasive growth characteristics. BFS concluded that these colonies were unlikely to pose an immediate biosecurity risk to the Derwent River, and that the colonies were unlikely to reproduce via sexual (viable larvae) or via asexual reproduction (fragmentation) to result in a successful establishment. Following this inspection and prior to activities at Blackback Esso also commissioned BFS to assess the IMS species present in the Derwent, the likelihood of them having colonized the Ocean Monarch, surviving the transit and then colonizing Bass Strait. This assessment concluded that the risk was low and acceptable. Once the Ocean Monarch completes the Blackback work she will be contracted by [redacted] and our expectation is she will move to the Otway Basin to do some work. Following that she will return to the Gippsland Basin and will drill an exploration well called Sculpin for Esso again in VIC/P70. Sculpin is further offshore than all our existing facilities and is beyond the shipping lanes in about 2400m of water. Prior to its return Esso will re-assess the IMS risk posed by the Ocean Monarch. Given the location of Sculpin and that there are no planned port visits we expect the IMS risk will continue to be Low from the Ocean Monarch activities. The Ocean Monarch will be supported by a number of other vessels, p[redacted]ably the same ones we are currently using. These have also been subject to IMS risk assessments which indicate they currently pose a low risk and the risk they pose will also be re-evaluated prior to Sculpin. As discussed the risk from IMS from Ocean Monarch activities at Sculpin is expected to be Low and acceptable particularly given the water depth and location some 100km offshore. An Environment Plan addressing the Sculpin drilling activities has been submitted to NOPSEMA and this covers IMS risk due to biofouling and ballast water discharge along with other potential impacts and risks to the environment from this activity. If you have any questions please don't hesitate to contact me.	RESPONSE: 09/04/19 Email from [redacted] ([redacted]) to [redacted] (EAPL): Nice to chat with you last week about Esso's upcoming work with the Ocean Monarch and thanks for providing the further detail in your email. Given the location of the Sculpin activities, I agree that the IMS risk for this next round of work is likely to be low. That being said, I'd like to be kept in the loop in regards to any future risk assessments for either the rig or its support vessels. Please note that following the last Victorian state election, machinery of government changes has led to the Department of Economic Development, Jobs, Transport and Resources becoming the Department of Jobs, Precincts and Regions.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
126	**2947**	09-Apr-19	Email from [redacted] (EAPL) and Dr [redacted] ([redacted]): We will keep you in the loop and discuss future IMS assessments of the Ocean Monarch and the supply vessels with you.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
44	**3010**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
126	**3009**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
43	**3011**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
102	**2562**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised
46	**2590**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised
46	**3012**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised
105	**2559**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
105	**3013**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**1610**	24-Apr-18	Email from [redacted] (EAPL) to [redacted] ([redacted]): Esso are planning a couple of exploration wells in Bass Strait, called Baldfish and Hairtail. These wells are located about 90km offshore and are expected to be gas wells with some associated condensate. The attached flyer provides a map showing the location and co-ordinates of the two wells. As part of our Environment Plan development we have had oil spill modelling conducted based on a worst case blowout and a diesel spill. [redacted] In the very unlikely event of a blowout Esso will implement an OPEP and will notify state departments as appropriate. Where oil is predicted to impact state waters we will look to have a state liaison representative involved with the Esso OSRT to ensure any required state response is informed and any actions are appropriately aligned. We would be happy to discuss the project, the oil spill modelling and how we can best interface with any other state requirements further so please send me an email or give me a call.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**1600**	26-Apr-18	[redacted] (EAPL) contacting [redacted] ([redacted]): Tried calling – existing number is unavailable. Contacted the [redacted] reception – [redacted] is still with them. Email is still [redacted].[redacted]@[redacted].[redacted].gov.au – phone number has changed to 03 6165 4538. Tried being put through but no answer.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1604**	01-May-18	Email from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], Thanks for your time this morning. As discussed Esso are looking to drill a couple of exploration wells this year called Baldfish and Hairtail, the wells will be drilled by the Ocean Monarch and are about 90km off the Victorian coastline. The wells are expected to intersect a gas reserve, potentially with some associated condensate. The reservoir and geology of Bass Strait is well understood and the wells will be designed and managed to ExxonMobil global practices and subject to a Well Operations Management Plan, Safety Case and Environment Plan requiring NOPSEMA approval. [redacted] Discussions with NOPSEMA have led to an examination of entrained concentrations below the NOEC and down to a Predicted No Effect Concentration (PNEC) of [redacted] (for [redacted]) for entrained hydrocarbons. The two figures attached, show the PNEC thresholds and the extent of the area that may be exposed to them, based on stochastic modelling. Esso's oil spill response would largely comprise of source control and observation and surveillance. Source control options include the use of a capping stack and drilling a relief well in the event of a blowout. There are no predicted oil levels above actionable thresholds that are predicted to impact state waters and offshore containment and recovery in Bass Strait has been judged not practicable. The oil spill response capabilities for this drilling campaign will be based on Esso's operational oil spill response capabilities for its complete Bass Strait facilities. In the event of a spill state departments will be notified and where appropriate liaison officers will be invited to join the Esso oil spill response team.	No objections, claims or issues raised

Esso would welcome the opportunity to discuss the drilling project and our proposed Oil Pollution Emergency Plans further with you at a convenient time once you have had an opportunity to read the previously sent and attached additional information.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1603**	01-May-18	Phone call from [redacted] (EAPL) to [redacted] ([redacted]): Called [redacted] to see if she had received the email I sent last week and to ascertain the level of consultation she would be interested in. [redacted] had been on a training course last week and hadn't had an opportunity to read my email. I gave her a quick overview of the project and explained the oil spill modelling that had been conducted to date. [redacted] [redacted] was keen to know more and I said I would send her the oil spill modelling report, that provides information on the thresholds and the extent of these thresholds and a brief overview of the proposed Esso oil spill response. [redacted] indicated that a follow up meeting via a phone call the week beginning the 7th May would be acceptable.	ISSUE: schedule meeting with [redacted] ([redacted]) MERIT: Agree - Meeting / phone call with [redacted] should be arranged. MERIT: Phone call with [redacted] ([redacted]) (see ID_1636)

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1627**	16-May-18	[redacted] (EAPL) has called [redacted] ([redacted]) on several occasions and there has been no answer and no facility to leave a message. Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], I would like to arrange a phone call meeting to discuss our Baldfish drilling campaign and the results of the oil spill modelling we have conducted and that I sent through earlier in the month What time and day would suit you best?	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1632**	16-May-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], I would like to arrange a phone call meeting to discuss our Baldfish drilling campaign and the results of the oil spill modelling we have conducted and that I sent through earlier in the month What time and day would suit you best. Many thanks, [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**1633**	16-May-18	Email received by [redacted] (EAPL) from [redacted] ([redacted]): Hi [redacted], I am away for next two weeks on training, back in the office May 30th. I could do a phone hook-up that afternoon, or Mon 4th June. Kind regards [redacted]	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**1634**	21-May-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], How about 2pm on the 30th – I'll give you a call.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**1637**	30-May-18	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): Had a call from [redacted] - meeting cancelled she has some urgent business this afternoon. I however took the opportunity to speak with her – she hasn't had a chance to read the information I sent, through however was keen to talk about interactions with the Tasmanian oil spill response. In the event of a spill she would expect to be notified and for a liaison officer to join our OSRT, I responded that this aligns with our expectation and OPEP. If an impact to Tasmanian waters is required she expects that a representative of our OSRT would be mobilized to Tasmania to support the response there. Tasmania has a small number of response personnel and they would need to be supplemented by us. They also have a limited amount of oil spill response equipment and this would also need to be supplemented. I said we had a fair sized team internally and that through [redacted] we have access to a much larger number of trained personnel and additional equipment. We would primarily be conducting monitor and evaluate activities and talking samples as per our Operational Scientific Monitoring Plan. Pointed out that the trajectory modelling indicated no significant surface oil and that it was only very low levels of entrained oil that we expect to see in Tasmanian waters from a Baldfish or Hairtail event. They have quite a bit of info on the island groups in Bass Strait and would be happy to share that information to assist in oil spill response planning. She would be happy to have a further chat with you on oiled wildlife and response arrangements. She works PT and isn't back in the office till Monday. Monday isn't however a good day to contact her and the suggestion was to send her an email with a couple of potential dates / times. She would like a current copy of the OPEP but noted that she wouldn't be looking to review it or provide any feedback back to us. I said that this was fine but if she had any question or comments we would be more than happy to discuss them. I highlighted that we had an OPEP for Baldfish that had recently been revised and that we would look to send this, we agreed to hold off sending her the Bass Strait OPEP until it to had been updated.	ACTION 2: Send [redacted] a copy of the Bass Strait OPEP once revised. MERIT: See ID_1744

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1636**	30-May-18	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): Had a call from [redacted] - meeting cancelled she has some urgent business this afternoon. I however took the opportunity to speak with her – she hasn't had a chance to read the information I sent, through however was keen to talk about interactions with the Tasmanian oil spill response. In the event of a spill she would expect to be notified and for a liaison officer to join our OSRT, I responded that this aligns with our expectation and OPEP. If an impact to Tasmanian waters is required she expects that a representative of our OSRT would be mobilized to Tasmania to support the response there. Tasmania has a small number of response personnel and they would need to be supplemented by us. They also have a limited amount of oil spill response equipment and this would also need to be supplemented. I said we had a fair sized team internally and that through [redacted] we have access to a much larger number of trained personnel and additional equipment. We would primarily be conducting monitor and evaluate activities and talking samples as per our Operational Scientific Monitoring Plan. Pointed out that the trajectory modelling indicated no significant surface oil and that it was only very low levels of entrained oil that we expect to see in Tasmanian waters from a Baldfish or Hairtail event. They have quite a bit of info on the island groups in Bass Strait and would be happy to share that information to assist in oil spill response planning. She would be happy to have a further chat with you on oiled wildlife and response arrangements. She works PT and isn't back in the office till Monday. Monday isn't however a good day to contact her and the suggestion was to send her an email with a couple of potential dates / times. She would like a current copy of the OPEP but noted that she wouldn't be looking to review it or provide any feedback back to us. I said that this was fine but if she had any question or comments we would be more than happy to discuss them. I highlighted that we had an OPEP for Baldfish that had recently been revised and that we would look to send this, we agreed to hold off sending her the Bass Strait OPEP until it to had been updated.	ISSUE: Send [redacted] a copy of the Baldfish OPEP. MERIT: Baldfish OPEP provided to [redacted] (see ID_1744)

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**1744**	14-Jun-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], As discussed here is a copy of the Baldfish OPEP as issued to NOPSEMA for your records. The operational Bass Strait OPEP is in the process of being revised and updated and we will send you a copy of that once completed. Once the drilling campaign at Baldfish is complete (expected to be September this year) the rig will be used to plug and abandon our three Blackback subsea wells. A separate EP and OPEP is being developed to cover this activity and will also be submitted to NOPSEMA in due course. Oil spill modelling to support the Blackback OPEP is underway and if the results are significantly different from that included in the Baldfish OPEP we will let you know.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**2581**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
63	**2926**	24-Jan-19	Email sent from [redacted] EAPL) to [redacted]: As you may be aware Esso completed the Baldfish exploration drilling campaign last year and we are now looking at drilling another prospect in the same licence block (VIC/P70), that will be called Sculpin-1 well. Sculpin-1 is on the edge of the continental shelf in Bass Strait and in deep water. We have completed oil spill modelling for the well and would be happy to discuss the results and other issues associated with the campaign, that will be detailed within a revision to the Baldfish (VIC/P70) Environment Plan we are preparing for NOPSEMA. Below is a brief summary of the oil spill results. The Sculpin prospect is a gas reservoir with associated condensate. The modeling conducted by RPS predicts that in the unlikely case of an uncontrolled blowout scenario from the Sculpin-1 well, there is no impact from surface hydrocarbons to any of the shorelines, nor is any dissolved hydrocarbon predicted to reach the shore. [redacted] We would be happy to present additional information and discuss the Environment Plan and associated Oil Pollution Emergency Plan arrangements in further detail if you would like. Not that the OPEP and response arrangements will be similar and consistent with the Baldfish OPEP and the current Base business arrangements for the rest of our Bass Strait facilities.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
63	**3014**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
103	**1473**	09-Feb-18	Email sent from [redacted] to [redacted] (EAPL): Hello [redacted], Please find your Notice to Mariners for your registered charts below. If you experience any p[redacted]lems, please send an email to [redacted]. This message is to alert you to the latest Notice to Mariners that affect the charts that you have registered under the eNotices Service. The offical copy of Notice to Mariners including any block corrections and tracings can be found at www.hydro.gov.au and should be used as the official source for updating [redacted] products. *IMPORTANT NOTICE* This edition of Notices to Mariners includes all significant information affecting [redacted] products which the [redacted] has become aware of since the last edition. All reasonable efforts have been made to ensure the accuracy and completeness of the information, including third party information, on which these updates are based. The [redacted] regards third parties from which it receives information as reliable, however the [redacted] cannot verify all such information and errors may therefore exist. The [redacted] does not accept liability for errors in third party information. **eNotices Information and News** Please note that you are able to login and register to receive eNotices for [redacted] Products including Seafarer's Handbook for Australian Waters, Annual Notices to Mariners and ANTT's. If you have any suggestions on what you would like to see in eNotices, please feel free to submit comments via our feedback forms or send email to [redacted]. If you no longer wish to receive eNotices emails from the [redacted] please email [redacted] with the subject "Unsubscribe eNotices". --- General Notice to Mariners Links: --- Direct access to Edition Blocks & Tracings: http://www.hydro.gov.au/n2m/notices.htm#view --- NOTICES TO MARINERS for Aus357 --- 126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards. Australian Maritime Safety Authority Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows: Direction Coordinates	[redacted]

Westbound lane
38° 38'.41 S 148° 17'.58 E
38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus357 [NE 19/11/10]

NOTICES TO MARINERS for Aus487

126(T)/2018 AUSTRALIA - VICTORIA - Ninety Mile Beach - Traffic separation scheme southwestwards.
Australian Maritime Safety Authority
Two shipping fairways have been established adjoining the existing traffic separation scheme (38° 44'.20 S 148° 15'.20 E) as follows:
Direction
Coordinates

Westbound lane
38° 38'.41 S 148° 17'.58 E
38° 23'.68 S 148° 40'.29 E
38° 25'.42 S 148° 42'.28 E
38° 40'.80 S 148° 19'.72 E.

Eastbound lane
38° 42'.02 S 148° 20'.84 E
38° 35'.93 S 148° 40'.69 E
38° 38'.92 S 148° 40'.68 E
38° 44'.51 S 148° 23'.08 E.

Aus487 [NC 07/01/05]

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
103	**1747**	18-Jun-18	Email sent from [redacted] (EAPL) to [redacted]: Good Afternoon, Please find attached Notice A604295 which establishes a Petroleum Safety Zone around the locations known as Baldfish-1 and Hartail-1. Could you please review, and issue the appropriate Notice to Mariners to draw attention to the existence of the PSZ which has been established. If you have any questions, please do not hesitate to contact me.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
103	**2561**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
103	**2925**	24-Jan-19	Email sent from [redacted] [redacted] EAPL) to [redacted]: As you may be aware Esso completed the Baldfish exploration drilling campaign last year and we are now looking at drilling another prospect in the same licence block (VIC/P70), that will be called Sculpin-1 well. Sculpin-1 is on the edge of the continental shelf in Bass Strait and in deep water. We have completed oil spill modelling for the well and would be happy to discuss the results and other issues associated with the campaign, that will be detailed within a revision to the Baldfish (VIC/P70) Environment Plan we are preparing for NOPSEMA. Below is a brief summary of the oil spill results. The Sculpin prospect is a gas reservoir with associated condensate. The modeling conducted by RPS predicts that in the unlikely case of an uncontrolled blowout scenario from the Sculpin-1 well, there is no impact from surface hydrocarbons to any of the shorelines, nor is any dissolved hydrocarbon predicted to reach the shore. [redacted] We would be happy to present additional information and discuss the Environment Plan and associated Oil Pollution Emergency Plan arrangements in further detail if you would like. Not that the OPEP and response arrangements will be similar and consistent with the Baldfish OPEP and the current Base business arrangements for the rest of our Bass Strait facilities.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
103	**2937**	21-Mar-19	Email from [redacted] [redacted] ([redacted]) to [redacted] [redacted] (EAPL): Good afternoon [redacted], Thank you for the update on Esso Australia's proposed activities in the Bass Strait. Based on the information provided, we note that the planned activities do not overlap any Australian Marine Parks, therefore there are no authorisation requirements from the [redacted]. The Sculpin-1 well (VIC/P70) will be approximately 70 km, 100 km, 160 km and 300km to Beagle, East Gippsland, Flinders and Freycinet marine parks respectively. Therefore there are no authorisation requirements from the [redacted]. We also note that spill modelling demonstrates that Beagle, East Gippsland, Flinders and Freycinet marine parks may be impacted. Theses marine parks are part of the South-east Marine Parks Network and further information on the park values are available in the South-east Marine Parks Network Management Plan 2013 and the Australian Marine Parks Science Atlas. To assist in the revision of an Environment Plan (EP) for petroleum activities that may affect Australian marine parks, NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate. In revising the EP, you should consider Australian marine parks and their representativeness. In the context of the management plan objectives and values, you should ensure that the EP: - identifies and manages the impacts and risks on Australian marine park values to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable. - clearly demonstrates that the activity will not be inconsistent with the management plan. In the South-east Marine Parks Network oil pollution response, environmental monitoring and remediation activities are allowed under the class approval in IUCN category VI zones, when undertaken in accordance with an EP accepted under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009. In the event of an oil pollution incident that may affect zones other than IUCN category VI zones, prompt consultation with the [redacted] is required. I can confirm that we do not require further notification of progress made in relation to this activity unless details regarding the activity change and result in an overlap with a marine park or for emergency responses (see details below). Emergency responses: The [redacted] should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24 hour Marine Compliance Duty Officer on [redacted]. The notification should include: - titleholder details - time and location of the incident (including name of marine park likely to be effected) - proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.) - confirmation of providing access to relevant monitoring and evaluation reports when available; and - contact details for the response coordinator. Please don't hesitate to contact marineparks@environment.gov.au if you have any further	No objections, claims or issues raised

questions.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
11	**2617**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
11	**2281**	05-Dec-18	Offshore Community Session: summary of [redacted] (EAPL) talking points & stakeholder consultation as noted by [redacted] (EAPL): [redacted] spoke to the whole group about Esso's current and planned activities in Bass Strait in the next 12 months. Topics for discussion included the G&G survey work completed in 2018, the location and timing of survey work to be completed in 2019, and the scope of the BTW project. Other topics included: MILESTONES: - Over the last 24 months, our Gippsland operations have been able to meet unprecedented east coast gas demand by increasing our production well above our historical levels. - But as the major fields in Bass Strait reach the end of their natural lives, we need to find new sources of gas. - In August, we commenced our first deep-water exploration drilling program in over 20 years, by drilling two new wells, Baldfish and Hairtail at a block known as VIC/P70, south east of our existing fields. - While the $120m drilling campaign was completed safely and without incident by the drill rig Ocean Monarch in November, unfortunately, we didn’t encounter commercial quantities of hydrocarbons. - Prior to drilling we also competed our Environment Plan, which included stakeholder consultation. We’re keen to listen to your opinions on how that went and how we can keep improving our operations. - Despite not finding commercial gas at our first attempt in over 20 years, we are actively pursuing new gas development opportunities in Bass Strait so that we can meet the demand for gas. - We are going to keep trying to find new sources of gas. To do this, we have had our best engineering and science minds working on options for new gas developments to bring online much needed new gas supplies from Bass Strait fields. - We’ve already spent money reprocessing our historic seismic data across the Bass Strait and will consider purchasing new seismic data, should it be acquired. This will help our geoscience team better identify opportunities for new gas supplies that will keep Victorians warm in winter and cooking with gas. PLANNED OFFSHORE ACTIVITIES - Following the completion of our exploration drilling at Baldfish and Hairtail, Esso is planning to utilise the Ocean Monarch rig to undertake well abandonment work for the Blackback field and look to undertake possible further exploration drilling in VIC/P70 sometime in 2019. - We are also planning to develop a gas field in the VIC/L1 block, known as West Barracouta, approximately 6km south west of the existing Barracouta platform. - The proposed West Barracouta development will involve the drilling of two subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. - A subsea flowline approximately 6km in length will be connected via a subsea hot tap into the existing gas export pipeline and a controls umbilical approximately 6.5 km in length to the Barracouta platform will also be installed. - As the project develops, additional consultation with stakeholders will be conducted. - We’re also planning on undertaking repair and maintenance works on our Cobia pipeline, which will start soon on 20 December 2018. The pipeline is 5.5 kilometres long and runs between our Cobia and Halibut platforms. - The dive support vessel, the Seven Eagle, will be supported by the Bhagwan Dryden and the	No objections, claims or issues raised

repair between Cobia and Halibut is expected to take 10-14 days.
- The Seven Eagle collected the 5.5km flexible pipeline in Denmark in late October and has just left Singapore after taking on supplies and Australian crew.
- Whilst the majority of the work will take place within the Cobia and Halibut petroleum safety zones a notice to mariners will be issued.
- We're also updating the current environment plans for our offshore plans, which we conduct 5-yearly, and will consult with relevant stakeholders on ongoing and new risks. We've heard your feedback around multiple consultations and I'm pleased to say we've been able to work with the regulator to consolidate our 9 Environment Plans into 1 for our existing operations.
- As you can see we have a busy schedule of work ahead of us and are pleased to continue investing in our operations, bringing new domestic gas supplies to market and creating jobs. 2019 also marks a milestone year for our Bass Strait operations, with the 50th year of production from our Gippsland Basin Joint Venture with BHP.
- It's amazing to think that back in 1969 when hydrocarbons were first produced, that we'd still be here today 50 years later, powering the local economy.

Stakeholders in attendance:
[redacted] – Discussed Esso projects including Cobia PRP and timing of the activity this year. No environmental concerns or issues raised relating to EAPL projects or operations. Industry has been busy with a lot of consultation and they are concerned about the extent of the proposed CGG seismic campaign. Enquired as to whether there had been any change in fishing activities and areas in Bass Strait – only change has been the development of an octopus fishery. One boat is doing this and [redacted] are processing the catch. Octopus fishing involves the use of traps laid on the sea floor that are then retrieved.

Water Police – offshore recreational fishing has grown significantly in recent years with the development of the sword fish fishery. This is a long way offshore (beyond phone range) and has attracted up to 20 vessels at times. No environmental concerns or issues raised with EAPL operations or projects.

Lakes Entrance Senior citizens Centre and Lakes Entrance Neighborhood House representatives – provided a brief overview of our operations and projects and the various regulatory requirements (environment plan, safety case, licences) – no environmental concerns or issues raised with EAPL operations or projects.

Attendees of the COXINS training course – quick discussion on long term opportunities for employment within the oil and gas business in Bass Strait no environmental issues raised.

Di Lilburn (Federal MPs office) – quick discussion about projects in the next 12+ months and the level of activity associated with maintaining gas production and supply to Victoria – no environmental concerns

[redacted] - [redacted] (Regional Manager Gippsland) was also in attendance

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
10	**2618**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
82	**2571**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
82	**3015**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
79	**2573**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
79	**3017**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
13	**2616**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
13	**3016**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
14	**2615**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
15	**2614**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
15	**2283**	05-Dec-18	Offshore Community Session: summary of [redacted] (EAPL) talking points & stakeholder consultation as noted by [redacted] (EAPL): [redacted] spoke to the whole group about Esso's current and planned activities in Bass Strait in the next 12 months. Topics for discussion included the G&G survey work completed in 2018, the location and timing of survey work to be completed in 2019, and the scope of the BTW project. Other topics included: MILESTONES: - Over the last 24 months, our Gippsland operations have been able to meet unprecedented east coast gas demand by increasing our production well above our historical levels. - But as the major fields in Bass Strait reach the end of their natural lives, we need to find new sources of gas. - In August, we commenced our first deep-water exploration drilling program in over 20 years, by drilling two new wells, Baldfish and Hairtail at a block known as VIC/P70, south east of our existing fields. - While the $120m drilling campaign was completed safely and without incident by the drill rig Ocean Monarch in November, unfortunately, we didn't encounter commercial quantities of hydrocarbons. - Prior to drilling we also competed our Environment Plan, which included stakeholder consultation. We're keen to listen to your opinions on how that went and how we can keep improving our operations. - Despite not finding commercial gas at our first attempt in over 20 years, we are actively pursuing new gas development opportunities in Bass Strait so that we can meet the demand for gas. - We are going to keep trying to find new sources of gas. To do this, we have had our best engineering and science minds working on options for new gas developments to bring online much needed new gas supplies from Bass Strait fields. - We've already spent money reprocessing our historic seismic data across the Bass Strait and will consider purchasing new seismic data, should it be acquired. This will help our geoscience team better identify opportunities for new gas supplies that will keep Victorians warm in winter and cooking with gas. PLANNED OFFSHORE ACTIVITIES - Following the completion of our exploration drilling at Baldfish and Hairtail, Esso is planning to utilise the Ocean Monarch rig to undertake well abandonment work for the Blackback field and look to undertake possible further exploration drilling in VIC/P70 sometime in 2019. - We are also planning to develop a gas field in the VIC/L1 block, known as West Barracouta, approximately 6km south west of the existing Barracouta platform. - The proposed West Barracouta development will involve the drilling of two subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. - A subsea flowline approximately 6km in length will be connected via a subsea hot tap into the existing gas export pipeline and a controls umbilical approximately 6.5 km in length to the Barracouta platform will also be installed. - As the project develops, additional consultation with stakeholders will be conducted. - We're also planning on undertaking repair and maintenance works on our Cobia pipeline, which will start soon on 20 December 2018. The pipeline is 5.5 kilometres long and runs between our Cobia and Halibut platforms. - The dive support vessel, the Seven Eagle, will be supported by the Bhagwan Dryden and the	No objections, claims or issues raised

repair between Cobia and Halibut is expected to take 10-14 days.
- The Seven Eagle collected the 5.5km flexible pipeline in Denmark in late October and has just left Singapore after taking on supplies and Australian crew.
- Whilst the majority of the work will take place within the Cobia and Halibut petroleum safety zones a notice to mariners will be issued.
- We're also updating the current environment plans for our offshore plans, which we conduct 5-yearly, and will consult with relevant stakeholders on ongoing and new risks. We've heard your feedback around multiple consultations and I'm pleased to say we've been able to work with the regulator to consolidate our 9 Environment Plans into 1 for our existing operations.
- As you can see we have a busy schedule of work ahead of us and are pleased to continue investing in our operations, bringing new domestic gas supplies to market and creating jobs. 2019 also marks a milestone year for our Bass Strait operations, with the 50th year of production from our Gippsland Basin Joint Venture with BHP.
- It's amazing to think that back in 1969 when hydrocarbons were first produced, that we'd still be here today 50 years later, powering the local economy.

Stakeholders in attendance:
[redacted] – Discussed Esso projects including Cobia PRP and timing of the activity this year. No environmental concerns or issues raised relating to EAPL projects or operations. Industry has been busy with a lot of consultation and they are concerned about the extent of the proposed CGG seismic campaign. Enquired as to whether there had been any change in fishing activities and areas in Bass Strait – only change has been the development of an octopus fishery. One boat is doing this and [redacted] are processing the catch. Octopus fishing involves the use of traps laid on the sea floor that are then retrieved.

Water Police – offshore recreational fishing has grown significantly in recent years with the development of the sword fish fishery. This is a long way offshore (beyond phone range) and has attracted up to 20 vessels at times. No environmental concerns or issues raised with EAPL operations or projects.

Lakes Entrance Senior citizens Centre and Lakes Entrance Neighborhood House representatives – provided a brief overview of our operations and projects and the various regulatory requirements (environment plan, safety case, licences) – no environmental concerns or issues raised with EAPL operations or projects.

Attendees of the COXINS training course – quick discussion on long term opportunities for employment within the oil and gas business in Bass Strait no environmental issues raised.

Di Lilburn (Federal MPs office) – quick discussion about projects in the next 12+ months and the level of activity associated with maintaining gas production and supply to Victoria – no environmental concerns

[redacted] - [redacted] (Regional Manager Gippsland) was also in attendance

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
15	**3018**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**169**	01-Nov-17	[redacted] (EAPL) spoke with [redacted] re the various Esso projects that are planned for the next 12 months – Baldfish Exploration drilling, Cobia pipeline repair and the West Barracouta development. [redacted] had received the flyer and the invite. [redacted] deferred the impact / interaction with fishers to [redacted] ([redacted]) and would welcome a joint meeting with [redacted] - mentioned that the 17th November would be good after the larger stakeholder meeting planned.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**314**	17-Nov-17	[redacted] attended the Lakes Entrance community session. The various projects were discussed with [redacted] and what impact there could be on the local fishermen. Cobia PRP will have virtually no impact, campaign is only a couple of weeks toward the end of the year and after the FIS survey. West Barracouta project is only at an early stage and the current campaign is only examining suitable locations for a rig and providing data for future project steps – further consultation will be undertaken as the project progresses. Baldfish drilling campaign may be the closest to the FIS locations, estimated about 20 min away but we are after the actual FIS coordinates to calculate the exact separation distances. The Baldfish drilling campaign is unlikely to have any impact on the FIS locations the level of noise and discharges is unlikely to be significant and may be hard to differentiate from the passing marine traffic. Explained [redacted] had been asked for details of the FIS locations and [redacted] said he would discuss with [redacted] next time when they met. [redacted] and [redacted] see each other regularly. No major concerns raised.	ISSUE: Potential issue with proximity of Baldfish to FIS survey location. Merits and issue to be further reviewed. No objections, claims or issues raised for West Barracouta or Cobia. MERIT: Yes and the issue has been reviewed further. The FIS locations are a sufficient distance from Baldfish and this was discussed with [redacted] & [redacted] in meeting 15/2/18. The well sites are 11 nm from the FIS locations and are also separated by the shipping lane. The additional noise levels from drilling are not expected to have any significant impact on fish densities. Esso and [redacted] will continue to liase to determin if supply vessel routing should be adjusted during the actual FIS timing.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**1163**	14-Dec-17	[redacted] (EAPL) sent email to [redacted] looking to confirm the location of the nearest FIS locations to next years drilling campaign, as discussed at the Lakes Entrance meeting in November.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**1462**	23-Jan-18	Email sent to [redacted] and [redacted] from [redacted]: Here is our review of the distance to the nearest FIS Locations from the Baldfish drilling and Cobia pipeline repair projects. The Cobia repair (between Halibut, HLA and Cobia CBA) is very unlikely to take place earlier than Dec this year so there will be no impact. (SEE ATTACHMENT) The Baldfish drilling campaign is still scheduled for early Q3. The Baldfish well is between 12 and 16 NM from the FIS location and Hairtail is between 11 and 15 NM. Both the wells are the other side of a shipping lane, so any noise impacts are likely to be low in comparison to the impact from passing vessels. Many thanks for the information on the SMS service, we will be looking to use it to advise fishermen of our activities and to minimise any impact. In the mean time I will keep you updated on the campaign and will look to arrange a meeting with you and [redacted] in the next couple of months.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**1475**	09-Feb-18	Email sent from [redacted] (EAPL) to [redacted] & [redacted]: Hi [redacted], [redacted], I'm in Lakes Entrance next Thursday 15th Feb, would be happy to pop in and give you an update on our planned activities on either the Thursday afternoon or Friday morning. Let me know if this is of interest. Response from [redacted] ([redacted]): Thursday works for me Email from [redacted] (EAPL) to [redacted] ([redacted]) and ([redacted]): What time Thursday afternoon suits you - would 4pm at the [redacted] offices work? If there is anything specific you want to know about please let me know or I can give you a general update and we can discuss things as they come up.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**2613**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**2936**	18-Feb-19	Meeting minutes from the [redacted] 5 yearly EP update: Esso iscurrently conducting a 5 yearly review of our existing Environment Plans for platforms operating in Bass Strait. The revised plans will be submitted to the regulator (NOPSEMA) in September 2019. In developing the Environment Plans, Esso will conduct an environmental risk assessment to evaluate environmental risks associated with our ongoing operations, and will incorporate prevention and mitigation measures that reduce these risks to As Low as Reasonably Practicable (ALARP) and acceptable levels. Esso undertakes regular and continuing consultation with our stakeholders regarding impacts and risks to the environment from our operations and the control measures in place to prevent or mitigate these impacts and risks. Your feedback is sought and welcomed regarding any of our activities in Bass Strait. Blackback Update: Esso is undertaking a project to secure the Blackback wells using the Ocean Monarch MODU. The program started in February 2019 and will last approximately 90 days. (Well coordinates: Latitude 38° 32' south, Longitude 148° 33' east). BTW / Kipper Update: A geotechnical survey will be completed at a number of locations in Bass Strait including the BTW proposed well locations, Seahorse, Tarwhine and Kipper subsea facilities. The vessel to be used and timing are still being negotiated, but will be communicated to our stakeholders as soon as possible. Earliest start date will be April and latest start date will be July this year. The geotechnical campaign will take approximately 10 days. An ROV vessel will be contracted to complete inspection activities on the BTA450 approximately 400m from BTA (ie within the PSZ) at the proposed BTW hot tap location. The inspection activities will commence at the earliest mid-May for a duration of less than 10 days. Drilling EP preparation has commenced for BTW and KPA. Further details about the environmental impacts and risks from the drilling activity will be communicated separately. The earliest start date for drilling of BTW is January 2020. A ROV vessel will be conducting early inspection works at the KPA subsea facilities at the earliest June for a duration of 2 weeks. Another vessel will be contracted to continue the remaining geophysical survey in accordance with the Gippsland Basin Geophysical and Geotechnical Investigations EP. Esso will advise [redacted] the start dates once confirmed. Cobia PRP Update: The Subsea 7 "Seven Eagle" Dive Support Vessel safely and successfully replaced the Cobia-to-Halibut 300mm diameter oil export pipeline with a new 150mm flexible pipeline.	No objections, claims or issues raised

The offshore installation work started on Christmas Eve and lasted about 10 days. It took 20,000 work hours involving saturation divers and ROV activities to lay approximately 5.5 kilometres of flexible pipeline and tie it in to the Cobia and Halibut platforms.

The work was completed with zero safety or environmental incidents.

Teams are preparing Cobia’s facilities to return to production after about four years offline and Halibut platform is being prepared to receive oil-flow from Cobia. This preparation work includes pressure vessel inspections and repairs, piping inspections and replacements, valve checks and overhauls, instrumentation and electrical system works.

Compressor and pump machinery will be reinstated, plugs removed from the wells with a wireline campaign and then finally commissioning and starting-up the facilities.

Mackerel Platform: Mackerel platform has reached the end of its producing life. The wells will be secured in 2019. Navigation lights and corrosion protection for the structure will be maintained until the decommissioning plan is approved and executed.

Sculpin-1: Esso is planning to drill the Sculpin-1 exploration well in block Vic P/70, about 90 km offshore in 2,300 m water depth. The target is a potential gas reservoir (with limited condensate)

Drilling is scheduled to commence as early as June, 2019, utilising the Ocean Monarch MODU. The offshore activities are expected to take about 2 months.

Seahorse / Tarwhine: Esso is reviewing options to secure the Seahorse and Tarwhine wells using a jack-up drilling rig in 2020

Perch / Dolphin / Whiting: Esso is reviewing options to secure the Perch, Dolphin and Whiting wells using a jack-up drilling rig in 2020/21

50 years in Bass Strait: This year we will be celebrating two key milestones for our business – the 50th anniversary of first production from our Gippsland operations and the 70th anniversary of the opening of our Altona Refinery.

These milestones will be celebrated with community sessions later in the year.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**2999**	06-May-19	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): Spoke with [redacted] at [redacted] this morning. Discussion was around arranging a meeting to discuss consultation and how we could better achieve this as well as providing an update on current projects and EP submissions. Told him we had been in discussion with [redacted] and that [redacted] was suggesting some time May 20-May22 and that this could be in Melbourne, Lakes or somewhere in between. [redacted] was keen to be involved and asked for an email with the possible dates – Note it could suit him to have another reason to come up to Melbourne. I also said we had been trying to get hold of [redacted] at [redacted] but hadn't had any luck. [redacted] indicated that [redacted] was very busy at the moment but said that he would print out the email and walk it around to [redacted] to see if the proposed dates would also work for [redacted].	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**3000**	14-May-19	Meeting request sent from [redacted] (EAPL) to [redacted] ([redacted]).	No response received.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**3001**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
17	**3043**	21-May-19	9:00am – 10:00am Tuesday 21st May 2019 [redacted] Boardroom – [redacted] ATTENDEES [redacted]: [redacted] [redacted]: [redacted] EAPL: [redacted], [redacted], [redacted] Pr[redacted]t and [redacted] [redacted] opened the meeting with discussion around the increased workload from the Oil and Gas industry to [redacted] / [redacted] and his reluctance to offer any support until a formal payment structure is in place for his services. This is strongly supported by [redacted] and [redacted], who also rely upon [redacted] and his extensive knowledge and relationships within the Gippsland Fishing community. The proposed solution offered by [redacted], [redacted] and [redacted] is for EAPL to fund a contractor to liaise between them and EAPL on stakeholder consultation, egg sending out SMS regarding EAPL activities in Bass Strait to relevant stakeholders and attending quarterly meetings with EAPL and then consulting with relevant stakeholders, as well as pre and post meeting work. [redacted] estimated approximately $[redacted] a year for a consultant to fulfil this type of role. There was also a suggestion that a formal agreement could be made through APPEA for all interested Oil and Gas companies to fund such a role. EAPL have committed to reviewing options and will submit a proposal in the next fortnight. It was also noted that the fishing community would benefit from receiving EAPL activities plotted on nautical charts rather than Bass Strait maps. [redacted] (EAPL) and [redacted] (EAPL) will action this request in the coming month. [redacted] (EAPL) and [redacted] Pr[redacted]t (EAPL) then talked through a presentation on the upcoming Esso projects (see attached). These consist of West Barracouta and Kipper projects (including the Geotechnical & Geophysical campaign), potential plugging and abandonment at Blackback, Seahorse, Tarwhine, Whiting, Perch and Dolphin and drilling at Sculpin, East Pilchard, Wirrah & Sweetlips. Key items of discussion were; That there was only one new petroleum safety zone at West Barracouta and it was noted that this was not new and had been discussed previously. Esso's design had progressed and the arrangements within the PSZ were now available for discussion. These are two West Barracouta wells with a snag resistant design, a pipeline end manifold and umbilical termination structure, both also designed to be snag resistant and that the electrical and hydraulic flying leads would be protected with concrete matts. These would all be located well within the 500m PSZ that must be avoided, no concerns were raised with this approach. The pipeline to Barracouta will be snag resistant and has been designed to be overfished, the umbilical will be trenched to minimise potential damage. Work at Kipper was wholly within the existing petroleum safety zone. Work at Seahorse, Tarwhine, Perch and Dolphin would also be within PSZs and that decommissioning options and potential removal of their PSZs was being considered. The Geotechnical & Geophysical EP has been revised to cover potential advance work at these locations to confirm the sea bed is suitable for a jack-up rig.	

Drilling at Wirrah, Sweetlips, and East Pilchard would require temporary PSZs and if commercial hydrocarbons are discovered then development plans would follow and further consultation would take place. Drilling at Sculpin is expected to start Q3/Q4 this year this is very deep water (2400m) and there is no known commercial fishing effort at this depth.

[redacted] and [redacted] raised no concerns with any of this. As already discussed the level of consultation is significant and a commercial arrangement should be examined to help ensure appropriate consultation is conducted and that certain industry figures are not overloaded with work that they are not there to conduct. The proposed CGG campaign has caused p[redacted]lems and whilst consultation with EAPL has always been good, the industry as a whole has been damaged by the actions of the CGG campaign. Questions were asked and answered about EAPL involvement with CGG this included that the CGG is entirely separate from EAPL, however given its scope of work EAPL would be interested in the results of the CGG to better understand Bass Strait and to better ID areas that could contain commercial hydrocarbons. Drilling is very expensive and as evident from the recent Baldfish / Hairtail campaign is not always successful.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
18	**2612**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
18	**3019**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
109	**2557**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
42	**2124**	29-Sep-18	Email received from [redacted] (Ocean Monarch): Please see revised arrival notice for Hairtail-1. 01:41hrs 29th September .	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
42	**2594**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
42	**3020**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
93	**2564**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
85	**2568**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
85	**3021**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
58	**2584**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
58	**3022**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
25	**2608**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
123	**2549**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
123	**3027**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
64	**2580**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
64	**3029**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
27	**2118**	23-Aug-18	[redacted] Discussion – focusing on Offshore Operations 23rd of August 2018. Attendees [redacted] Stakeholder newsletter [redacted] presented a copy of the Offshore Stakeholder Newsletter and an update on upcoming offshore activities. The Baldfish drilling program is kicking off next week in the VIC P70 license, 70 k offshore. The regulatory plans are approved by NOPSEMA. The activity is on the edge of the shipping lane and [redacted] has been engaged. There will be standby vessel on location during the program. The rig will then proceed to conduct P&A program at Blackback. Marine pollution response plans mirror Baldfish plans. We have one OPEP for base business and now specific EP and OPEP for projects including the Cobia pipeline replacement. In the next couple of years we have a number of plans we will be working on and will develop a new OPEP/OSMP to cover all activities. The OPEP/OSMP planned to be completed by year end will cover all our future operations over the next 5 years. Are there any pollution risks for P&A program? – Vessel collision, blow out scenario were modeled. The release were considerably smaller due to the end of life of the field. There was no predicted shoreline impact or state waters. Supply vessel is operating from Corner Inlet, and has two anchor handlers operating out of Port of Melbourne on location. Will the subsea equipment (Blackback) be removed – Not as this stage this will be evaluated to determine future actions. The subsea trees and well heads will be removed. Stakeholder engagement with fisheries has been completed. Cobia pipeline replacement. We suspended operations a few years ago and we are planning on repairing the Cobia pipeline. Timing is December 2018. A vessel is coming in from North Sea and will bring a flexible pipeline. Short operation (2 weeks) and will be at Cobia and Halibut locations. The operations include cutting and fitting adapter to the old pipeline. 5 ½ kilometers of pipeline is required to be repaired. The pipeline is only between platforms. The pipeline currently is filled with inhibited water. The vessel will come into Hastings and has met all regulatory requirements. Management arrangements regarding biofouling and ballast were discussed. Next year platform based Plug and Abandonment of well will commence.	No objections, claims or issues raised

Kipper drilling programs is planned for later next year. The revised OPEP will also cover these activities.
Reviews of response capabilities will be reviewed at this stage as the locations are closer to shore.
Increased supply vessel operations may occur in the future due to these projects.

PFW study has been conducted to understand the longer term impacts into the environment.

Preparing the revised EP and associated OPEP/OSMP and is required to be submitted in the second half of 2019. Likely to engage [redacted] or OSRL to write the OPEP. Engagement of stakeholder will be included in the process.

[redacted] are looking to align on the work we are doing in relation to Tactical Response Plans.
Do they form part of the OPEP? They will be an appendix. The draft TRP were provided to the state for their use. [redacted] are very interested.

Development of one regional OSMP. This has been looked at in WA. The participation has dropped away, however we will have further discussion with [redacted] to look at opportunities to collaborate. More sharing is occurring between title holders.

Esso meet with [redacted] ([redacted]) and [redacted] ([redacted]) earlier this year to discuss oiled wildlife response (now referred to as wildlife impacted by marine pollution) arrangements. Esso has a commitment to test the arrangements in our plan this year where NOPSEMA have indicated they would like Esso to explore access to resources detailed. [redacted] are interested to be involved in some way. We would like to discuss conducting a test to be mutual benefit. OWR arrangements are also being tested nationally through [redacted], including access to trained industry personnel and vets. Something to consider in testing arrangements is what would the incident management look like?

Maritime Emergency sub plans have been finalized and can be found on the Vic Emergency Response Website. The Victorian wildlife plan is still in draft. [redacted] is the best person to talk to when he returns from leave.
[redacted] provided an update on the new structure of the State Maritime Emergency Working Group and the proposed sub groups.
Interest in conducting an exercise at Gellibrand from Mobil Altona Refinery SHE Manger. Still need to discuss with the port authority.
[redacted] discussed the recent sheen offshore near golden beach. There was confusion with regards to the regulatory notification as [redacted] had heard from NOPSEMA. [redacted] queried if there was any follow up from Esso with regards to the sheen. Esso not aware of any follow up

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
27	**2606**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
27	**3028**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
29	**2604**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
30	**2603**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
28	**2605**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
115	**2554**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
84	**2569**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
62	**1611**	24-Apr-18	Email sent from [redacted] (EAPL) to Shanyne [redacted] ([redacted]): Esso are planning a couple of exploration wells in Bass Strait, called Baldfish and Hairtail. These wells are located about 90km offshore and are expected to be gas wells with some associated condensate. The attached flyer provides a map showing the location and co-ordinates of the two wells. As part of our Environment Plan development we have had oil spill modelling conducted based on a worst case blowout and a diesel spill. [redacted] In the very unlikely event of a blowout Esso will implement an OPEP and will notify state departments as appropriate. Where oil is predicted to impact state waters we will look to have a state liaison representative involved with the Esso OSRT to ensure any required state response is informed and any actions are appropriately aligned. We would be happy to discuss the project, the oil spill modelling and how we can best interface with any other state requirements further so please send me an email or give me a call.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
62	**1599**	26-Apr-18	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): he is still the correct person to talk to and consult with. He is currently out of the office and will be back on the 30th April. He has received the email and will be in Melbourne in the next couple of weeks. Plan will be to catch up then and discuss Esso operations in general and Baldfish drilling campaign in further detail.	ISSUE: Schedule meeting with [redacted] ([redacted]) MERIT: A meeting between EAPL base business, EAPL projects and [redacted] has value and should be planned the next time that [redacted] is in Melbourne. CLOSED: this is ongoing, Esso are continuing to consult with [redacted] ([redacted]) (lastly on Sculpin 24th Jan) and will continue to do so, when and if a meeting is convenient it will take place. There is currently nothing urgent that requires a meeting to occur.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
62	**2582**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
62	**2927**	24-Jan-19	Email sent from [redacted] [redacted] EAPL) to [redacted]: As you may be aware Esso completed the Baldfish exploration drilling campaign last year and we are now looking at drilling another prospect in the same licence block (VIC/P70), that will be called Sculpin-1 well. Sculpin-1 is on the edge of the continental shelf in Bass Strait and in deep water. We have completed oil spill modelling for the well and would be happy to discuss the results and other issues associated with the campaign, that will be detailed within a revision to the Baldfish (VIC/P70) Environment Plan we are preparing for NOPSEMA. Below is a brief summary of the oil spill results. The Sculpin prospect is a gas reservoir with associated condensate. [redacted] We would be happy to present additional information and discuss the Environment Plan and associated Oil Pollution Emergency Plan arrangements in further detail if you would like. Not that the OPEP and response arrangements will be similar and consistent with the Baldfish OPEP and the current Base business arrangements for the rest of our Bass Strait facilities.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
62	**3030**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
57	**2585**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
33	**2601**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
33	**3034**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
33	**3042**	21-May-19	9:00am – 10:00am Tuesday 21st May 2019 [redacted] – [redacted] ATTENDEES [redacted]: [redacted] [redacted]: [redacted] EAPL: [redacted], [redacted], [redacted] Pr[redacted]t and [redacted] [redacted] opened the meeting with discussion around the increased workload from the Oil and Gas industry to [redacted] / [redacted] and his reluctance to offer any support until a formal payment structure is in place for his services. This is strongly supported by [redacted] and [redacted], who also rely upon [redacted] and his extensive knowledge and relationships within the Gippsland Fishing community. The proposed solution offered by [redacted], [redacted] and [redacted] is for EAPL to fund a contractor to liaise between them and EAPL on stakeholder consultation, egg sending out SMS regarding EAPL activities in Bass Strait to relevant stakeholders and attending quarterly meetings with EAPL and then consulting with relevant stakeholders, as well as pre and post meeting work. [redacted] estimated approximately $[redacted] a year for a consultant to fulfil this type of role. There was also a suggestion that a formal agreement could be made through APPEA for all interested Oil and Gas companies to fund such a role. EAPL have committed to reviewing options and will submit a proposal in the next fortnight. It was also noted that the fishing community would benefit from receiving EAPL activities plotted on nautical charts rather than Bass Strait maps. [redacted] (EAPL) and [redacted] (EAPL) will action this request in the coming month. [redacted] (EAPL) and [redacted] Pr[redacted]t (EAPL) then talked through a presentation on the upcoming Esso projects (see attached). These consist of West Barracouta and Kipper projects (including the Geotechnical & Geophysical campaign), potential plugging and abandonment at Blackback, Seahorse, Tarwhine, Whiting, Perch and Dolphin and drilling at Sculpin, East Pilchard, Wirrah & Sweetlips. Key items of discussion were; That there was only one new petroleum safety zone at West Barracouta and it was noted that this was not new and had been discussed previously. Esso's design had progressed and the arrangements within the PSZ were now available for discussion. These are two West Barracouta wells with a snag resistant design, a pipeline end manifold and umbilical termination structure, both also designed to be snag resistant and that the electrical and hydraulic flying leads would be protected with concrete matts. These would all be located well within the 500m PSZ that must be avoided, no concerns were raised with this approach. The pipeline to Barracouta will be snag resistant and has been designed to be overfished, the umbilical will be trenched to minimise potential damage. Work at Kipper was wholly within the existing petroleum safety zone. Work at Seahorse, Tarwhine, Perch and Dolphin would also be within PSZs and that decommissioning options and potential removal of their PSZs was being considered. The Geotechnical & Geophysical EP has been revised to cover potential advance work at these locations to confirm the sea bed is suitable for a jack-up rig.	

			Drilling at Wirrah, Sweetlips, and East Pilchard would require temporary PSZs and if commercial hydrocarbons are discovered then development plans would follow and further consultation would take place. Drilling at Sculpin is expected to start Q3/Q4 this year this is very deep water (2400m) and there is no known commercial fishing effort at this depth. [redacted] and [redacted] raised no concerns with any of this. As already discussed the level of consultation is significant and a commercial arrangement should be examined to help ensure appropriate consultation is conducted and that certain industry figures are not overloaded with work that they are not there to conduct. The proposed CGG campaign has caused p[redacted]lems and whilst consultation with EAPL has always been good, the industry as a whole has been damaged by the actions of the CGG campaign. Questions were asked and answered about EAPL involvement with CGG this included that the CGG is entirely separate from EAPL, however given its scope of work EAPL would be interested in the results of the CGG to better understand Bass Strait and to better ID areas that could contain commercial hydrocarbons. Drilling is very expensive and as evident from the recent Baldfish / Hairtail campaign is not always successful.	

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
23	**2610**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
24	**2609**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
24	**3032**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**215**	01-Nov-17	[redacted] (EAPL) phoned [redacted] at 11 am, [redacted] busy, [redacted] text message asking if he could call later and was after an opportunity to discuss the projects Esso are planning and would like to discuss how best to manage any potential interactions.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**216**	03-Nov-17	Phone call between [redacted] (EAPL) and [redacted] to discuss the various projects that Esso have planned in the next 12 months. Fact Sheet also emailed to [redacted]. Main issues raised: - amount of consultation - proximity to FIS sites. R [redacted] (EAPL) asked for coordinates of FIS sites to confirm separation distance but from the data we have looks about 20nM @ Baldfish which shouldn't have any impact.	ISSUE #1: Level of consultation MERIT #1: Esso have to consult but will try to coordinate projects to limit the number of requests. [redacted] to provide coordinate of the FIS sites. ISSUE #2: Proximity to FIS sites MERIT #2: Proximity to FIS location tobe determined however from the data we have looks about 20nM @ Baldfish which shouldn't have any impact.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**1164**	14-Dec-17	[redacted] (EAPL) sent email looking to confirm location of nearest FIS locations to next years drilling campaign.	Follow up with [redacted] in 2018 to confirm FIS location

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**1457**	12-Jan-18	Email received from [redacted]: Please find FIS locations attached. [redacted] operates and maintains several SMS lists for commercial fisherman across three regions. You are interested in the eastern region. Here are a couple of examples (one from today) of the sort of SMS we send. The aim is to minimise the affects of oil/gas works on the fishing industry. [redacted] charges per SMS, the cost allows us to maintain software that sends group SMSs and to maintain the list, the maintenance is a lot of work. There are about 90 contacts on the eastern list. The list covers all sectors, State and C'wealth not just trawl. I suggest we need to meet and would like to do this in Lakes Entrance. This campaign will take some planning to minimise effects on the fishing industry.	ISSUE 1: Proximity to FIS locations. MERIT 1: Not relevant to G&G campaign due to survey timing prior to FIS and distance from FIS locations. Not relevant for CBA due to timing. Needs to be reviewed further for Baldfish. ISSUE 2: Consultation with fishers via SMS. MERIT 2: Yes - EAPL agree consultation important.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**1461**	23-Jan-18	Email sent to [redacted] and [redacted] from [redacted]: Here is our review of the distance to the nearest FIS Locations from the Baldfish drilling and Cobia pipeline repair projects. The Cobia repair (between Halibut, HLA and Cobia CBA) is very unlikely to take place earlier than Dec this year so there will be no impact. (SEE ATTACHMENT) The Baldfish drilling campaign is still scheduled for early Q3. The Baldfish well is between 12 and 16 NM from the FIS location and Hairtail is between 11 and 15 NM. Both the wells are the other side of a shipping lane, so any noise impacts are likely to be low in comparison to the impact from passing vessels. Many thanks for the information on the SMS service, we will be looking to use it to advise fishermen of our activities and to minimise any impact. In the mean time I will keep you updated on the campaign and will look to arrange a meeting with you and [redacted] in the next couple of months.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**1476**	09-Feb-18	Email sent from [redacted] (EAPL) to [redacted] & [redacted]: Hi [redacted], [redacted], I'm in Lakes Entrance next Thursday 15th Feb, would be happy to pop in and give you an update on our planned activities on either the Thursday afternoon or Friday morning. Let me know if this is of interest. Response from [redacted] ([redacted]): Thursday works for me Email from [redacted] (EAPL) to [redacted] ([redacted]) and ([redacted]): What time Thursday afternoon suits you - would 4pm at the [redacted] offices work? If there is anything specific you want to know about please let me know or I can give you a general update and we can discuss things as they come up. Response from [redacted] ([redacted]):4pm Thursday good. Pls send a calander invite.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**1573**	15-Feb-18	[redacted] (EAPL) met with [redacted] ([redacted]) and [redacted] ([redacted]) at [redacted] offices in Lakes Entrance on Thursday 15th Feb. Discussed West Barracouta G&G, Baldfish Drilling, Cobia pipeline repair and Kipper/Pilchard campaigns including the type of activity involved and the timing. [redacted] and [redacted] happy to hear that wells at WBT would p[redacted]ably be in the same PSZ. Asked about fishing activity in the area and [redacted] indicated that if we wanted he could investigate the type, nature and scale of fishing in the area subject to a commercial contract. [redacted] also indicated that PSZ may not be as rigorously complied with as he and oil and gas operators have assumed to date. Discussed if there was an opportunity for industry to develop a video explaining what PSZs are for and for this to be provided to fishermen – agreed to discuss this internally within Esso but noted that it should p[redacted]ably be something that APPEA should look into. Action raise issue of an Industry video with APPEA and internally within Esso. [redacted] raised the value of sending an SMS to all fishermen of campaigns and vessel activity in Bass Strait. [redacted] have been providing regular updates on the Sole project and their other assets, it seems to have been well received and as fishermen do not rigorously read navigation warnings and alerts from [redacted] it provides an alternate means of raising awareness of the projects and what is happening where. [redacted] was happy to send an SMS for the G&G campaign on approval from Esso, subsequent SMSs will be entail a small cost. Action to be discussed within Esso, with [redacted] to be given go ahead to send G&G SMS text and an ongoing SMS protocol developed, i.e. SMSs to be sent regularly, month before, day before and on completion of activity. Talked about Baldfish and proximity to the FIS locations. [redacted] agreed that the distance from Baldfish Hairtail p[redacted]ably wouldn't have a significant impact on the FIS location. He indicated that he was a bit annoyed that while Oil and Gas operators had been provided with the FIS locations and dates that they hadn't planned their activities better to avoid any overlap. We talked about schedules and use of rigs of opportunity to minimise mobilisation and demobilisation costs and how these can be significant impediments to scheduling these campaigns around third party requests. [redacted] and [redacted] acknowledged how this would be an issue. The FIS work may not occur this year as there has been little statistically significant results obtained to date with this work, the work is arranged by [redacted]? And is a significant cost that is sourced from the fishing industry that may be better spent / saved. Potential Blackback decommissioning following the Baldfish drilling campaign was also discussed. The temporary fairways recently announced by [redacted] to protect the rig will also provide protection at Blackback. A temporary PSZ will be gazetted at Blackback for this work. Some discussion on whether the fishermen fish in the shipping lanes, thought was that they p[redacted]ably do as its near the drop off. After all the projects add The level of consultation was raised again and [redacted] indicated that he was getting numerous emails and phone calls and that it was taking up a significant amount of his time and that he couldn't and wouldn't always respond. We discussed it was a regulatory requirement and a NOPSEMA expectation that consultation was documented and could be demonstrated hence why [redacted] was being chased for responses. Acknowledged that in some cases it may be frustrating but without being able to provide a response from stakeholders the oil and gas industry had potential difficulty in gaining EP acceptance. A single point of contact within the	Refer to [redacted] consultation records regarding ISSUES / MERITS

oil and gas industry would be good but the mechanisms and arrangements for this to be conducted are not currently available.

Discussed Cobia pipeline repair, still scheduled for December this year with a DSV from Europe. Another candidate for SMS messages.

Discussed Kipper infield drilling and adjacent (Pilchard) development that is being examined. Kipper infield drilling to be contained within existing PSZ, adjacent development may require an additional PSZ will discuss these projects further as they progress. Another candidate for SMS messages and review of fishing intensity.

Given the quantity of work and activities going on [redacted] suggested a monthly phone call to advise progress, changes and the dates of key activities taking place. An invite was sent out for this to occur the last Friday of every month starting the 30th March.

There are a number of issues raised so we'll need to add these and document our response

ISSUE: Development of Video to raise awareness of PSZ and subsea assets – good idea has merits will need to be raised internally within Esso and possibly APPEA

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**1580**	23-Mar-18	First monthly phone call between [redacted] (EAPL) and [redacted] ([redacted]) following meeting in Lakes Entrance Provided an update of what EAPL are doing in Bass Strait – ongoing production and maintenance, supply vessels out of Barry's Beach and small catermeran supporting ROV inspection out of Lakes Entrance. No significant work scheduled in the next month or so. Drilling campaign at Baldfish / Hairtail still scheduled for July. [redacted] are currently installing anchors for it at Sole and following that work Esso will use it at Baldfish, actual dates will firm up over the next few months. Based on above [redacted] saw no need to update the fishing community and we agreed to have another phone call update towards the end of April.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**1601**	27-Apr-18	Spoke with [redacted] today 27th April. Discussed WBT geotechnical work and that the Dryden may be doing some work at WBT in mid May. Told him we were about to send an email regarding the work but wanted to get the date better confirmed. Indicated that the work would be completed in a week or two and that the Dryden would be stationary with reduced mobility for some time. Discussed and agreed that an SMS message nearer the time would be good. Also discussed rig mobilization to Baldfish and I indicated that nothing was likely before mid June and depending on [redacted] activities it may be delayed till August. [redacted] said that [redacted] were very busy and he was talking to them every few days. Agreed to keep in touch and notify [redacted] when the BTW dates are better defined and when Baldfish dates are clearer. Subsequently got the following SMS from [redacted] on [redacted] (see attachment)	ISSUE: provide [redacted] with WBT geotechnical details and dates such that he can send an SMS message to notify fishermen in Bass Strait MERIT: Esso agree and details will be provided for SMS alert once campaign timing is known.

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2001**	20-Jul-18	Phone call between [redacted] [redacted] ([redacted]) and [redacted] [redacted] (EAPL) to discuss EAPL activities. First activity will be Baldfish which will take place following [redacted] campaign at Basker Manta. Early date is p[redacted]ably in August and EAPL will know this better once [redacted] have finished at Sole. The duration of the [redacted] Basker Manta activities are also unknown but EAPL will try and ask for an SMS message to fishermen about 2 weeks before moving to Baldfish. Baldfish EP was accepted a couple of weeks ago by NOPSEMA. Baldfish campaign will last about 60 days. Second activity will be Blackback P&A campaign this will follow Baldfish and EAPL will look to issue an SMS for this too. Blackback is relatively close to Baldfish and on the edge of the continental shelf. A PSZ will be gazetted and as per Baldfish the anchor chains will need to be avoided by fishermen. Blackback may last 2-3 months. Cobia pipeline repair is still scheduled for December and will be the subject of another SMS message in November, a temporary PSZ will be gazette to protect the divers, ROV and vessel when repairing the pipeline as she will have limited maneuverability. Other projects at West Barracouta and Kipper are being planned with some minor work potentially in 2019 and drilling in 2020. [redacted] had no major concerns with these projects and had completed the paperwork to be added to the EAPL system to enable payment for SMS messages to be processed. There are a number of seismic campaigns taking place in and around the south east area and these have potentially a more significant impact on where fishing can take place. [redacted] have been commissioned to undertake fishing assessments within the seismic areas and have issued some of the seismic operators with detailed reports listing the key fishermen and their contact details who work the areas. A lack of this information has led to Eps being rejected. [redacted] has also been sent recent emails on Prelude and Crux and wanted to know what these were for. We discussed that these were from Shell and were for projects on the NW shelf and would have no impact on [redacted] activities.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2004**	31-Jul-18	Email sent from [redacted] [redacted] (EAPL) to [redacted] [redacted] ([redacted]): Hi [redacted], It looks as if [redacted] will not be using the Ocean Monarch at Basker Manta and it will be taken by Esso to drill the VIC/P70 exploration wells. The date currently being discussed is for the move to occur on the 12/13th August. This should firm up this week and I think we can plan for an SMS alert early next week to advise the fishing community. I'll put together a proposed SMS message and email / txt it through.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2101**	31-Jul-18	Email received by [redacted] [redacted] (EAPL) from [redacted] [redacted] ([redacted]): Great. Please send an email.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2102**	07-Aug-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): [redacted], Please find proposed SMS for distribution. Dear Eastern Fishing Fleet, the drill rig Ocean Monarch will relocate to the Esso VIC/P70 licence from Sole on the 15 August 2018. She will be supported by the Far Saracen, Far Senator and Sea Swan, for activities at 38.36 south, 148.35 east and 38.36 south, 148.31 east for approximately 60 days. Both locations have established petroleum safety zones and vessels should avoid these at all times. Esso thanks you for your consideration.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2110**	17-Aug-18	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): Following Simon's email dated 17 August RT rang him on the 17th August to discuss EAPL activities and SMS arrangements. [redacted] had received RT email re the SMS on the 7th August but has had computer and email / SMS issues. The SMS will be slightly reworded and will be sent to advise the fishing fleet of the rigs move to Baldfish and Hairtail. We discussed the drilling campaign at a high level and that it would likely move to Blackback to work on the wells following Baldfish Hairtail in around 60 days. RT and SB agreed to discuss nearer that move and look to send another SMS to the Eastern fleet. [redacted] indicated that [redacted] are now on the EAPL systems and payment for SMSs should be possible. [redacted] has been working on the proposed CGG seismic campaign that is being planned – this will cover the entire south east fishing area that provides fish to Melbourne and Sydney 18000 km2 and spread over 5 months. This will have a significant impact on the fishermen as fish are known to move away from seismic campaigns, there is a 5% mortality of scallops and it impacts rock lobsters and zooplankton. [redacted] didn't know what power seismic source was being proposed. Discussed Cobia PRP and that a vessel will be in the field for 10 days. RT asked what information he would like and described some of the risks in the EP – noise, sewage, impact to the sea bed, minor release of chemicals, the temporary PSZ. He said that he had heard all he needed and that he had no concerns with the CBA project. RT said that our level of consultation was being questioned by NOPSEMA, particularly the level of detail about the impacts and if he had any questions or would like to know anything else to let EAPL know. [redacted] again said that he had enough information on Cobia and that it was insignificant in comparison to the proposed seismic campaign. [redacted] indicated that he was writing a letter to NOPSEMA regarding the seismic campaign and said that the way EAPL dealt with and consulted with the fishing industry was a good example and one that the operators of the CGG seismic campaign should follow.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2126**	11-Oct-18	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Hi [redacted], Please find proposed SMS for distribution. "Dear Eastern Fishing Fleet: Drill rig Ocean Monarch has relocated to the Hairtail-1 well, location 38.37 and 148.31. She continues to be supported by the Far Saracen, Far Senator, Sea Swan and Offshore Guardian. This location has an established petroleum safety zone & a cautionary zone of 2.5NM around the MODU to accommodate the anchor lines and should be observed at all times. Esso thanks you for your consideration. [redacted] (on behalf of Esso)"	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
37	**2129**	15-Oct-18	Email received from [redacted] ([redacted]) to [redacted] (EAPL): This is the best written SMS from and oil and gas company ever! Sent. Next time please can you provide decimal minutes also (assuming that is wasn't just .000). What we need is as follows: 38 37.xxx / 148 31.xx	No objections, claims or issues raised
37	**2130**	15-Oct-18	SMS sent out by [redacted] for rig relocation to Hairtail	No objections, claims or issues raised
37	**2545**	12-Nov-18	Email from [redacted] (EAPL) to [redacted] ([redacted]): The Ocean Monarch has finished at Hairtail-1 and has demobilized. Could you arrange an SMS message advising the Eastern Fishing Fleet, something along the lines of; "The Hairtail-1 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. The associated Petroleum Safety Zone will be revoked. Esso thanks you for your consideration.".	
37	**2599**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**2635**	06-Dec-18	Email from [redacted] ([redacted]) to [redacted] (EAPL): Anything happening in the field that I should tell the fleet about?	Response from [redacted] (EAPL) to [redacted] ([redacted]): Not in the next week. Caught up with [redacted] yesterday in Lakes Entrance at the Esso meeting. In summary Cobia to Halibut pipeline repair scheduled to start around 20th Dec for 10 days – will confirm timing next week so we can issue SMS before and then after. Blackback plug and abandon campaign will be Feb next year and this may be followed up by another drilling campaign in the same block as Baldfish Hairtail – deepwater and beyond the shipping lane. Will keep you informed and we will look to issue SMSs. Some geotechnical surveys to support West Barracouta are planned for mid next year Drilling at West Barracouta and Kipper end next year / beginning 2020. Let me know if you need any extra detail.

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**2998**	29-Apr-19	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Just following up on earlier email – Esso are keen to discuss how we can better consult with the fishing industry and would like to arrange a meeting with yourself and other key parties to work out what this should look like as well as provide an update on our current activities. If you're going to be up in Melbourne in the next month or so that would be good to know or alternatively we can come down to Lakes Entrance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
37	**3031**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
38	**2598**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
38	**3033**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
77	**2574**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
77	**3036**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
39	**2597**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
40	**2596**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
40	**3035**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
41	**2595**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
120	**2552**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
47	**2589**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
124	**2548**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
70	**2578**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
70	**3037**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
101	**2563**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
101	**3038**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
32	**2602**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
51	**2588**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
112	**2555**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
73	**2577**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
52	**2587**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
52	**3023**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
74	**2576**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
90	**2565**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
90	**3024**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
20	**2611**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
20	**3025**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
55	**2586**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised

Stakeholder ID	Coresp_ID	Corresp Date	Summary	Response
55	**3026**	14-May-19	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised

Stakeholder ID	*Coresp_ID*	*Corresp Date*	*Summary*	*Response*
111	**2556**	12-Nov-18	Email sent to all Baldfish Stakeholders: Dear Stakeholder, Please be advised that the Esso Australia VIC/P70 drilling campaign has been completed and that the Ocean Monarch and anchor handling vessels have been demobilized. Esso thanks you for your consideration. Please reply directly to this email if you would like to be taken off our consultation mailing list and/or regular updates mailing list.	No objections, claims or issues raised