Gippsland Offshore Operations Environment Plan

Operations | Gippsland | EP

Document Control

Approvals	Name	Role	Signature	Document Control
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1 Introduction

1.1 Background

Cooper Energy Limited (Cooper Energy) hold 100% interest in several offshore tenements in the Gippsland Basin (Figure 1-1) as well as the Orbost Gas Plant (OGP) onshore near Orbost in East Gippsland, Victoria.

Cooper Energy produces natural gas from subsea wells in the Sole gas field (~65 km offshore from the Victorian coast). The Sole production wells were drilled in 2018 and continue to be operated, monitored, and controlled through the OGP. The production wells are connected to the onshore OGP via a pipeline and associated subsea infrastructure.

Patricia-Baleen (PB) are currently non-producing assets, with wells and associated subsea infrastructure located ~25 km offshore from the Victorian coast.

Other assets in the Gippsland Basin include Basker-Manta-Gummy (BMG) (non-producing) and exploration permits (Figure 1-1).

Cooper Energy's Gippsland operations provide gas to Australia's domestic east coast market.

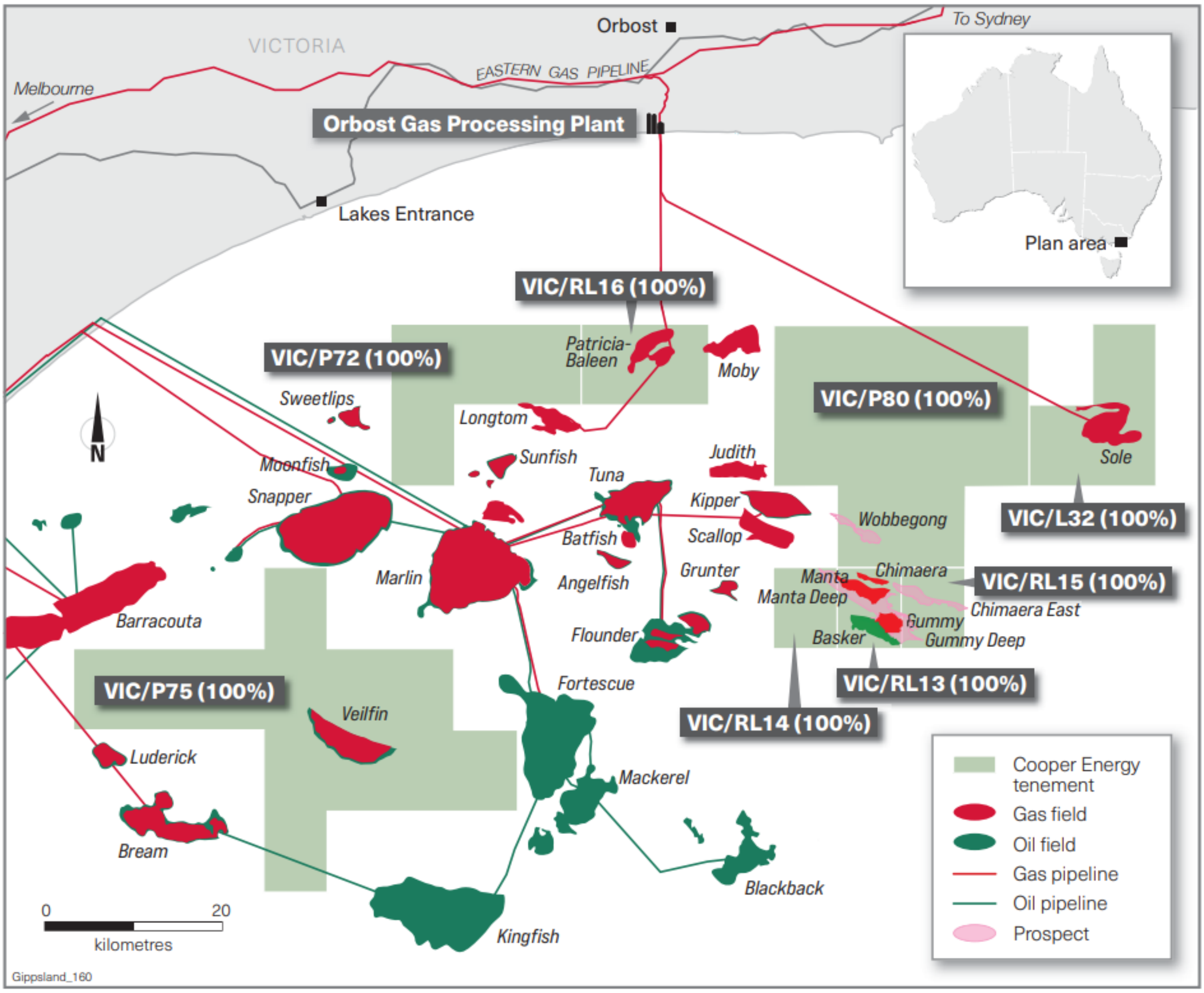


Figure 1-1 Location of Gippsland Offshore Operations Permits

1.2 Environment Plan Summary

This Gippsland Offshore Operations Environmental Plan (EP) Summary has been prepared from material provided in this EP. The summary consists of Table 1-1 as required by Regulation 35(7)[1] of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (OPGGS(E)R) 2023 (Commonwealth [Cth]).

Table 1-1 EP Summary of Material Requirements

EP Summary Material Requirement	Relevant Section of EP Containing EP Summary Material
The location of the activity	Section 3.1
A description of the receiving environment	Section 4
A description of the activity	Section 3
Details of the environmental impacts and risks	Section 6
A summary of the control measure for the activity	Section 8
A summary of the arrangements of ongoing monitoring of the titleholder's environmental performance	Section 9.13
A summary of the response arrangements in the oil pollution emergency plan / environmental emergency response arrangements.	Section 7 and the Offshore Victoria Oil Pollution Emergency Plan (OPEP)
Details of consultation already undertaken and plans for ongoing consultation	Section 10
Details of the titleholders nominated liaison person for the activity	Section 1.5

1.3 Purpose

The Sole and PB gas fields, subsea wells, and associated infrastructure are in Commonwealth waters, with the Sole and PB pipelines and umbilicals traversing both State and Commonwealth waters. This EP has been prepared to meet the requirements of both Victorian and Commonwealth legislation:

- the OPGGS(E)R (Cth), administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)
- the Offshore Petroleum and Greenhouse Gas Storage Regulations (OPGGSR) 2021 Victoria (Vic), administered by the Victorian Department of Energy, Environment and Climate Action (DEECA).

In this EP these regulations are collectively referred to as the Regulations. Refer to Section 2 for full list of relevant legislation and requirements addressed within this EP.

1.4 Scope

This EP relates to the ongoing offshore operations of the PB and Sole gas fields. The petroleum activities in this EP are discussed in Section 3, and include:

- Sole operations (Section 3.6.1)
- PB non-production (Section 3.6.2)
- inspection, maintenance, and repair (IMR, Section 3.6.3)
- support operations (Section 3.6.4).

This EP is submitted as a revision of the Gippsland Offshore Operations EP. It will cover a period of 5 years from the date of acceptance.

Activities out of the scope of this EP are:

- onshore petroleum activities including operation of the OGP

[1] As per the environment plan summary statement form N-04750-FM1848 - A662605 from NOPSEMA, the EP Summary requirements can be met through cross referencing sections of the EP (Table 1-1).

- field abandonment and decommissioning activities for Sole and PB[2]
- maintenance and decommissioning of the BMG infrastructure; the planned phases of decommissioning, and interim maintenance are provided for under two EPs (BMG Closure Project (Phase 1) EP [BMG-DC-EMP-0001] and BMG Closure Project (Phase 2) EP [BMG-DC-EMP-0002])
- exploration activities
- installation activities (other than for the purpose of IMR)
- vessels (including emergency response vessels) transiting to or from the Operational Area; these vessels are deemed to be operating under the *Navigation Act 2012* (Cth) and not performing a petroleum activity
- helicopters transiting to or from the Operational Area; these aircraft are subject to the *Air Navigation Act 1920* (Cth), Civil Aviation Safety Regulations 1998, and the Federal Aviation Regulations and not performing the petroleum activity.

Figure 1-2 and Figure 1-3 show the offshore and onshore activities and associated pipeline licences.

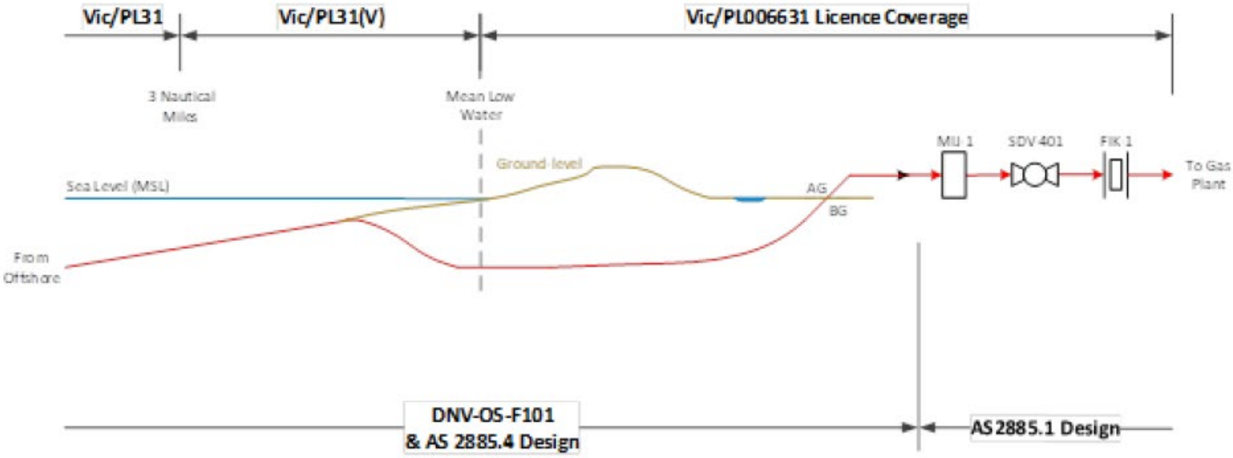


Figure 1-2: PB offshore and onshore activities and associated pipeline licences

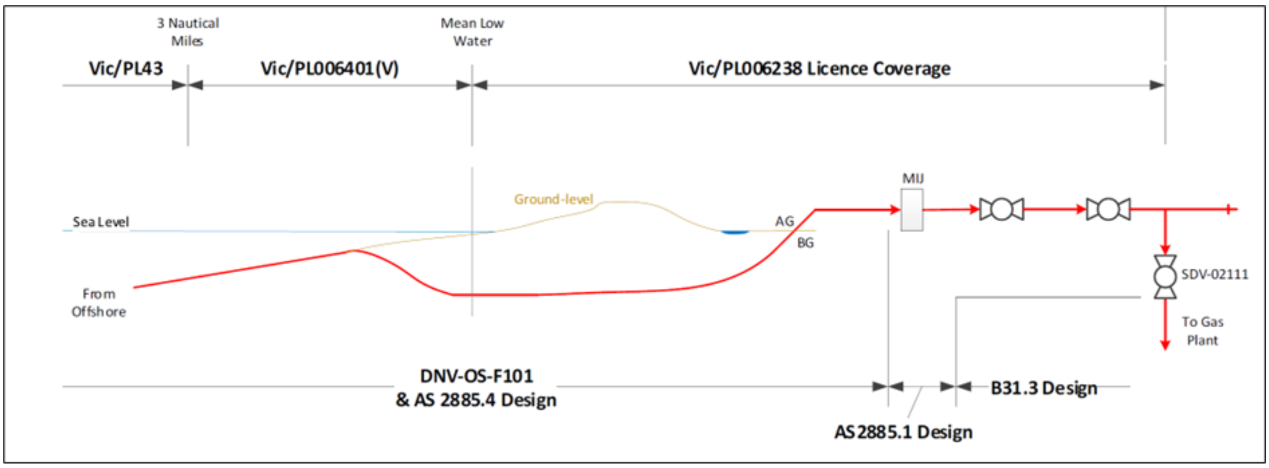


Figure 1-3: Sole offshore and onshore activities and associated pipeline licences

1.5 Titleholder Details

In accordance with the Regulations, Table 1-2 provides the details of titleholders and liaison person for this EP.

[2] Asset decommissioning strategies and planning approaches are described within this EP.

If the titleholder's nominated liaison person or contact details for the nominated liaison person changes, Cooper Energy will notify the relevant regulators in accordance with the Regulations.

Table 1-2 Details of Titleholder and Liaison Person

Titleholder	Titleholder Details	Liaison Person
Name: Cooper Energy (PBF) Pty Ltd **ACN:** 615 354 982 **Lease:** Retention Lease VIC/RL16	**Address:** Level 8, 70 Franklin Street, Adelaide, South Australia 5000 **Telephone Number:** (08) 8100 4900	Chad Wilson Chief Operating Officer Cooper Energy Limited Level 15, 123 St Georges Tce, Brookfield Place Tower 2, Perth, WA, 6000 Phone: (08) 8100 4900 Email: Chad.Wilson@cooperenergy.com.au
Name: Cooper Energy (PB Pipelines) Pty. Ltd. **ACN:** 619 251 482 **Pipeline Licence:** VIC/PL31 and VIC/PL31(V).		
Name: Cooper Energy (Sole) Pty Ltd **ACN:** 86 613 951 429 **Lease:** Production Licence VIC/L32 **Pipeline Licences:** • VIC/PL006401(V) • VIC/PL43.		

2 Requirements

This section provides information on the requirements that apply to the petroleum activity described in this EP, including relevant laws, codes, other approvals and conditions, standards, agreements, treaties, conventions, or practices (in whole or part) that apply to jurisdictions in which the activity takes place.

The proposed petroleum activity is located within Commonwealth and State (Victorian) waters. Planned petroleum activities undertaken in these areas are regulated by Commonwealth legislation, primarily the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) (OPGGS Act (Cth)) and OPGGS(E)R (Cth) and State legislation, the *Offshore Petroleum and Greenhouse Gas Storage Act 2010* (Vic) (OPGGS Act (Vic)) and OPGGSR (Vic).

Table 2-1 details the requirements of the relevant regulations, and the corresponding section of this EP where the requirements are addressed.

The key Commonwealth and State legislative requirements associated with this EP are described below, with additional requirements listed in Appendix 1.

Table 2-1 Requirements of the Regulations

OPGGS(E)R (Cth) 2023	OPGGSR (Vic) 2021	Description	Document Section
21(1)	15(1)	A description of proposed activities.	Section 3
21(2), 21(3)	15(2)	A description of the existing environment including details of the particular relevant values and sensitivities (if any) of that environment that may be affected (EMBA) by the activity. For the OPGGS(E)R 2023, particular relevant values and sensitivity may include those identified in Regulation 21(3), which align with selected matters of national environmental significance (MNES) as defined under Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).	Section 4
21(4)	15(3)(a), 15(3)(b)	An overview of the environment legislation applicable to the proposed activities and a demonstration on how they are met.	Section 2 Appendix 1
21(5), 21(6)	15(3)(c), 15(3)(d), 15(3)(e), 15(4)	An identification and evaluation of environmental impacts and risks of described petroleum activities and details of control measures that will be used to reduce impacts and risks to as low as reasonably practicable (ALARP) and an acceptable level, for both planned activities and unplanned events.	Section 6
21(7)	15(5)	Set the environmental performance outcomes, standards and measurement criteria that apply to both planned activities and unplanned events.	Section 6 Section 8
22(1), 22(7)	16(1), 16(2)	An appropriate implementation strategy including reporting arrangements to the regulator in relation to environmental performance.	Section 9
22(2)	16(3)	A description of the environmental management system and measures to ensure that impacts and risks are continually identified and reduced to ALARP, control measures are effective in reducing impacts and risks to ALARP and acceptable, and that performance outcomes and standards are being met.	Section 9.1
22(3)	16(4)	Details of role and responsibilities of personnel in relation to implementation, management, and review of this EP, including during emergencies or potential emergencies.	Section 9.5
22(4)	16(5)	Details of measures to ensure personnel and contractors are aware of their responsibilities and has the appropriate competencies and training, including during emergencies or potential emergencies.	Section 9.6
22(5)	16(6), 31A	Details of monitoring, recording, auditing, management of non-conformance and review of environmental performance and the implementation strategy.	Section 9.13
22(6)	16(7)	Details of monitoring and maintenance of quantitative records for emissions and discharges.	Section 9.13.1
22(8), 22(9), 22(12), 22(13), 22(14)	N/A	Details of the OPEP, provision for its updating, inclusion of response arrangements for monitoring and responding to oil pollution, and details of testing of the plan.	Section 9.7 OPEP
N/A	17(1), 17(2), 17(3)	An environmental emergency response manual that describes emergency response arrangements, is maintained, kept up to date, and tested	Section 9.7
22(10)	N/A	Details of monitoring of impacts to the environment from oil pollution and response activities	Section 9.7 OSMP

OPGGS(E)R (Cth) 2023	OPGGSR (Vic) 2021	Description	Document Section
22(15), 24(b), 25	16(8), 19(b)	Details of Relevant Persons consultation that has been undertaken prior to, and during preparation of the EP, including all correspondence.	Section 10
23(1), 23(2), 23(3)	18(1), 18(2), 18(3)	Details of the titleholder and an appropriate nominated liaison person, including arrangements for notifying the regulator should this change.	Section 1.5
24(a)	19(a)	Details of the titleholders' environmental policy.	Figure 9-2
24(c), 47, 48, 50	19(c), 29(1), 29(4), 30(1), 31(1)	Details of reportable incidents in relation to the petroleum activity, procedures for reporting and notifying reportable and recordable incidents.	Section 9.12
46	28(a)	Details of titleholder notification requirements at end of an EP.	Section 9.13.2
54	34	Details of titleholder notification for commencement and completion of a petroleum activity	Section 10.7

2.1 Commonwealth Legislation

2.1.1 OPGGS Act and OPGGS(E)R

The OPGGS Act (Cth) addresses all licensing, health, safety, environmental, and royalty considerations for offshore petroleum exploration and development operations extending beyond the 3 nautical mile (nm) limit. The OPGGS(E)R specify the requirements to manage the environmental impacts of petroleum activities. Key to these regulations is the submission of an EP to the regulatory authority (NOPSEMA) for acceptance prior to commencing the proposed petroleum activities.

2.1.2 *Environment Protection and Biodiversity Conservation Act 1999*

The PB Gas Field Development underwent an environmental impact assessment in 2000 and 2001. This assessment was conducted jointly under the *Environment Protection (Impact of Proposals) Act 1974* (Cth) which required the preparation of a Public Environment Report (PER); and the *Environment Effects Act 1978* (Vic), which required the preparation of an Environment Effects Statement (EES). The joint PER/EES received approval from the Minister for Planning on the 30 October 2001, and the PB Gas Field Development commenced operation in April 2003.

The Sole Gas Development was originally referred by Basin Oil in 2003 to the then Department of Environment under the EPBC Act and was deemed by the Minister to not be a controlled action under Section 75 of the Act (EPBC 2003/937). In consultation with the Department of Environment (2015; now Department of Climate Change, Environment, Energy and Water [DCCEEW]), the previous titleholder (Santos) confirmed that no legal mechanisms exist for changing the name of the proponent on that referral, and that if the action is undertaken in a manner that is not inconsistent (i.e. if the action is the same, and previous commitments are implemented) then there was no requirement for re-referral. A review against this referral did not identify any significant changes to the Sole Gas Development or the circumstances of the assessment under the EPBC Act. In accordance with the OPGGS(E)R (Cth), Cooper Energy determined an Offshore Project Proposal for the Sole Gas Development, is not required as the Minister 'has made a decision under Section 75 of the EPBC Act that an action that is equivalent to or includes the project is not a controlled action'.

Since February 2014, NOPSEMA's environmental management authorisation process has been endorsed by the Federal Minister for the Environment as a Program (the Program) that meets the requirements of Part 10, Section 146, of the EPBC Act. Under the Program, the Minister for the Environment has approved a class of actions which, if undertaken in accordance with the endorsed Program, will not require referral, assessment, and approval under the EPBC Act. Petroleum and greenhouse gas activities undertaken in Commonwealth waters in accordance with the Program are considered to be "approved classes of action". The Program has objectives which include ensuring activities undertaken in the offshore area are conducted in a manner consistent with the principles of ecologically sustainable development (ESD) and will not result in unacceptable impacts to MNES protected under Part 3 of the EPBC Act.

This EP considers the impacts to protected matters (summarised in Table 2-2 and Table 2-3) as described in the EPBC Act, and key terms of the Blue Whale Conservation Management Plan (Table 2-4). This has included making specific reference in Section 4 to the values of matters protected under Part 3 of the

EPBC Act using references and relevant guidance documents, such as EPBC Act significance guidance documents, relevant policy statements, management plans established by government, recovery plans and online databases.

The assessment of these protected matters has been conducted as per the assessment process described in Figure 2-1.

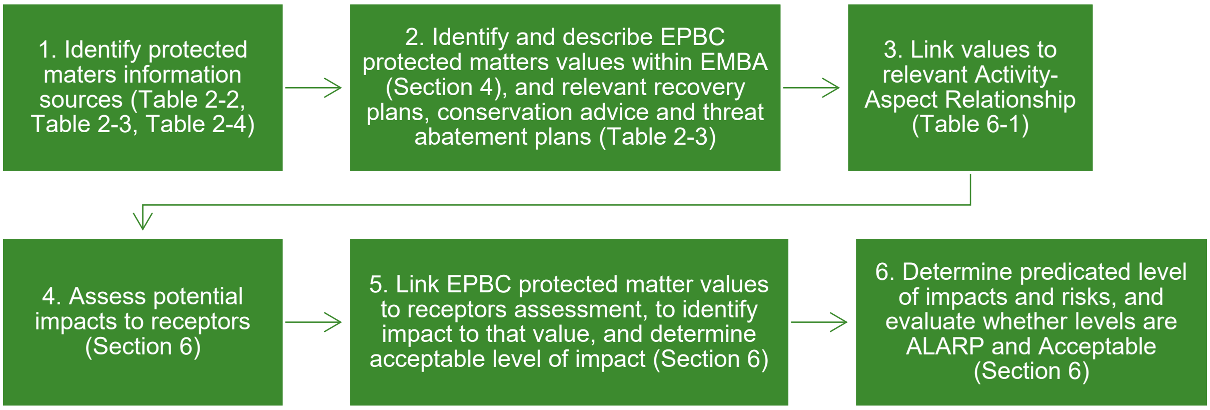


Figure 2-1 Impact assessment process of EPBC MNES

Table 2-2 EPBC Act Information Incorporated into this EP

EPBC Act Relevant Information Considered	How information is used	Document Section
Protected matters search tool (PMST)	An EPBC Act Protected Matters Database search has been conducted for the Operational Area (as defined in Section 3.1.1 and Section 4). A description of the marine or coastal receptors occurring within the spill EMBA is provided in Section 4. The EPBC PMST report also includes some terrestrial receptors (e.g. threatened species, threatened ecological communities (TEC), or heritage places); some of which have not been considered further within this EP given impacts are not expected and considered outside the bounds of oil spill impact assessment. The EPBC PMST reports are included in Appendix 3.	Section 4, and Appendix 3
Threatened species recovery plans, threat abatement plans and species conservation advices	Relevant plans or advice that are applicable to the environmental management of the petroleum activity and associated impacts and risks are identified in Table 2-3.	Section 2.1.2, and Section 6
Plans of management for World Heritage properties, Australian marine parks, or National Heritage places	The Australian Government has established numerous Australian Marine Parks (AMPs) around Australia under the EPBC Act. There are five AMPs that intersect with the EMBA. The closest AMP is East Gippsland Marine Park, ~85 km to the east of Sole-4 well. The Commonwealth Heritage List is a list of natural, Indigenous, and historic heritage places owned or controlled by the Australian Government. There are 12 Commonwealth Heritage Places/Properties listed in the EPBC PMST for the EMBA, of which many are buildings or sites without a marine/coastal influence. 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. The National Heritage list is Australia's list of natural, historic, and Indigenous places of outstanding significance to the nation. No World or National Heritage property intersects with the EMBA.	Section 4, Section 6, and Cooper Energy Description of the Environment: Projects & Operations [Appendix 2]
EPBC Act related guidelines	Relevant guidelines/policies are considered in the management of impacts and risks, including (but not limited to): • EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species • EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – MNES (DoE 2013) • National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) • Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life (Commonwealth of Australia 2018).	Section 6

EPBC Act Relevant Information Considered	How information is used	Document Section
Ramsar wetland ecological character descriptions	There is one Ramsar wetland that has coastal boundaries intersecting with the EMBA. This Ramsar wetland is Gippsland Lakes.	Section 4, Appendix 2, and Appendix 3
Marine bioregional plan	Marine bioregional plans are identified and considered in Section 4 and Section 6. Key Ecological Features (KEF) are elements of the Commonwealth marine environment considered as regional importance for either a region's biodiversity or its ecosystem function and integrity. Six KEFs intersect with the EMBA, including: • Big Horseshoe Canyon • Canyons on the eastern continental slope • Seamounts South and east of Tasmania • Shelf rocky reefs • Tasman Front and eddy field • Upwelling East of Eden.	Section 4, Section 6, Appendix 2, and Appendix 3
The Conservation Values Atlas	The Conservation Values Atlas has been developed by the Commonwealth Government, and has been used for the identification of features, including biologically important areas (BIAs) and KEFs, within the EMBA. These have been presented specific to receptors in the Section 4 and considered in the assessment of impacts and risks in Section 6. BIAs are identified by the Commonwealth Government, 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. Multiple BIAs intersect with the EMBA, including: • 33 BIAs for 22 seabird and shorebird species • eight BIAs for two shark species • six BIAs for three whale species • two BIAs for one dolphin species.	Section 4, Section 6, Appendix 2, and Appendix 3
Species profile and threats (SPRAT) database (DCCEEW 2023a)	This database has been used as a source of information on the receptors. Information accessed has included species details such as habitat, movements, sensitivities, feeding, reproduction, and taxonomic. Note that profiles are not available for all species and ecological communities.	Section 4, Appendix 2

Table 2-3 Recovery Plans, Threat Abatement Plans and Species Conservation Advices Relevant to Gippsland Offshore Operations

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
Migratory shorebirds and seabirds		
Approved Conservation Advice for *Anthochaera Phrygia* (regent honeyeater), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Aphelocephala leucopsis* (southern whiteface), 2023	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Botaurus poiciloptilus* (Australasian bittern), 2019	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threat: increased salinity, siltation, and pollution. No management advice or actions were identified.
Approved Conservation Advice for *Calidris canutus* (red knot), 2016	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: climate change, pollution/contamination and anthropogenic disturbance. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites which are subject to anthropogenic disturbance when red knot are present.

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
Approved Conservation Advice for *Calidris ferruginea* (curlew sandpiper), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: human disturbance, habitat loss and degradation from pollution. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites when curlew sandpipers are present.
Approved Conservation Advice for *Calidris tenuirostris* (great knot), 2016	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: climate change, pollution/contamination and anthropogenic disturbance. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites which are subject to anthropogenic disturbance when great knots are present.
Approved Conservation Advice for *Ceyx azureus diemenensis* (Tasmanian azure kingfisher), 2010	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Charadrius leschenaultii* (greater sand plover), 2016	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: human disturbance, habitat loss and degradation from pollution. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites which are subject to anthropogenic disturbance when greater sand plovers are present.
Approved Conservation Advice for *Grantiella picta* (painted honeyeater), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Halobaena caerulea* (blue petrel), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Hirundapus caudacutus* (white-throated needletail), 2019	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Limosa lapponica baueri* [bar-tailed godwit (western Alaskan)], 2016	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: human disturbance, habitat loss and degradation from pollution were identified as threats to this species. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites which are subject to anthropogenic disturbance when bar-tailed godwit (western Alaskan) are present.
Approved Conservation Advice for *Numenius madagascariensis* (eastern curlew), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: human disturbance, habitat loss and degradation from pollution were identified as threats to this species. Actions associated to specific threats were not identified; however, the following action was identified: • manage disturbance at important sites when eastern curlews are present.
Approved Conservation Advice for *Pachyptila turtur subantarctica* [fairy prion (southern)], 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Rostratula australis* (Australian painted snipe), 2013	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threat: loss and degradation of wetlands. Action: ensure there is no disturbance in areas where the species is known to breed, excluding necessary actions to manage the conservation of the species.
Approved Conservation Advice for *Sternula nereis nereis* (fairy tern), 2011	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: disturbance by humans which can cause the direct destruction of nests or the desertion of nest and oil spills. Actions:

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
		• disturbance by humans: Reduce disturbance during the breeding season from human recreation. • oil spills: ensure appropriate oil-spill contingency plans are in place for the subspecies' breeding sites.
Approved Conservation Advice for *Thalassarche cauta* (shy albatross), 2020	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: marine pollution, human disturbance and climate change. Actions associated to specific threats were not identified; however, the following action was identified: • marine-based threats to the survival and breeding success of albatrosses and giant petrels foraging in waters under Australian jurisdiction are quantified and reduced.
Approved Conservation Advice for *Thalassarche chrysostoma* (grey-headed albatross), 2009	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threat: pollution. No management advice or actions were identified.
Approved Conservation Advice for *Thinornis rubricollis rubricollis* [hooded plover (eastern)], 2014	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: oils spill and entanglements and ingestion of marine debris. Actions: • oil spills: prepare oil spill response plans to ensure effective rehabilitation of oiled birds. • entanglements and ingestion of marine debris: reduce in-shore marine debris.
Approved Recovery Plan gould's petrel (*Pterodroma leucoptera leucoptera*), 2006	The recovery plan is a coordinated conservation strategy between Commonwealth and New South Wales for the Gould's Petrel.	None identified.
National Recovery Plan for the Australasian bittern (*Botaurus poiciloptilus*), 2022	The recovery plan is a coordinated conservation strategy for the Australasian Bittern.	Threats: climate variability and change, and reduction in water quality. No management advice or actions were identified.
National Recovery Plan for the Australian fairy tern (*Sternula nereis nereis*), 2022	The recovery plan is a coordinated conservation strategy for the Australian Fairy Tern.	Threats: habitat degradation and loss of breeding habitat, human disturbance, pollution and climate variability and change. Actions associated to specific threats were not identified; however, the following action was identified: • reduce disturbance from human recreation during the breeding season.
National Recovery Plan for the Australian Painted snipe (*Rostratula australis*), 2022	The recovery plan is a coordinated conservation strategy for the Australian Painted Snipe.	Threats: invasive plants, climate variability and change and human disturbance. Actions associated to specific threats were not identified; however, the following actions were identified: • manage threats at known breeding and non-breeding habitats. • investigate the impact of potential threats such as human disturbance.
National Recovery Plan for eastern bristlebird (*Dasyornis brachypterus*), 2012	The recovery plan is a coordinated conservation strategy for the Eastern Bristlebird.	Threats: climate change, and human disturbance. No management advice or actions were identified.
National Recovery Plan for Albatrosses and Petrels, 2022	The recovery plan is a coordinated conservation strategy for albatrosses and petrels.	Threats: marine pollution, marine infrastructure and climate variability and change. No management advice or actions were identified.
Wildlife Conservation Plan for Migratory Shorebirds, 2015	The long-term recovery plan objective for migratory shorebirds is to minimise anthropogenic threats to allow for the conservation status of these bird species.	Threats: anthropogenic disturbance and climate variability and change. Actions: • anthropogenic disturbance: - investigate the significance of cumulative impacts on migratory shorebird habitat and populations in Australia. - ensure all areas important to migratory shorebirds in Australia continue to be

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
		considered in development assessment processes. • climate variability and change: investigate the impacts of climate change on migratory shorebird habitat and populations in Australia.
Wildlife Conservation Plan for Seabirds, 2020	The Plan aims to provide a strategic national framework for the research and management of listed marine and migratory seabirds and to outline national activities to support the conservation of listed seabirds in Australia and beyond.	Threats: pollution, climate variability and change and anthropogenic disturbance. Actions associated to specific threats were not identified; however, the following actions were identified: • ensure all areas of important habitat for seabirds are considered appropriately and consistently in the development assessment process. • manage the effects of anthropogenic disturbance to seabird breeding and roosting areas. • enhance contingency plans to prevent and/or respond to environmental emergencies that have an impact on seabirds and their habitats.
Fish and Sharks		
Approved Conservation Advice for *Epinephelus daemelii* (black rockcod), 2012	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Hippocampus whitei* (white's seahorse), 2020	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	None identified.
Approved Conservation Advice for *Rhincodon typus* (whale shark), 2015	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threats: boat strike from large vessels, marine debris and climate change impacts. Actions: • boat strike: minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations. • marine debris: no management advice or actions were identified • climate change impacts: no management advice or actions were identified.
Approved Conservation Advice for *Prototroctes maraena* (Australian grayling), 2021	The conservation advice provides management actions that can be undertaken to ensure the conservation of the species.	Threat: climate change. No management advice or actions were identified.
National Recovery Plan for Australian grayling (*Prototroctes maraena*), 2008	The recovery plan is a coordinated conservation strategy for the Australian grayling.	Threat: climate change. No management advice or actions were identified.
National Recovery Plan for the dwarf galaxias (*Galaxiella pusilla*), 2010	The recovery plan is a coordinated conservation strategy for the Dwarf Galaxias.	Threat: climate change. No management advice or actions were identified.
Recovery Plan for the grey nurse shark (*Carcharias Taurus*), 2014	The recovery plan provides strategy for recovery of grey nurse shark.	Threats: ecosystem effects as a result of habitat modification and climate change. No management advice or actions were identified.
Recovery Plan for the white shark (*Carcharodon carcharias*), 2013	The recovery plan is a coordinated conservation strategy for the white shark.	Threats: ecosystem effects as a result of habitat modification and climate change. No management advice or actions were identified.
Marine Turtles		
Recovery Plan for Marine Turtles in Australia, 2017-2027	The long-term recovery plan objective for marine turtles is to minimise anthropogenic threats to allow for the conservation status of marine turtles.	Threats: climate change, marine debris, marine pollution, light pollution, vessel disturbance and noise interference. Actions: • Climate change: no management advice or actions were identified

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
		• marine debris: no management advice or actions were identified. • marine pollution: - ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs. - quantify the impacts of decreased water quality on stock viability. - quantify the accumulation and effects of anthropogenic toxins in marine turtles, their foraging habitats and subsequent stock viability. • light pollution: - artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats. - identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution. • vessel disturbance: no management advice or actions were identified • noise interference: no management advice or actions were identified.
Cetaceans		
Approved Conservation Advice for *Balaenoptera borealis* (sei whale), 2015	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the species.	Threats: climate and oceanographic variability and change, noise disturbance, pollution, and vessel strike. Actions: • climate and oceanographic variability and change: no management advice or actions were identified. • noise disturbance: evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures will be implemented • pollution: no management advice or actions were identified • vessel strike: report in the National Vessel Strike Database all vessel strikes.
Approved Conservation Advice for *Balaenoptera physalus* (fin whale), 2015	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the species.	Threats: climate and oceanographic variability and change, noise disturbance, pollution, and vessel strike. Actions: • climate and oceanographic variability and change: no management advice was identified. • noise disturbance: evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures will be implemented • pollution: no management advice was identified • vessel strike: report in the National Vessel Strike Database all vessel strikes.
Conservation Management Plan for the blue whale, 2015-2025	The long-term recovery plan objective for blue whales is to minimise anthropogenic threats to allow for their conservation status to improve.	Threats: climate variability and change, noise interference, marine debris, chemical discharges, and vessel disturbance. Actions: • climate variability and change: no management advice was identified. • noise interference: - assessing the effect of anthropogenic noise on blue whale behaviour - anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area.

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity

		• marine debris: no management advice was identified
		• chemical discharges: no management advice was identified
		• vessel disturbance:
		  - report in the National Vessel Strike Database all vessel strikes.
		  - ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.
		• key terms of the Conservation Management Plan (CMP) and how they have been considered in this EP are provided in Table 2-4.

Conservation Management Plan for the southern right whale, 2011-2021	The long-term recovery plan objective for southern right whale is to minimise anthropogenic threats to allow for their conservation status to improve.	Threats: climate variability and change, noise interference, marine debris, chronic chemical pollution and acute chemical discharge, and vessel disturbance.
		Actions:
		• climate variability and change: no management advice was identified
		• noise interference:
		  - assessing anthropogenic noise in key calving areas
		  - assessing responses of southern right whales to anthropogenic noise if necessary, developing further mitigation measures for noise impacts.
		• marine debris: no management advice was identified
		• chemical pollution and chemical discharge: no management advice was identified
		• vessel disturbance: no management advice was identified.

Draft National Recovery Plan for the southern right whale, 2022	The recovery plan objective for southern right whale is to minimise anthropogenic threats to facilitate the recovery of this species and allow their conservation status to improve.	Threats: climate change and climate variability, anthropogenic underwater noise, marine debris, pollution and vessel collision.
		Actions:
		• climate variability and change: no management advice was identified
		• underwater noise:
		  - actions within and adjacent to southern right whale BIAs and habitat critical to the survival should demonstrate that it does not prevent any southern right whale from utilising the area or cause injury.
		  - ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g., EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to southern right whales to the lowest possible level.
		  - quantify risks of anthropogenic underwater noise to southern right whales, including behavioural disturbance, changes to vocalisations, and physiological effects to whales.
		• marine debris: no management advice was identified
		• pollution: no management advice was identified
		• vessel disturbance:
		  - assess risk of vessel strike to southern right whales in BIAs.
		  - ensure environmental impact assessments and associated plans consider and quantify the risk

Relevant Plan/Advice	Description	Threats or Management Advice Relevant to the Activity
		of vessel strike and associated potential cumulative risks in BIAs. - ensure all vessel strike incidents are reported in the National Ship Strike Database managed through the Australian Marine Mammal Centre, Australian Antarctic Division.
Marine habitat		
Approved Conservation Advice for *Dendronephthya australis* (cauliflower soft coral), 2020	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the species.	Threat: damage from boat anchoring and moorings. Action: reduce the impact of public and private boat moorings that impact on *D. australis* habitats within New South Wales (NSW) including replacement of block and chain moorings with non-scouring environmentally friendly mooring systems.
Threatened Ecological Communities		
Approved Conservation Advice for Giant Kelp Marine Forests of South East Australia, 2012	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of this TEC.	Threat: expansion of invasive species. Action: manage shipping and practices to minimise potential invasion of exotic species.
Approved Conservation Advice for Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, 2015	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of this TEC.	None identified.
Approved Conservation Advice for Subtropical and Temperate Coastal Saltmarsh, 2013	The conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of this TEC.	Threat: pollution. No management advice or actions were identified.
Other relevant		
Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans, 2018	The plans focus on strategic approaches to reduce the impacts of marine debris on vertebrate marine life.	Threat: marine debris. Action: evaluate risk of marine debris and, if required, appropriate mitigation measures will be implemented.

Table 2-4 Guidance on Key terms within the Blue Whale Conservation Management Plan (DAWE 2021a) and how they are applied within this EP

Relevant Plan/Advice	Description
Recovery Plans	The Conservation Management Plan for the Blue Whale (Commonwealth of Australia 2015a), 2015-2025 has been treated as a recovery plan (under the EPBC Act) throughout the EP.
Recovery plan actions	Actions identified in the Conservation Management Plan for the Blue Whale, 2015-2025 have been considered in the assessment of impacts and determination of acceptability of impacts to blue whale, specifically in the Impact and Risk assessment (Section 6).
BIAs	BIAs for blue whale, as provided in the CMP for the Blue Whale, 2015-2025, are described in the descriptions of the environment within this EP (Appendix 2 and Section 4)
Legal requirement - Action A.2.3. from the Blue Whale CMP: "*Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area"* Further, the Department of agriculture, water and environment (DAWE) key terms state: '*The recovery plan requirement, Action A.2.3, applies in relation to BIAs. A whale could be displaced from a Foraging Area if impact mitigation is not implemented. This means that underwater anthropogenic noise should not:*	Action A.2.3 and the DAWE key terms (2021a) have informed the assessment of acceptability of underwater sound emissions. In the assessment of underwater sound emissions (Section 6.5), Cooper Energy has taken a precautionary approach. This is presented through the application of conservative impact thresholds for potential disturbance and injury, the application of ALARP Decision Context B (for blue whales), and the adoption of additional control measures to achieve ALARP and acceptability. Adaptive management approaches have been investigated and the selected measures adopted reflect a precautionary approach; they are designed such that the risk of injury and displacement are reduced so that the foraging behaviour of any blue whale should not be impacted. Cooper Energy has considered the seasonal presence of species in defining the schedule and limitations for this activity. The residual risks to the species are considered low (Section 6.5) and the duration of activities (which could cause disturbance) are limited. As sound emissions are not expected to be significantly higher than existing shipping noise, the level of risk reduction achieved by locking

Relevant Plan/Advice	Description
• stop or prevent any blue whale from foraging • *cause any blue whale to move on when foraging* • *stop or prevent any blue whale from entering a Foraging Area* *It is considered that a whale is displaced from a Foraging Area if foraging behaviour is disrupted, regardless of whether the whale can continue to forage elsewhere within that Foraging Area. Mitigation measures must be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a Foraging Area may occur'*	the activity into a specific activity window is grossly disproportionate to the level of risk reduction achieved. Temporal restrictions, if applied consistently within blue whale foraging areas, would prevent the use of vessels for a range of offshore activities for large periods of the year across the entire south-eastern bioregion, with significant impacts to shipping, fishing, existing and transitional offshore projects.
Definition of 'a foraging area'	The Operational Area of the activity is located within a possible foraging BIA. Blue whale foraging is considered throughout the assessment of potential impacts and risks to blue whales. Timeframes when blue whale foraging is more likely to occur has been defined based on contemporary literature.
Definition of 'displaced from a foraging area'	The definition of 'displacement from a foraging area' has been adopted throughout the assessment of underwater sound emissions.
Definition of 'injury to Blue Whales'	Injury has been defined as permanent threshold shift (PTS) and temporary threshold shift (TTS) throughout the assessment of underwater sound emissions (Section 6.5).

2.2 State Legislation

The OPGGS Act (Vic) addresses all licensing, health, safety, environmental, and royalty considerations for offshore petroleum exploration and development operations within the Victorian coastal waters, which consist of the first 3 nm seaward of the territorial sea. The OPGGSR specify the requirements to manage the environmental impacts of petroleum activities. Key to these regulations is the submission of an EP to the regulatory authority (DEECA) for acceptance prior to commencing the proposed petroleum activities.

2.3 Government Policy and Administrative Guidelines

This EP has been developed in accordance with the NOPSEMA Guidance Note for Environment Plan Content Requirements (N04750-GN1344, (2022c)). The guidance note provides guidance to the petroleum industry on NOPSEMA's interpretation of the OPGGS(E)R (Cth) to assist operators in preparing EPs. This guidance has also been applied to the portion of the Gippsland assets within Victorian state waters where appropriate.

Other relevant government guidelines or advisory information that have been incorporated into the preparation of this EP include:

- Oil Spill Modelling (NOPSEMA Environment Bulletin, A652993, (2019))
- Oil Pollution Risk Management (NOPSEMA Guidance Note, N-04750-GN1488, (2021))
- Operational and scientific monitoring programs (NOPSEMA Information Paper, N-04700-IP1349, (2020))
- Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA 2015)
- Consultation in the Course of Preparing an Environment Plan (NOPSEMA Guideline, N-04750-GL2086 A900179, (2023a))
- Draft guidelines to protect underwater cultural heritage (DCCEEW 2023b)
- National Light Pollution Guidelines for Wildlife (DCCEEW 2023c)
- Australian Ballast Water Management Requirements (DAWE 2020)

- Australian Biofouling Management Requirements (DAWE 2022).

2.4 Cooper Energy Environment Practices and Policy

The activities covered by this EP will be planned and executed in accordance with the Cooper Energy Management System (CEMS). As such, the Cooper Energy Health, Safety, Environment and Community (HSEC) Policy is shown in Figure 9-2. Further information regarding the implementation of this policy and related procedures are outlined in the description of the CEMS in Section 9.1.

3 Activity Description

To meet the requirements of the OPGGS(E)R, this section provides a description of:

- location and timing of the activity
- existing infrastructure, including layout and current state
- field characteristics
- the petroleum activity, which comprises:
  - Sole operations
  - PB non-production
  - IMR
  - Support operations

For the purposes of this EP, activities performed by vessel(s) and helicopters when outside the Operational Area (refer to Section 3.1.1) are not covered by the OPGGS(E)R (Cth) and OPGGSR (Vic) and are therefore, not addressed within this EP.

3.1 Activity Location

The Gippsland Offshore Operations assets are in Commonwealth and State waters off Victoria's south-east coast (Figure 1-1). Assets within scope of this EP are located within the following Licence areas:

- PB gas field and associated infrastructure in VIC/RL16, ~25 km south of Marlo in East Gippsland
- PB gas pipeline and umbilical in VIC/PL31 and VIC/PL31 (V), a 24 km subsea pipeline and umbilical cable connecting the Patricia-2 and Baleen-4 wells to the Orbost Gas Plant
- Sole gas field and associated infrastructure in VIC/L32, ~32 km south of Bemm River, Victoria
- Sole gas pipeline and umbilical in VIC/PL43 and VIC/PL006401(V), a 65 km subsea pipeline and umbilical connecting the Sole-3 and Sole-4 wells to the Orbost Gas Plant.

The Gippsland infrastructure is in water depths ranging from ~9 m to ~125 m. The coordinates are provided in Table 3-1.

Table 3-1: Coordinates of the Gippsland offshore infrastructure (Coordinate System: GDA94)

Location	Latitude	Longitude	Approximate Water depth (m) Lowest Astronomical Tide
PB			
Patricia-2 well	38° 01' 34.37" S	148° 27' 02.35" E	54
Baleen-4 well	38° 00' 15.52" S	148° 26' 38.91" E	54
Patricia-1 well	38° 01' 47.46" S	148° 26' 51.81" E	54
Pipeline End Manifold (PLEM)	38º 01' 35.49" S	148º 27' 02.44" E	54
PB Pipeline Start	38º 01' 34.38" S	148º 27' 02.70" E	10
PB Pipeline End	37º 47' 53.23" S	148º 26' 11.94" E	54
PB Pipeline Tangent point	37º 59' 03.25" S	148º 26' 18.00" E	54
PB Pipeline Tangent point	37º 58' 44.76" S	148º 26' 15.30" E	54
Horizontal Directional Drill (HDD) exit	37º 48' 23.66" S	148º 26' 12.52" E	15
PB Umbilical exit	37º 47' 56.75" S	148º 26' 11.30" E	10
Sole			
Sole-2 well	38° 06' 13.101" S	149° 00' 33.511" E	125
Sole-3 well	38° 06' 01.184" S	149° 00' 30.801" E	124
Sole-4 well	38° 06' 00.066" S	149° 00' 31.673" E	124

Location	Latitude	Longitude	Approximate Water depth (m) Lowest Astronomical Tide
PLEM Subsea Umbilical Termination Unit (SUTU)	38° 06’ 00.066” S	149° 00’ 31.368” E	124
Pipeline Tangent point	38° 05’ 25.43” S	148° 58’ 39.18” E	124
Pipeline Tangent point	38° 05’ 17.54” S	148° 58’ 17.28” E	124
Pipeline Tangent point	37° 52’ 16.21” S	148° 26’ 39.20” E	14–124
Pipeline Tangent point	37° 51’ 47.17” S	148° 26’ 17.26” E	14–124
Pipeline Tangent point	37° 49’ 07.50” S	148° 26’ 19.14” E	14–124
Pipeline Tangent point	37° 48’ 59.07” S	148° 26’ 18.78” E	12–14
Sole Umbilical exit	37° 48' 30.12” S	148° 26' 13.50 E	14
Sole HDD exit	37° 48' 23.32” S	148° 26' 15.31 E	9

3.1.1 Operational Area

The Operational Area for the activity is the area where the petroleum activities will take place and will be managed under this EP. The Operational Area has been defined as 500 m buffer on either side of the Sole and PB pipelines and 500 m around the Sole and PB wells and subsea infrastructure (Figure 3-1). The Operational Area incorporates the gazetted Petroleum Safety Zones (PSZs) that are in place for the Gippsland Offshore Operations infrastructure (Table 3-2).

Table 3-2: Gippsland Offshore Operations Infrastructure Petroleum Safety Zones

Asset	Infrastructure	Distance	Gazette Notice
Sole	PLEM for Sole 3 well and Sole 4 well	500 m	A601713
PB	Baleen-4 well	500 m	A528370
PB	Patricia-2 well	500 m	A528370

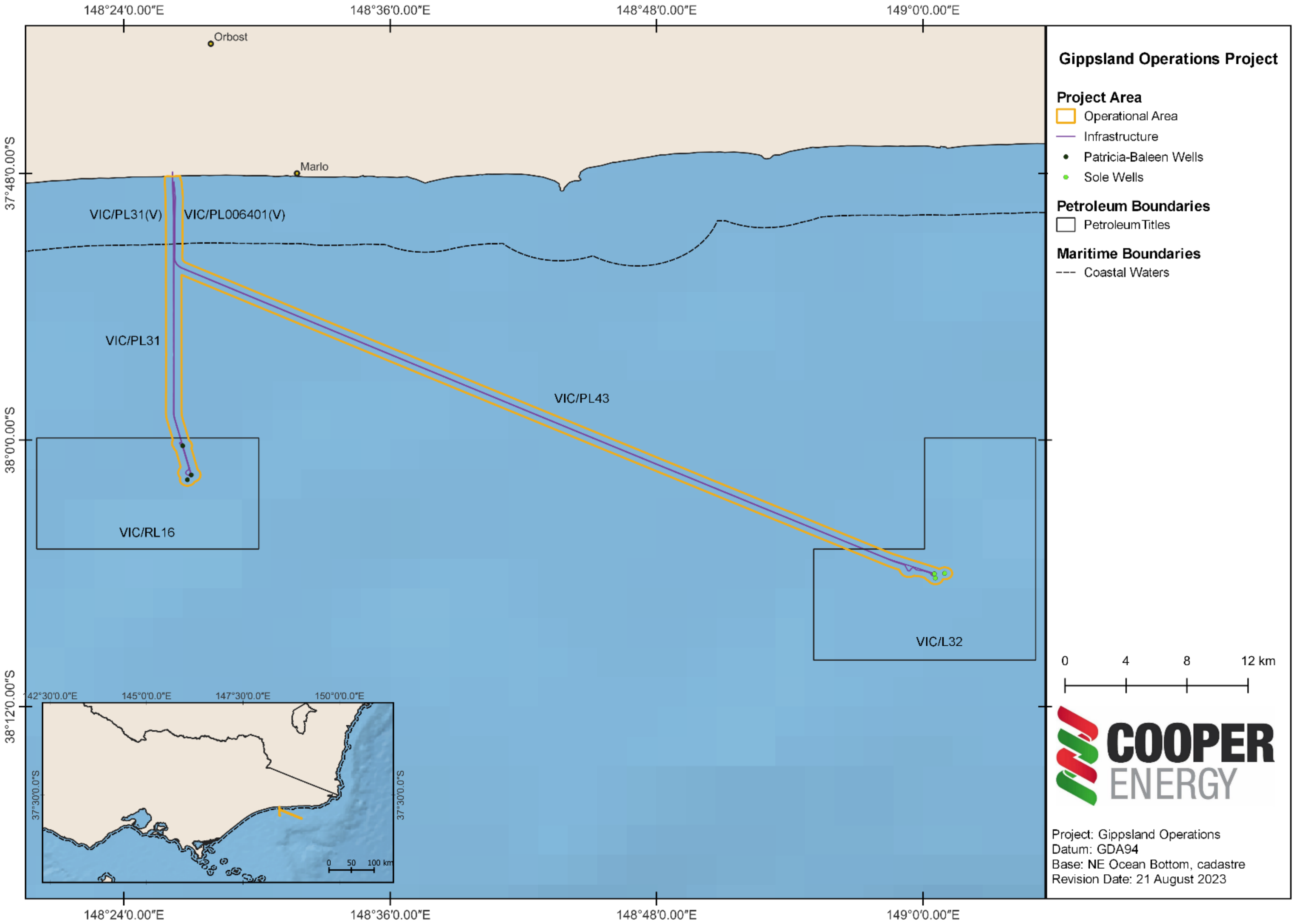


Figure 3-1: Operational Area of the Gippsland Offshore Operations

3.2 Activity Timing

Cooper Energy is currently operating the hydrocarbon systems associated with the Gippsland Offshore Operations. The EP covers a period of 5-years from acceptance. During this period a number of activities are provided for under this EP, including planned (e.g. inspections) and contingency activities (i.e. repair works). The description of the activities and their estimated durations are described in the sections below.

Table 3-3 provides an indicative activity schedule with the types of offshore activities and indicative frequency over the next 5-year period. Production operations through the subsea infrastructure are continuous. Activities covered by this EP can occur 24 hours a day and 7 days a week.

Table 3-3: Gippsland Offshore Operations - Indicative Activity Timing

Year	2024				2025				2026				2027				2028				2029			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Sole operations																								
Sole IMR																								
PB non-production																								
PB IMR																								
	Operations																							
	IMR Activities																							

3.3 Asset Description

3.3.1 PB

The PB reservoirs are significantly depleted and consist of dry gas. The PB field is currently in a non-production phase. The most recent use (in 2015) of the PB offshore pipeline was to transport Longtom gas and condensate rather than PB gas production.

The Longtom gas field, pipeline, electrical system, and associated control systems are outside the scope of this EP as Seven Group Holdings is the titleholder of the Longtom gas field and associated infrastructure.

There is a re-lifing study in progress for the re-use of the PB assets, pre or post cessation of Sole assets (refer to Section 3.4). The re-use strategy may trigger the potential for inline inspection (ILI) of the PB pipeline as part of re-lifing. ILI would also support new production from the Longtom system in the event the electrical fault (see Sections 3.3.1.1 to 3.3.1.3 for descriptions of the fault) is resolved during future IMR activities.

3.3.1.1 Wells

The subsea system for Patricia-2 and Baleen-4 wells consists of wellheads with a subsea tree, fitted with production chokes, chemical injection facilities, subsea control modules and instrumentation, whereas the Patricia-1 well system consists of a wellhead only. The Patricia-2 and Baleen-4 wells are currently shut-in at their subsea trees and valves have been confirmed closed. Control and monitoring of the wells is via an electro-hydraulic multiplexed control system supplied via umbilicals that connect the wells to the OGP. Since an offshore electrical fault (which occurred in May 2015), direct control and monitoring of the subsea system from the OGP is not possible and the control and production systems have been isolated at OGP.

3.3.1.2 Pipeline

The Patricia-2 and Baleen-4 wells tie into the PB pipeline via short carbon steel jumper spools. The PB pipeline is 300 mm (12 inch) in nominal diameter. The PB pipeline is connected to the Longtom pipeline via a PLEM which consists of a manual valve and a T-junction available for future connections. The T-junction has double isolation.

The PB pipeline system is isolated at the high integrity pipeline protection system (HIPPS) and at the onshore plant inlet. The HIPPS isolation valves are failed-safe (closed) on loss of electrical signal following an electrical fault, thereby isolating the PB pipeline and a 17 km section of Longtom pipeline downstream of the HIPPS. In May 2015, the pipeline was blown down to 230 kPa, and this pressure was monitored and proved to be holding static, indicating that the HIPPS valves were not passing. The HIPPS isolation valves remain closed during the non-production phase.

The pipeline was injected with nitrogen to establish a pressure of 630 kPa. This positive pressure has been chosen to exceed the seawater head by 100 kPa to support the early identification of a passing valve and prove ongoing pipeline integrity.

The pipeline contains ~2,700 m^3 natural gas, 4,550 m^3 nitrogen, 5 m^3 Longtom condensate and 150 m^3 Mono-ethylene glycol (MEG) / water mix (40:60). Residual fluids in the pipeline have been left in-situ based on the following:

- the pipeline is not considered to be subject to internal corrosion, therefore purging/flushing to remove hydrocarbons upon suspension is not required (in accordance with AS2885)
- a complete purge/flush of the pipeline would require an offshore campaign and potential diving/pigging operations (i.e. introduction of additional risks) which are not justified due to the negligible risk of internal corrosion and minimised hydrocarbon pipeline contents.

3.3.1.3 Umbilical

The main umbilical consists of power/communication and chemical (MEG and hydraulic fluid) injection lines to and from the subsea infrastructure and the OGP[3]. The subsea main umbilical runs from the OGP to the main umbilical termination assembly (MUTA), located adjacent to the Baleen-4 well. A smaller umbilical runs from the MUTA to the Patricia-2 well.

Due to the electrical fault (which occurred in 2015), the umbilical's power/communication signal, hydraulic and chemical injection functions are inactive.

The pressures in the chemical injection lines are monitored periodically by the OGP operations team with a gradual increase in pressure observed since commencement of monitoring. It is suspected that the source of pressure is from the Longtom field. If the pressure approaches 3,000 PSI, the chemical injection lines are depressured to ensure no exceedance of maximum allowable operating pressure (4,000 PSI) occurs.

3.3.2 Sole

The Sole Gas Development comprises two gas production wells connected to a production pipeline via a PLEM and tie-in spools. Communication and services for the offshore wells are provided by a control umbilical. The Sole production wells were drilled in 2018 and commenced production in 2019. The Sole Gas Development is currently in production phase.

3.3.2.1 Wells

The Sole-3 and Sole-4 production wells consist of a subsea tree, fitted with production chokes, chemical injection facilities, subsea control modules and instrumentation. The Sole-2 well was abandoned in 2018; it is plugged and isolated from the reservoir with the wellhead still in place.

3.3.2.2 Pipeline

The Sole production pipeline is 300 mm (12 inch) in diameter carbon steel grade DNV 450. A PLEM is welded to the pipeline. The PLEM enables the production wells to be connected to the Sole production pipeline via rigid tie-in spool pieces. The PLEM is a gravity-based structure that is supported by a mudmat foundation. Several tie-in spools and flying leads are required to connect the production wells to the Sole production pipeline and umbilical.

The production pipeline was designed to lay on the seabed and did not require anchors or trenches.

Pipeline external corrosion management is via anti-corrosion coating and sacrificial anodes designed to be maintenance free for the design life of the pipeline and externally visible for inspection by a Remotely Operated Vehicle (ROV) (or similar).

[3] Onshore operations, including management of the OGP, are out of scope (Section 1.4)

Pipeline internal corrosion is managed by continuous corrosion inhibitor injection at a rate of ~6 L/day via the control umbilical. Control of hydrate is managed by the intermittent injection of MEG/Water mix, or equivalent, at the subsea trees via the control umbilical. If hydrate dissipation and scale inhibition is required (though unlikely), it would be by:

- hydrate dissipation: intermittent injection of methanol, or equivalent, at the subsea trees via the control umbilical
- scale inhibition: intermittent or continuous injection of scale inhibitor via the control umbilical.

3.3.2.3 Umbilical

The Sole umbilical consists of power/communication and chemical (MEG and hydraulic fluid) lines and runs from the subsea infrastructure to the OGP. It is buried along the alignment and re-surfaces inside of the 500 m radius PSZ gazetted around the PLEM and production wells.

The SUTU links the production wells (via subsea trees) to the Sole umbilical via flying leads and allows pressure to be monitored along with the flow of hydrocarbons to be controlled. The SUTU is a gravity-based structure that is supported by a mudmat foundation.

3.3.3 Equipment Status

A range of infrastructure currently exists within the Operational Area. Table 3-4 provides a summary of the main infrastructure components for PB and Sole and their status; minor and auxiliary pieces of equipment (e.g. flowline jumpers, flying leads) are not described here but are tracked via the Asset Integrity Management Plan (Asset IMP). An asset list is maintained within the respective Asset IMP.

Table 3-4: Equipment Status

Infrastructure	Petroleum Licence	Status
PB		
Patricia-1 well	VIC/RL16	Suspended
Patricia-2 well	VIC/RL16	Shut-in
Baleen-4 well	VIC/RL16	Shut-in
PLEM PB Pipeline PB Umbilical	VIC/RL16 VIC/PL31 VIC/PL31(V)	Shut-in
Sole		
Sole-2 well	VIC/L32	Plugged and abandoned
Sole-2 wellhead	VIC/L32	Not operational
Sole-3 well	VIC/L32	Operational
Sole-4 well	VIC/L32	Operational
PLEM SUTU Sole Pipeline Sole Umbilical	VIC/L32 VIC/PL43 VIC/PL006401(V)	Operational

3.4 Asset Decommissioning

Cooper Energy's strategy in the Gippsland hub with processing gas via the OGP is to re-life and re-use existing subsea infrastructure, where practical. This has the dual benefit of reducing the economic threshold for bringing gas to market and reducing the environmental footprint. The Gippsland Offshore Infrastructure is maintained in accordance with the respective Asset IMPs.

Cooper Energy acknowledges the requirement through Section 572(3) of the OPGGS Act and NOPSEMA Policy Section 572 Maintenance and Removal of Property (N-00500-PL1903, A720369, (2022a)) for removal of all property when it is no longer in use and that any deviations from this position will need to be evaluated and accepted by NOPSEMA. The level of detail of decommissioning plans increases as time to production cessation reduces. These requirements are integrated into the Cooper Energy Decommissioning Protocol (refer to Section 9.3.1).

Table 3-5 outlines the expected abandonment and decommissioning timelines for Cooper Energy's Sole and PB infrastructure. Decommissioning timings are indicative and are dependent on several factors, including:

- production duration from producing assets
- rig/vessel availability
- potential to extend life for adjacent projects
- ability to combine decommissioning operations with other projects and/or operators to undertake works efficiently, and in a cost-effective manner
- review of alternative uses of the asset (such as storage)
- continuation of asset use in the event of re-lifing of PB or Longtom system (production or storage).

Table 3-5: Indicative Decommissioning Plan

Asset	Scope	Indicative timing	Notes	Deviation from Section 572
PB				
Offshore wells - Patricia-1 and Patricia-2	Abandon wells	Within 3 years of PB fields cessation following re-lifing options	Requires rig capable of working in 52 m water depth, potentially jack-up rig. Part of PB development well abandonment campaign.	Currently re-lifing options are being explored such as return to production of gas or gas/carbon storage options. These re-lifing options are subject to economic reviews and post umbilical testing programs to evaluate repair costs. Refer to Section 9.3.1 for the PB re-life and decommissioning strategy.
Offshore wells – Baleen-4	Abandon wells	Within 3 years of PB fields cessation as part of re-lifing	Cooper Energy is investigating production restart or storage following Sole field cessation (Section 3.5.2) in conjunction with enabling development. One or more developments based on Manta Gas Development / VIC/P72, Longtom restart. Requires rig capable of working in 53 m water depth, potentially jack-up rig.	Currently re-lifing options are being explored such as return to production of gas or gas/carbon storage options. These re-lifing options are subject to economic reviews and post umbilical testing programs to evaluate repair costs. Refer to Section 9.3.1 for the PB re-life and decommissioning strategy.
Offshore infrastructure	Prepare Offshore Facilities for decommissioning (flushing/cleaning).	Following cessation of production as part of re-lifing	Undertaken as part of preparations for full field decommissioning.	N/A
	Decommissioning of offshore facilities, including in Cth and State waters.	Within 5 years of cessation as part of re-lifing	Assume re-purposed for one or more of: • Manta Gas Development • Longtom field restart development following VIC/P72 exploration drilling.	Currently re-lifing options are being explored such as return to production of gas or gas/carbon storage options. These re-lifing options are subject to economic reviews and post umbilical testing programs to evaluate repair costs. Refer to Section 9.3.1 for the PB re-life and decommissioning strategy.
Title Area	Making good seabed	Following facility decommissioning	Making good the seabed may involve offshore survey for debris and seabed condition.	N/A
Sole				
Offshore wells – Sole-2	Remove wellhead	Within 3 years of cessation of production or re-use Sole-3 and Sole-4	Well abandoned in August 2018. To be undertaken as part of decommissioning of full Sole field infrastructure. Removal of wellhead is expected 5 years post final production from Sole Field.	Deferral of property (wellhead) removal until full field cessation. Cooper Energy may investigate re-use and re-life potential and will seek approval as required.

Asset	Scope	Indicative timing	Notes	Deviation from Section 572
Offshore wells – Sole-3 and Sole-4	Abandon Wells	Within 3 years of cessation of production or re-use	To be undertaken as part of decommissioning of full Sole field infrastructure. Decommissioning is estimated 5 years post final production.	None currently proposed. Cooper Energy may investigate re-use and re-life potential and will seek approval as required.
Offshore infrastructure	Prepare Offshore Facilities for decommissioning (flushing/cleaning).	Following cessation of production or re-use.	Undertaken as part of preparations for full field decommissioning.	N/A
	Decommissioning of offshore facilities, including in Cth and State water.	Within 5 years of cessation of production or re-use	Control system has been engineered with capability to control Manta gas development. Pipeline/HDD could be re-purposed/re-lifed for gas transmission from further developments.	None currently proposed. Cooper Energy may investigate re-use and re-life potential and will seek approval as required.
Title Area	Making good seabed	Following facility decommissioning	Making good the seabed may involve offshore survey for debris and seabed condition.	N/A

3.5 Production and Field Characteristics

3.5.1 PB

The PB reservoirs are dry gas (Table 3-6). The reservoirs are now substantially depleted although Baleen has been observed to be pressure recharging over time.

The Longtom fluid physical characteristics are provided in Table 3-7. Approximately 5 m^3 of Longtom condensate remains in the PB pipeline.

Table 3-6: PB Reservoir Conditions

Parameter	Patricia-1 (suspended)	Patricia-2 (shut-in)	Baleen-4 (shut-in)
Maximum Pressure at Reservoir Depth	541 psia	541 psia	700 psia
Maximum temperature	49°C	49°C	49°C
Gas Specific Gravity	0.572	0.572	0.563
Condensate to Gas Ratio (CGR)	~0.1 bbl/MMscf	~0.1 bbl/MMscf	~0.1 bbl/MMscf
Worst Case Discharge (WCD) rate gas (MMscf/d)	Baleen-4 is WCD	Baleen-4 is WCD	24.4
Worst Case Discharge rate condensate (CGR of 0.1)	-	-	2.4 bbl/d (0.4m^3/d)

Source: Well Operations Management Plan (WOMP) *(Santos 2014)*, PB Asset Source Control Emergency Response Plan (SCERP) *(Cooper Energy 2022a)*

Table 3-7: Longtom Condensate Physical Properties

Parameter		Longtom Condensate
American Petroleum Institute (API) Gravity		51.2
Density at 25 °C (g/ml)		0.777
Dynamic Viscosity at 20 °C (cP)		1.081
Gas Oil Ratio		10.85 stb/MMscf
Pour Point (°C)		-9 (when fresh)
International Tank Owners Pollution Federation (ITOPF) Group		I (non-persistent)
Boiling Point Curve (% mass)	Volatiles (<180 °C)	61.5
	Semi-volatile (180-265 °C)	14.3
	Low Volatility (265-380 °C)	21.1
	Residual (>380 °C)	3.1

Source: Pipeline Safety Case – Non-Operational Phase *(Santos 2015)*

3.5.2 Sole

The Sole reservoirs is a dry gas reservoir (Table 3-8) with very limited condensate observed or recovered during the well tests on Sole-2, Sole-3 and Sole-4. Physical characteristics of the Sole gas is provided in Table 3-9.

The Sole offshore reservoirs produce gas with minor quantities of condensate. Production from the Sole gas field commenced in 2019 with two production wells (Sole-3, Sole-4) through the pipeline to the OGP.

Table 3-8: Sole Reservoir Conditions

Parameter	Sole
Maximum Pressure at Reservoir Depth	1,147 psi
Maximum temperature	43 °C
Gas Specific Gravity	0.589
CGR	<0.1 bbl/MMscf
WCD rate gas	160 MMscf/d
Worst Case Discharge rate condensate (CGR of 0.1)	10 bbl/d (1.6 m^3/d)

Source: Basic Data Report (Cooper Energy 2018)*; Sole Asset SCERP* (Cooper Energy 2022b)

Table 3-9: Sole Condensate Physical Properties

Parameter		Sole Condensate
API Gravity		36.6
Density at 15 °C (kg/l)		0.8414
Kinematic Viscosity at 20 °C (cSt)		1.709
Gas Oil Ratio		See Table 3-8
Pour Point (°C)		<-36
ITOPF Group		II
Boiling Point Curve (% mass)	Volatiles (<180 °C)	37.2
	Residue (>180°C)	62.8

Source: Sole condensate Assay (Intertek 2021)

Figure 3-2 shows a 2P raw gas production forecast profile for the Offshore Sole Asset. The assumed plant inlet pressure at OGP is 3800 kPag and it is expected to reduce to 3200 kPag from August 2028 with 3 compressors.

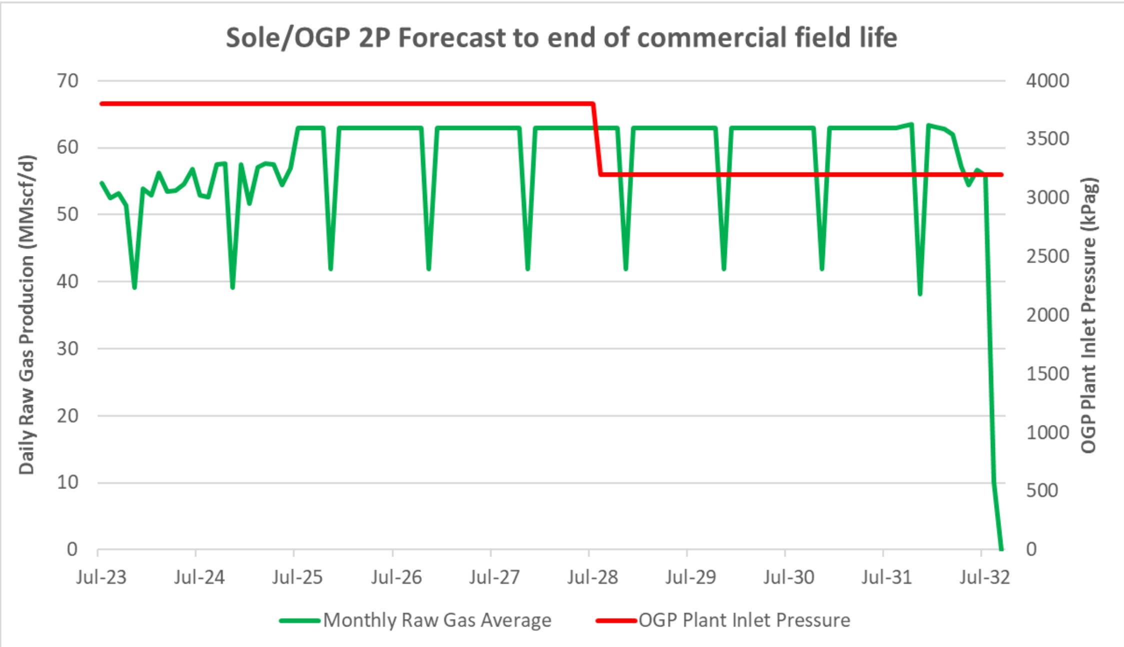


Figure 3-2: Sole/OGP 2P forecast profile

3.6 Activities that Have the Potential to Impact the Environment

This section outlines the activities included in this EP which have the potential to result in environmental aspects or hazards, leading to impacts or risks on receptors.

3.6.1 Sole operations

The operation, monitoring and control of the Sole wells is conducted from the OGP via the umbilical, and therefore out of scope. Production, hydrate/scale control and internal corrosion control will operate within a closed-loop system. The only planned discharge during Sole operations is water-based hydraulic fluid from the operational control and testing of the subsea well valves.

There are two high-pressure (HP) and two low-pressure (LP) hydraulic lines within the Sole umbilical, which contain hydraulic fluid. Hydraulic fluid will be discharged during valve integrity testing and when the wells are brought online or taken offline. Hydraulic fluid is released on valve closure of any of the valves, plus movement open or closed for the choke. Approximately 3 L of hydraulic fluid is discharged with each valve actuation, estimated to be 1,500 – 5,000 L across all valves per year.

3.6.2 PB non-production

There are no planned discharges associated with the PB non-production phase, except during IMR activities such as function testing, refer to Section 3.6.3. There is no ongoing injection of chemicals into the PB infrastructure for hydrate, scale or corrosion control.

3.6.3 IMR

IMR programs are undertaken on each asset's infrastructure to confirm and maintain the integrity of the systems. IMR programs are detailed in the Sole and PB accepted Safety Cases for subsea infrastructure and accepted WOMPs for wells. Each asset has an Asset IMP that details the frequency, management, monitoring, mitigation and inspection activities determined necessary to ensure integrity is maintained for the infrastructure. The IMP covers all aspects of asset lifecycle management, and has been developed around the following fundamental processes:

- definition of system limits
- definition of the organisation and allocation of responsibilities
- use of standards and risk assessment for determining appropriate controls and mitigation measures to reduce risk to ALARP
- continuous assurance and effective review of the system.

As detailed in the accepted asset Safety Case and WOMP, a risk assessment methodology is used to assess potential threats to the subsea assets, risk mitigations and determine appropriate integrity monitoring plans including required frequency of subsea inspections. As part of WOMP requirements, Well Integrity Testing and general visual inspections (GVI's) with umbilical trouble shooting for PB wells will be performed prior to July 2025, GVI' will be conducted every 2 years post next campaign. On 04 November 2023 an anode skid was installed at Patricia-1 well in line with integrity management requirements under the WOMP. GVIs and umbilical trouble shooting will be also undertaken in the Sole assets as part of WOMP requirements.

The maximum interval between inspections is 5 years, with the actual interval bought forward depending on the findings of the previous inspections.

Inspection, maintenance and repair programs consist of activities such as:

- inspection of the infrastructure (Section 3.6.3.1)
- maintenance or repair of the infrastructure (Section 3.6.3.2).

3.6.3.1 Inspections

Inspection of infrastructure will be undertaken by an ROV from a vessel. In some cases, this may involve divers and dive support vessels. The frequency of inspections is up to 5 years according to the schedule outlined in the Asset IMP; however, frequency can vary based on the outcomes of previous inspections. Duration of inspections takes ~4-6 hours per structure and around 5 days per pipeline. The total duration of inspections is ~2-4 weeks for an entire inspection program.

Inspections typically monitor:

- anode wastage
- coating damage
- cathodic protection measurements
- non-destructive testing
- external corrosion
- lack of integrity (missing components, broken loose or damaged appurtenances)
- marine growth
- damage (impact, environment or third party)
- scour
- variation of inspected components or operating conditions
- leaks (gas or liquid).

ILI/pigging of the offshore pipelines may occur with pigs received at the OGP along with any pipeline gas, fluids, debris and chemicals, and therefore outside of scope. Prior to ILI, cleaning of pipeline systems via pushing cleaning pigs down the line to remove residue and to verify internal diameter will occur. This activity will require saturation diving activities associated with pigging operations and installation of pig launchers and receivers. Planned discharges <1 m^3 of water or MEG/water mix, treated with dye, biocide, corrosion inhibitor and oxygen scavenger are expected during the installation and recovery of the pigging equipment.

3.6.3.2 Maintenance and Repair

Maintenance and repair activities may occur during the operational life of the field to:

- prevent deterioration and/or failure of infrastructure.
- maintain reliability and performance of infrastructure.

Maintenance and repair activities are conducted in response to inspection findings, engineering analyses, and/or external events. Activities may be performed by an ROV or divers both deployed from a vessel. Maintenance and repair activities are expected to be rare and infrequent and depend upon the results of the inspections. However, if a repair is required, a vessel will typically be required on site for ~7-60 days per activity.

Planned discharges in the order of 5 m^3 of fluids (e.g. control fluids, MEG) and other chemicals (e.g. sulfamic acid, corrosion inhibitor) may occur. All chemicals that will be or have the potential to be discharged to the marine environment must be assessed and approved prior to use (Section 9.8).

Seabed disturbance may also occur due to the placement of tools/equipment on the seabed (~5 m^2), the replacement of equipment (up to ~25 m^2) or during major pipeline repair (~12,500 m^2). Any marine life or sediment removed from or around the infrastructure will be left in situ.

Table 3-10 summarises the key maintenance and repair activities that may be undertaken. It is noted that this list is not exhaustive and additional activities may be undertaken. The table also includes details of the initiation criteria for the various maintenance programs.

Table 3-10: Key maintenance and repair activities

Maintenance and Repair Type	Description	Initiation Criteria
Cathodic protection system maintenance	Replacement of anodes and continuity straps. Installation of cathodic skids.	Anodes are retrofitted when the existing anodes have depleted, or are about to deplete, beyond 90% of their original volume.
Leak testing	Leak testing is undertaken as required to verify the pressure integrity of components. Leak testing involves filling the component with water dosed with inhibitor, biocide and dye (normally fluorescent) and pressurising the pipeline to an appropriate test pressure.	Where the integrity of the pipeline system must be re-confirmed following a significant wall thickness defect.
Excavation for intervention	To undertake subsea IMR, localised excavation may be required directly adjacent to the subsea system, allowing access to buried infrastructure. This is conducted by jetting, mechanical and/or digging equipment from an ROV, vessel, or by using divers, depending on the location, depth, and seabed characteristics.	Access required to buried subsea infrastructure for inspection, maintenance, or repair.
Marine growth and hard deposit removal	Marine growth and deposits may be removed by water jetting or manual cleaning from an ROV or by divers. Water jetting may use potable or sea water. Chemicals (i.e. sulfamic acid or equivalent) may be used to assist clean-up for removing limescale.	Access required to infrastructure for inspection, maintenance or repair.
Removal of debris	Removal of debris such as ropes and fishing nets that may become entangled on infrastructure.	Inspection identifies hazardous debris on infrastructure.
Rectification of electrical or hydraulic fault	Rectification of electrical or hydraulic fault associated with an umbilical and associated connected equipment. Replacement of electrical/hydraulic/chemical umbilical or jumper. Cleaning and/or testing of connectors.	Electrical or hydraulic fault.
Pipeline repair	Depending upon the damage the pipeline has sustained, pipeline repair may include composite wrap application, mechanical clamp installation and anode retrofit. Pipeline cut-out and section replacement would only be undertaken for loss of containment events where pipeline contents have already been discharged.	Inspection identifies significant corrosion or damage to the pipeline or a loss of containment from the pipeline.
Flowline jumper replacement	Replacement of flowline jumper with either rigid or flexible flowline between existing flange connections.	Flowline jumper has been significantly damaged or not functioning.
Service line / hydraulic capping plate removal and reinstallation	Replacement or institute servicing of hydraulic multi quick connect plate, including cleaning of the interface (ROV and hydraulic) and testing of connections.	Testing/inspection indicates an issue or local control/intervention is required.
Subsea control unit change out	Replacement or institute servicing of subsea control modules including cleaning of interface (ROV, hydraulic and electrical) and testing of connections.	Subsea control modules significantly damaged or not functioning.
Replacement of equipment on the seabed	Replacement of subsea equipment will occur when it cannot be repaired. This would occur in the same location or near the previous location.	Subsea equipment has been significantly damaged or not functioning.
Mattress deployment	Mattresses may be used where electrical or hydraulic leads are observed to be “floating” or additional protection is deemed to be needed for the infrastructure (such as umbilical at trench entry/exit points). Includes the replacement of mattresses.	Inspection identifies electrical or hydraulic leads “floating” or other infrastructure requires physical protection.
Subsea trees, flowlines, well bore penetrations, flanges and mechanical connections servicing	Tensioning, blanking or polymer sealant intervention to restore or preserve integrity to subsea conduits.	Equipment has been significantly damaged or not functioning.
Scour rectification	Scour is filled in using a grout bag positioned under the infrastructure and pumped with grout until the bag supports it. Log and/or concrete mattresses may also be used for scour rectification. Seabed disturbance of up to 2 m^2 may occur.	Inspection identifies potential damage to pipelines or structures.

3.6.4 Support Operations

3.6.4.1 Vessel Operations

Support vessels will be required during IMR activities. Although vessels utilised for previous IMR activities have been sourced locally, international vessels may be also contracted. Selection of vessels will vary depending on the proposed activity and vessel availability. Vessels selected will be managed in line with relevant International and Australian requirements.

Typical vessels utilised for previous inspection activities include the *Bass Trek* and *Silver Star*. The *Bass Trek* has a gross tonnage of 95 tonnes and a fuel capacity of 25 m^3 with fuel spread between numerous tanks (maximum 11.5 m^3). The *Silver Star* has a gross tonnage of 300 tonnes and a fuel capacity of 48 m^3 with fuel spread between numerous tanks (maximum 12 m^3). Maintenance and repair activities are likely to require larger vessels with increased ROV and crane capability. These larger vessel types for repair, rectifications or inspections may have gross tonnage in the order of 7,000 t or more and have a larger fuel tank ranging from 250 m^3 to 500 m^3.

Vessels will undertake operations and hold position using dynamic positioning (DP) or anchoring. Anchoring will be required in areas along the PB and Sole pipelines in shallow waters, where it is too shallow to use DP, or during emergencies (if required).

Vessel lighting is dictated by class, safety, navigational, and working requirements. Therefore, vessels will maintain lighting sufficient for safe operations on deck spaces.

Vessels discharge a variety of wastewater streams to the marine environment including sewage, greywater, food waste, cooling water, brine, and oily bilge water. Fuel bunkering will be undertaken at a nominated shore base or suitable wharf. The estimated daily fuel consumption is 0.2 m^3 to 25 m[4].

Depending on the inspection and maintenance activities required, vessels are likely to be within the Operational Area for 2-4 weeks per activity. Major pipeline repairs, if necessary, could require vessels to be in field for a longer duration, ~8 weeks, excluding weather, operational delays and port calls. Up to two vessels may be on site within the Operational Area at any time.

3.6.4.2 ROV

Inspection and/or work-class ROVs are required for inspection, maintenance or repair activities.

A ROV is a tethered underwater vehicle operated by a crew aboard a vessel. They are linked by either a neutrally buoyant tether or often when working in rough conditions or in deeper water a load carrying umbilical cable is used along with a tether management system.

Most ROVs are equipped with a video camera and lights. Additional equipment may include sonars, a manipulator or cutting arm, wall thickness measurement equipment, mechanical and chemical cleaning equipment, water-jetting equipment, grout-bag installation equipment and cathodic potential measurement equipment.

ROVs may use electrics or hydraulics to control the manipulator or cutting arm. Where hydraulics are used to control the arm, a closed system is employed where hydraulic fluid is circulated to move the arms and is designed not to release hydraulic fluid.

Inspection activities may involve the use of acoustic survey equipment including, but not limited to:

- hull or ROV mounted echo sounders
- towed or ROV mounted side scan sonar.

There are occasionally planned discharges associated with the use of ROVs; discharges are generally limited to cleaning operations where ROVs are used to transport an apply products like Calciwash to remove hard calcareous growth from subsea equipment, particularly tooling ports. Planned discharges ~1 m^3 are expected from this activity per location subject to the level of cleaning requirements. ROVs and

[4] Small vessel based on Bass Trek used for 2017 GVI. Large vessel based on Seven Eagle used for 2019 IMR campaign in the Otway offshore Victoria.

other subsea equipment such as debris baskets and acoustic beacons may be temporarily landed on the seabed. The footprint of these is typically <25 m^2.

3.6.4.3 Helicopter

Helicopters may be used during IMR activities for personnel, equipment and material transfers. Helicopter flights may occur 1-2 times per week during IMR activities. The estimate fuel consumption per flight is ~1.2 m^3.

3.6.5 Summary of Disturbance, Discharges and Emissions

Table 3-11 describes the expected planned disturbance, discharges, and emissions from the activity. Environmental Aspects are described in detail in Section 6.

Table 3-11: Summary of Planned Disturbance, Discharges and Emissions

Activity	Planned Disturbance, Discharge or Emission	Environmental Aspect	Details (includes indicative quantities where relevant)
Sole Infrastructure			
Operations	Hydraulic fluid will be discharged during valve integrity testing and normal operations as well as when the wells are brought online or taken offline.	Subsea discharges	Estimated of 1,500 – 5,000 L across all valves per year.
PB Infrastructure			
Non-production	None	N/A	N/A
IMR			
IMR	Planned discharges from: • Maintenance and repair activities.	Subsea discharges	Up to 5 m^3 of fluids and other chemicals.
	Direct seabed disturbance from temporal placement of tools, equipment on the seabed or during major pipeline repair.	Seabed disturbance	Up to 12,500 m^2.
Support Operations			
Vessel Operations	Planned marine discharges from the vessels will include: • sewage and grey water • putrescible waste • cooling water and brine • deck draining and bilge	Surface discharges	2-4 weeks per IMR activity. If major pipeline repair is required, it could take up to 8 weeks.
	Anchoring in shallow waters	Seabed disturbance	Footprint will be within the Operational Area
	Vessel lighting for operations.	Light emissions	Vessels will generate light emissions; emission may vary with environmental conditions and operating requirements.
	DP System / thrusters.	Underwater Sound Emissions	Vessels will generate continuous sound; sound levels may vary with environmental conditions and operating requirements.
	Fuel consumption within the Operational Area.	Air emissions	The estimated daily fuel consumption is between 0.2 m^3 and 25 m^3.
ROVs	Inspection activities may involve the use of acoustic survey equipment.	Underwater Sound Emissions	Acoustic surveys will generate impulsive sound; underwater sound levels sound levels vary according to the equipment used.
	Discharges from cleaning operations	Subsea discharges	Occasional discharges (e.g. Calciwash).
	ROV lighting for operations	Light emissions	ROVs will generate light emissions
	Temporary wet paring	Seabed disturbance	Footprint ~25 m^2.
Helicopter	Helicopter will result in some level of underwater noise, particularly when at lower altitudes for landing/take-off at the vessel.	Underwater Sound Emissions	Helicopters will generate continuous sound; underwater sound levels are expected to be limited to tens of meters from the source.
	Fuel consumption within the Operational Area.	Air emissions	Fuel consumption is estimated as ~1.2 m^3 per flight.

4 Description of the Environment

A detailed description of the environment in the South-east Marine Region, is provided in Appendix 2, for all physical, ecological and social receptors. This section provides regulatory context, description of the EMBA, regional setting and a summary of the key ecological and social receptors.

Threatened species recovery plans, threat abatement plans and species conservation advices relevant to the receptors identified in this section are detailed in Table 2-3.

4.1 Regulatory Context

The Regulations define 'environment' as the ecosystems and their constituent parts, including people and communities, natural and physical resources, qualities and characteristics of locations, places and areas, the heritage value of places and includes the social, economic and cultural features of those matters.

In accordance with the Regulations, this section, Appendix 2 and Appendix 3 describe the physical setting, ecological receptors, and social receptors, of the receiving environment relevant to the described petroleum activity.

A greater level of detail is provided for certain receptors, as defined by Regulation 21(3) of the OPGGS(E)R (Cth) which states that particular relevant values and sensitivities may include any of the following:

- the world heritage values of a declared World Heritage property within the meaning of the EPBC Act
- the national heritage values of a National Heritage place within the meaning of that Act
- the ecological character of a declared Ramsar wetland within the meaning of that Act
- the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act
- the presence of a listed migratory species within the meaning of that Act
- any values and sensitivities that exist in, or in relation to, part or all of:
  - – a Commonwealth marine area within the meaning of that Act
  - – a Commonwealth land within the meaning of that Act.

With regards to Regulation 21(3)(d) and 23(3)(e) of the OPGGS(E)R (Cth), more detail has been provided where threatened or migratory species have a spatially defined BIA – as they are spatially defined areas where aggregations of individuals of a regionally significant species may display biologically important behaviours such as breeding, foraging, resting or migration.

With regards to Regulation 21(3)(f) more detail has been provided for:

- KEFs as they are considered a conservation value under a Commonwealth Marine Area
- AMPs as they are enacted under the EPBC Act.

4.2 Environment that May be Affected

The EMBA by the petroleum activity has been defined as an area where a change to ambient environmental conditions may potentially occur as a result of planned activities or unplanned events. It is noted that a change does not always imply that an adverse impact will occur; for example, a change may be required over a particular exposure value or over a consistent period of time for a subsequent impact to occur. Table 4-1 and Figure 4-1 detail the Project Areas associated with the petroleum activity that are used to describe the environmental context relevant to the activity and to support the impact and risk assessments.

Table 4-1: Gippsland Offshore Operations Specific Project Areas

Project Area	Description
Operational Area	The Operational Area is defined as: • 500 m buffer on either side of the Sole and PB pipelines • 500 m radius buffer around the Sole and PB wells and subsea infrastructure (as described in Section 3.1.1).

Project Area	Description
	Planned operational discharges, physical presence and seabed disturbance that occur during the petroleum activity will be within the Operational Area. Appendix 3.1 details the EPBC Protected Matters Report for the Operational Area.
Spill EMBA	The boundary of the Spill EMBA is defined using the hydrocarbon exposure thresholds (Table 6-26) for the accidental release of marine diesel oil (MDO) from a vessel collision (Section 6.8). Based on stochastic modelling results (RPS 2021), the EMBA overlaps Victoria, NSW and Tasmanian state waters (Figure 4-1), Six Integrated Marine and Coastal Regionalisation of Australia (IMCRA) Provincial Bioregions (Bass Strait Shelf Province, Southeast Shelf Transition, Tasmanian Province, Southeast Transition, Central Eastern Shelf Province and Central Eastern Province) and Australia Economic Exclusive Zone (EEZ), which are described further in Appendix 2. Appendix 3.2 details the EPBC Protected Matters Report for the spill EMBA.

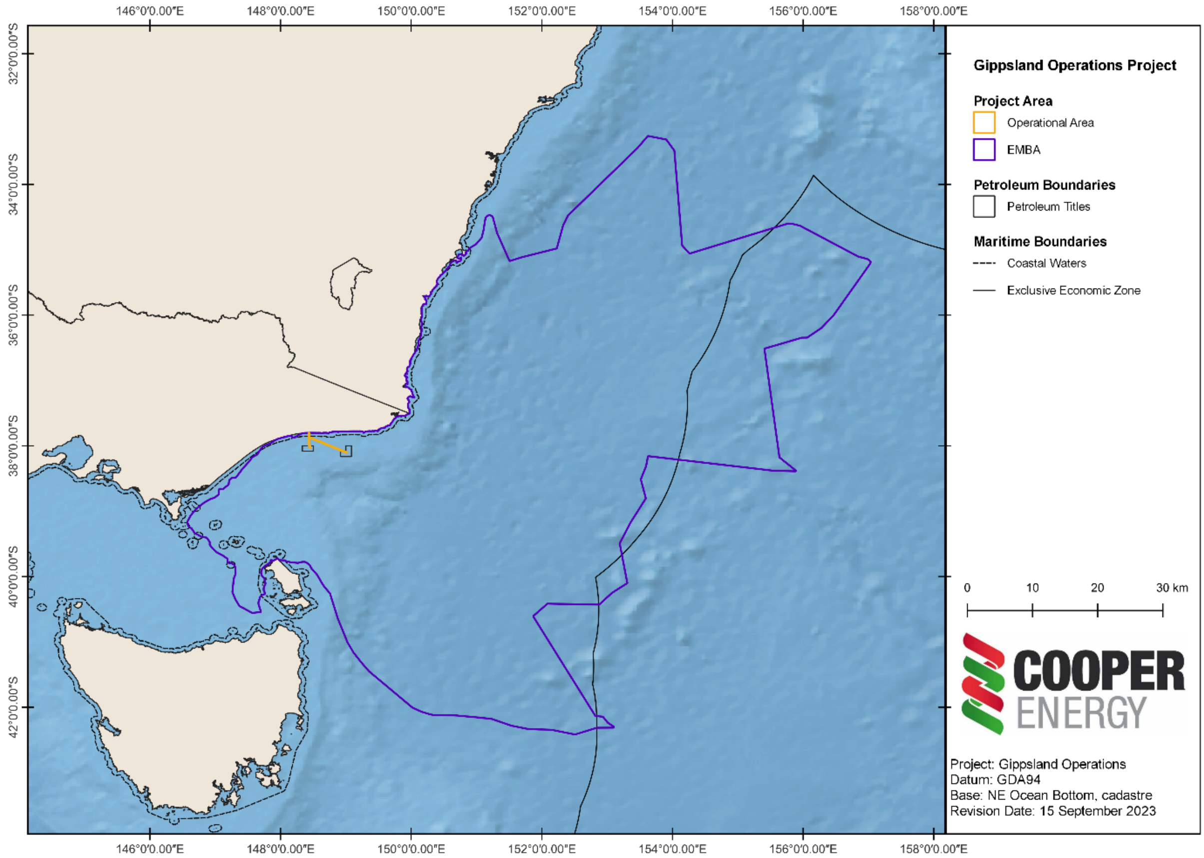


Figure 4-1: Gippsland Offshore Operations Operational Area and Spill EMBA

4.3 Regional Setting

The Sole and PB gas fields, subsea wells, and associated infrastructure are in Commonwealth waters, with the Sole and PB pipelines and umbilicals traversing both State and Commonwealth waters.

The assets within Commonwealth waters are in the Commonwealth South-east Marine Bioregion and the IMCRA Twofold Shield Meso-scale Bioregion. The continental shelf within the Twofold Shelf Meso-scale Bioregion has a very steep inshore profile (0–20 m), with a less steep inner (20–60 m) to mid (60–120 m) shelf profile, and a generally flatter outer shelf plain (120–160 m) southwest of Cape Howe (IMCRA 1998). The sediments on Twofold Shelf are poorly sorted, with a median of 92% sand and 8% gravel; they are composed of organic material, with a median of 64.5% calcium carbonate (IMCRA 1998).

In 2000, a video survey was undertaken along the PB pipeline and identified four general habitat associations on the seabed (CEE Consultants 2001):

1. **Medium sand and shell grit:** Extensive areas with pronounced sand waves or irregular pattern of small troughs and crests. Epibiota was generally sparse to relatively commonly occurring sea pens, occasional sponges and stalked colonial ascidians. Sea pens were particularly common at sites from

22–27 m water depths (within State waters). Sea pens can contract into the sediment and appear to be well adapted to the shifting sands and currents of the Ninety Mile Beach.

2. **Shell accumulations:** Patchy areas of the seabed comprised old large shells, predominantly bivalves and scallops. In areas where shells were the only epibiota present, the proportion of sand coverage ranged between 0 to 20%.
3. **Sponge garden:** Small and distinct area of large sponges and bryozoans at ~50 m water depth. Sponges included fans, spheres, massives, cups and fingers. Bryozoans included lace-like corals, concertina fans, perforated rigid sheets and fern-like branches. This suggests that although the seabed is predominantly sand and grit, it is stable enough to allow these associations to grow over years. Sponge gardens attracted schools of jackass morwong, butterfly perch and individual gurnard and leatherjackets.
4. **Introduced New Zealand screw shell aggregations:** New Zealand screw shell (*Maoricolpus roseus*) was commonly found at water depths greater than 40 m (within Commonwealth waters), sometimes forming dense beds covering 100% of the seabed.

The habitat associations identified in the survey area are expected to be widespread in similar habitats throughout eastern Bass Strait (CEE Consultants 2001, CEE Consultants 2003).

Similar habitat associations on the seabed are expected in the Sole assets (CEE Consultants 2003). The epibiota of the region is sparse and characterised by scallops and other large bivalve molluscs, crabs, sea squirts, sea pens, sponges and bryozoans (CEE Consultants 2003). A variety of mobile crabs, prawns and brittle stars are also relatively common. Many of the mobile epibiota appear to occur in aggregations from time to time (scallops, prawns and crabs), while some of the fixed epibiota occur in patches (sponges and bryozoans) (CEE Consultants 2003).

A 2020 habitat survey at BMG (Ierodiaconou, et al. 2021) identified visible benthos and substrate at flowlines as including black/octocorals, encrusting sponges, massive sponges, Actiniaria (anemones), bryozoans, ascidians, biofilm, rubble, burrows, shells, pebble/gravel and sand. Benthic habitats at the BMG well locations / manifolds were also assessed. The BMG habitat survey serves as a reasonable proxy for Sole well seabed conditions and associated fauna as Basker-A and Manta are located within similar water depth to the Sole wells.

A Sole Development – Pipeline Route geoacoustic survey was undertaken in January of 2003 to characterise the bathymetry, seabed features, shallow geology, sediments and benthic habitat along the sole pipeline route (Thales 2003).

Key survey findings are:

- bathymetry is generally gentle sloping between water depths of 14.7 m ~200 m south of the Sole HDD beach crossing and 125.8 m at the Sole-3 location
- featureless seabed comprised of clays, silts, sands and gravel and some consolidated bedded sediments
- average seabed slopes along the pipeline route do not exceed 0.25° (1:230). From the available bathymetry data, the seabed topography along the pipeline route does not appear to contain significant cross slopes exceeding 10° (1:5.7).
- poorly to well-defined megaripples and uneven surfaces were identified in a number of places along the proposed pipeline route. Megaripples are characterised by wavelength of less than 5 m to ~20 m, amplitudes less than 0.30 m and crest generally trending northeast suggesting a northwest to southeast primary current orientation.

In 2020 a survey and inspection of the pipeline route from the Sole PLEM to the inshore HDD was conducted. The area was described as having a generally flat seabed of sand or silt with some patches of gravelly rock bed. Infield infrastructure was identified as having a range of overlying marine growth including hydroid grass, soft coral, bryozoan and coloured sponge in patches (Fugro Australia Marin 2022).

Water quality is expected to be typical of the offshore marine environment. Gippsland Basin is well mixed given it is a higher-energy environment exposed to frequent storms and significant waves. Currents within Bass Strait are primarily driven by tides, winds and density driven flows. During winter the South Australian current moves dense, salty water eastward from the Great Australian Bight into the western margin of the Bass Strait (Sandery and Kanpf 2007). In winter and spring, waters within Bass Strait are well mixed with no obvious stratification, while during summer the central regions of the strait become stratified (Baines and

Fandry 1983, Middleton and Black 1994). The surface currents in the region generally flow in northeast to southwest with different intensities depending on the month. The average current speed ranged between 0.18 m/s and 0.24 m/s while maximum current speeds ranged between 0.59 m/s (December) and 0.96 m/s (March) (RPS 2021).

Wave energy in this bioregion is relatively low compared to the Otway and central Bass Strait regions. Water temperatures are also generally warmer than elsewhere on the Victorian open coast due to the influence of the East Australian Current (Parks Victoria 2003).

Upwelling zones are important for marine ecosystems due to the elevated primary and secondary productivity associated with upwelling systems (Huang and Wang 2019). Upwelling conditions are common along the eastern and southern coasts of Australia, with a recent study identifying upwelling in the southern NSW and eastern Victoria area throughout the year inshore of Gippsland, with a stronger upwelling event in the autumn. The NSW upwelling system is formed of several interconnecting upwelling events, of which the closest to the Gippsland area is the KEF called East of Eden Upwelling. This KEF upwelling system is a persistent/semipersistent system that occurs continuously from austral spring to autumn, although during mid to late autumn the upwelling may be either lacking or isolated and restricted to the coast (Huang and Wang 2019).

The coast of the Twofold Shelf Meso-scale Bioregion is dominated by dunes and sandy shorelines, with occasional rock outcrops; and there are extensive areas of inshore and offshore soft sediments nearshore (Barton, Pope and S 2012). This region also has occasional low-relief reef immediately beyond the surf zone (Parks Victoria 2003).

4.4 Ecological and Social Receptors

Table 4-2 and Table 4-3 show the presence of ecological and social receptors that may occur within the Operational Area and Spill EMBA. Further descriptions and maps of these ecological and social receptors are provided in the Appendix 2.

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

- presence of listed threatened and/or migratory species, or threatened ecological communities, identified in the EPBC protected matter searches (Appendix 3.1 and Appendix 3.2)
- presence of BIAs and habitats critical to the survival of the species (Appendix 3.1 and Appendix 3.2)
- presence of important behaviours (e.g. foraging, roosting, breeding) by fauna, including those identified in the EPBC protected matter searches (Appendix 3.1 and Appendix 3.2)
- they provide an important link to other receptors (e.g. nursery habitat, food source)
- they provide an important human benefit (e.g. recreation and tourism, aesthetics, commercial species, economic benefit).

4.4.1 Ecological Receptors

Table 4-2 Presence of Ecological Receptors within the Operational Area and Spill EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]		Spill EMBA[6]	
Habitat	Shoreline	Rocky	• foraging habitat • nesting or breeding habitat • haul-out sites	-	**Present** The coastal environment within the Operational Area is comprised predominately of sandy shores. Sandy beaches can support a variety of infauna and provide nesting and/or foraging habitat to shorebirds and seabirds and pinnipeds. Detailed existing environment descriptions of these shoreline habitats is described in Appendix 2, Section 3.1.	✓	**Present** The coastal environment within the spill EMBA is comprised predominately of sandy shores with sections of rocky outcrops. Each of these shoreline types has the potential to support different flora and fauna assemblage due to the different physical factors (e.g. waves, tides, light etc.) influencing the habitat, for example: • Australian fur-seals are also known to use rocky shores for haul-out and/breeding • bird species may use rocky and sandy areas for roosting and breeding sites • marine turtles use sandy beaches for nesting • rocky coasts can provide a hard substrate for sessile invertebrate species (e.g. barnacles, sponges, etc.) to attach to • artificial structures (e.g. groynes, jetties) while built for other purposes (e.g. shoreline protection, recreational activities) can also provide a hard substrate for sessile invertebrates to attach to. Detailed existing environment descriptions of these shoreline habitats within the spill EMBA is described in Appendix 2, Section 3.1.
		Sandy	• foraging, nesting and/or breeding habitat • haul-out sites	✓		✓	
		Artificial	• sessile invertebrates	-		✓	
	Mangroves (Dominant Habitat)	Intertidal/ subtitle habitat, mangrove communities	• nursery habitat • breeding habitat	-	**Not present** There are no known mangroves habitat in the Operational Area.	✓	**Present** Mangrove dominated habitat exists within Gippsland and Central NSW within the spill EMBA. Mangroves have been recorded in all Australian states except Tasmania. One species, *Avicennia marina*, occurs in Victoria: typically, in inlets or estuaries).

[5] Combination of an EPBC PMST of the Operational Area, and characteristics of the Gippsland environment sector described in Appendix 2, have been used to describe ecological receptors that may occur within the Operational Area.

[6] Combination of an EPBC PMST for the spill EMBA area, and characteristics of the Gippsland, Bass Strait and Central NSW environment sector described in Appendix 2, have been used to describe ecological receptors that may occur within the spill EMBA.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]	Spill EMBA[6]
					Species diversity increasing as they occur further to the north in NSW. Mangrove habitats nearshore along the Victorian coast are distributed in South Gippsland around the French Island National Park and coast around Port Welshpool. Dominant mangrove habitat based on National Intertidal-Subtidal Benthic Habitat Classification Scheme are present in the spill EMBA within Victoria and NSW. Detailed existing environment descriptions of these mangrove habitats within the spill EMBA is described in Appendix 2, Section 3.2.
	Saltmarshes (Dominant Habitat)	Upper intertidal zone, salt marsh habitat, habitat for fish and benthic communities	• nursery habitat • breeding habitat	- **Not present** There are no known saltmarshes habitat in the Operational Area.	✓ **Present** Saltmarsh is identified in the spill EMBA. Saltmarsh habitats are widespread along the Australian coast and mostly occur in the upper intertidal zone. Saltmarsh environments are much more common in northern Australia, compared to the temperate and southern coasts (i.e. NSW, Victoria, Tasmania) (Boon, et al. 2011). Saltmarsh dominated habitat with greater than 10% coverage of saltmarsh occurs along most of the coastline of the spill EMBA in Victoria. In the broader region within the spill EMBA, extensive saltmarsh occurs behind the sand dunes of Ninety Mile Beach in Gippsland Appendix 2, Section 3.3). Detailed existing environment descriptions of these saltmarsh habitats within the spill EMBA is described in Appendix 2, Section 3.3.
	TECs	Native plants, animals and other organisms interacting with unique habitats	• nursery habitat • breeding habitat • provides habitat for flora and fauna • coastal buffer against erosion • may influences drainage and hydrodynamic regimes	✓ **Present** TECs provide wildlife corridors or refugia for many plant and animal species. Listing TECs provides a form of landscape or systems-level conservation (including threatened species). Two TECs were identified in the EPBC PMST for the Operational Area (Appendix 3.1); however, only one, Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, has a potential coastal interface. Only a small area of this TEC (~0.1 km) interacts with the shoreline extent of the Operational Area (Figure 4-2). Detailed existing environment descriptions of these shoreline habitats is described in Appendix 2, Section 3.4.1.	✓ **Present** TECs provide wildlife corridors or refugia for many plant and animal species, and listing a TEC provides a form of landscape or systems-level conservation (including threatened species). 17 TECs were identified in the EPBC PMST for the EMBA (Appendix 3.2), of which many are located without a marine/coastal intersection. The following three TECs have coastal presence: • Giant Kelp Marine Forests of South East Australia • Littoral Rainforest and Coastal Vine Thickets of Eastern Australia • Subtropical and Temperate Coastal Saltmarsh.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]		Spill EMBA[6]	
							Detailed existing environment descriptions of these TECs within the spill EMBA is described in Appendix 2, Section 3.
	Soft Sediments	Predominantly unvegetated soft sediment substrates	• Key habitat	✓	**Present** A survey undertaken along the PB pipeline identified four general habitat associations on the seabed (CEE Consultants 2001): • medium sand and shell grit: extensive areas with pronounced sand waves • shell accumulations: areas of seabed comprised of old large shells • sponge garden: small and distinct area of large sponges and bryozoans at ~50 m water depth. This suggests that although the seabed is predominantly sand and grit it is stable enough to allow these associations to grow • introduced New Zealand screw shell aggregations: the screw shell (*Maoricolpus roseus*) was commonly found at water depths >40 m, sometimes forming dense beds covering 100% of the seabed. A survey of the Sole pipeline route showed a featureless seabed comprised of clays, silts, sands and gravel, and some consolidated bedded (Thales 2003). Detailed existing environment descriptions of soft sediments is described in Appendix 2, Section 3.5.	✓	**Present** Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The biodiversity and productivity of soft sediment habitat can vary depending upon depth, light, temperature, and the type of sediment present. The Gippsland Basin is composed of a series of large sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment. Detailed existing environment descriptions of soft sediment habitats within the spill EMBA is described in Appendix 2, Section 3.5.
	Seagrass	Seagrass meadows (Dominant Habitat)	• nursery habitat • food source	-	**Not present** There is no known seagrass in the Operational Area.	✓	**Present** Seagrass dominated habitat occurs around Melbourne and extends along the Gippsland coast along NSW (Appendix 2, Section 3.6). Seagrass generally grows in soft sediments within intertidal and shallow subtidal waters where there is sufficient light. In East Gippsland, seagrass meadows are common in sheltered bay environments or around small offshore islands. Detailed existing environment descriptions of seagrass habitats within the spill EMBA is described in Appendix 2, Section 3.6.
	Algae	Macroalgae (Dominant Habitat)	• nursery habitat • food source	-	**Not present** Based on Seamap Australia (Butler, et al. 2017), the Operational Area is not a dominant macroalgae habitat.	✓	**Present** Dominant habitat identified within the spill EMBA is located near Mallacoota. Species may include bull kelp and other brown algae species.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]		Spill EMBA[6]	
					Macroalgae was not identified along the PB or Sole pipelines (CEE Consultants 2001, CEE Consultants 2003)		Benthic microalgae are ubiquitous in aquatic areas where sunlight reaches the sediment surface. Macroalgae communities are generally found on intertidal and shallow subtidal rocky substrates. They are not common as a dominant habitat type in East Gippsland or NSW but do occur in mixed reef environments. Detailed existing environment descriptions of algae habitats within the spill EMBA is described in Appendix 2, Section 3.7.
	Coral	Hard and soft coral communities (Dominant Habitat)	• nursery habitat • breeding habitat	-	**Not present** Corals were not identified along the PB or Sole assets (CEE Consultants 2001, CEE Consultants 2003).	✓	**Present** One endangered coral species (or species habitat), Cauliflower Soft Coral, may occur within the spill EMBA (Appendix 3.2). This species is known to contain brightly coloured genera, mostly described as bushy, globe-shaped or arborescent in appearance and a worldwide distribution occurring in tropical waters (TSSC 2020a). The species appears to be confined to estuarine environments in NSW where it occurs in depths of 1 m to 18 m. It is generally found in sandy bottom areas in regions of high current flow, and it can expand and contract in relation to tidal flow cycle (Davis, Harasti and Smith 2015). Typically, soft corals can be found at most depths throughout the continental shelf, slope and off slope regions, to well below the limit of light penetration. Soft corals (e.g. sea fans, sea whips) occur as part of mixed reef environments in waters along the East Gippsland coast and can occur in a variety of water depths. Hard coral species have been recorded in south-eastern Australia (e.g. Kent Group Marine Protected Area near Flinders Island and Wilsons Promontory National Park, Victoria). Detailed existing environment descriptions of coral habitats within the spill EMBA is described in Appendix 2, Section 3.8.
Marine Fauna	Plankton	Phytoplankton and zooplankton	Food source		**Present** Plankton is influenced by regional current patterns within the Operational Area; hence, plankton is likely to be extremely variable during and between years depending on prevailing ocean currents (CEE Consultants 2001).	✓	**Present** Phytoplankton and zooplankton are widespread throughout oceanic environments and is expected to occur within the spill EMBA. Increased abundance and productivity can occur in areas of upwelling, such as Upwelling East of Eden KEF,

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
					Increased abundance and productivity can occur in areas of upwelling, such as Upwelling East of Eden KEF, which intersects the Operational Area (Appendix 2, Section 3.9). Detailed existing environment descriptions of plankton within the Operational Area is described in Appendix 2, Section 3.9.		which intersects the spill EMBA (Appendix 2, Section 3.9). Detailed existing environment descriptions of plankton within the spill EMBA is described in Appendix 2, Section 3.9.
	Seabirds and Shorebirds	Birds that live or frequent the coast or ocean	Listed Marine Species	✓	**Present** 50 seabird and shorebird species (or species habitat) may occur within the Operational Area, of which 34 birds are migratory species (Appendix 3.1). **Threatened species** 44 threatened bird species (or species habitat) may occur within the Operational Area (Appendix 3.1). **BIA** The Operational Area intersects foraging BIAs for the following nine species (Figure 4-3): • antipodean albatross • black-browed albatross • buller's albatross • campbell albatross • common diving petrel • indian yellow-nosed albatross • shy albatross • wandering albatross • white-faced storm petrel. Detailed existing environment descriptions of seabirds and shorebirds identified within the Operational Area is described in Appendix 2, Section 3.10.	✓	**Present** 82 seabird and shorebird species (or species habitat) may occur within the spill EMBA, of which 58 birds are migratory species (Appendix 3.2). **Threatened species** 52 threatened bird species (or species habitat) may occur within the spill EMBA, with 19 of the threatened seabird and shorebird species having important behaviours (roosting, breeding, foraging) identified. **BIA** The spill EMBA intersects 33 seabird and shorebird BIAs. The identified BIAs within the spill EMBA include foraging and breeding (Figure 4-3). Detailed existing environment descriptions of seabirds and shorebirds within the spill EMBA is described in Appendix 2, Section 3.10.
			Listed Threatened Species	✓		✓	
			Listed Migratory Species	✓		✓	
			BIAs	✓		✓	
	Marine Invertebrates	Benthic and pelagic invertebrate communities	• food source • commercial species	✓	**Present** Surveys undertaken in 2000 identified sea pens, sponges and scallops along the PB pipeline. A survey of the Sole pipeline in 2003 identified a featureless seabed (Thales 2003). Refer to Section 4.3 for further information.	✓	**Present** One crustacean species (or species habitat), Furneaux burrowing crayfish, was identified in the EPBC PMST for the spill EMBA (Appendix 3.2). This species is only found on Flinders Island and Cape Barren Island in the Bass Strait, known to occur only from isolated locations in fern-rich gullies on Mount Strzelecki and the Darling Ranges on Flinders Island, and from Mount Munro on Cape Barren Island (Horwitz 1990, Richardson, Doran and Hansen 2006)

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]		Spill EMBA[6]	
							Studies of infauna along the Victorian coast have shown high species diversity, particularly in East Gippsland (Heislers and Parry 2007) Commercially important species may occur within the spill EMBA. Detailed existing environment descriptions of marine invertebrates within the spill EMBA is described in Appendix 2, Section 3.11.
	Fish and Sharks	Fish	Commercial Species	✓	**Present** The absence of reefs and the relatively shallow waters (from the shoreline to ~60 m depth) of the PB pipeline restrict the numbers of commercial species (CEE Consultants 2001). The seabed in the vicinity of the Sole pipeline and wells is sand and soft sediments and the water depth ranges from the shoreline to ~120 m depth. A range of commercial species along the pipeline may occur (CEE Consultants 2003). Given the presence of subsea infrastructure and water depths, commercial fish species may occur within the Operational Area. Refer to Commercial Fisheries in Table 4-3 for further information.	✓	**Present** Commercial fish species may occur within the spill EMBA. Ray finned fish are known to occur within the spill EMBA, given the diversity of habitats and large geographical area. Species that may be present include Pink Ling, and species of wrasse, and flathead. Detailed existing environment descriptions of commercial fish species within the spill EMBA is described in Appendix 2.
			Listed Threatened Species	✓	**Present** Five threatened fish species (or species habitat) were identified within the Operational Area (Appendix 3.1): • Australian grayling (vulnerable) • blue warehou (conservation dependent) • eastern gemfish (conservation dependent) • orange roughy (conservation dependent) • southern bluefin tuna (conservation dependent). Habitat surveys undertaken at BMG subsea infrastructure, located ~30 km south southwest from the Sole wells and pipelines and ~34 km southeast from the PB wells, identified two potential species of conservation value (*Brachionichthyidae* spp., handfish; and *Bodianus frenchii*, *foxfish*). Through consideration of available literature (Stuart-Smith, et al. 2020), it is concluded that the more likely species of handfish observed is the Australian handfish based on recorded distributions. The Australian handfish is	✓	**Present** Seven threatened fish species (or species habitat) may occur within the spill EMBA (Appendix 3.2): • black rockcod (vulnerable) • eastern dwarf galaxias (vulnerable) • orange roughy (conservation dependant) • Australian grayling (vulnerable) • eastern gemfish (conservation dependent) • blue warehou (conservation dependent) • Southern bluefin tuna (conservation dependent). Detailed existing environment descriptions of threatened fish species within the spill EMBA is described in Appendix 2, Section 3.12.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
					not EPBC listed threatened and is listed by the International Union for Conservation of Nature (IUCN) as 'least concern'. Listed threatened handfish species have been observed in Tasmania only; as such, no EPBC listed species are expected to be found within the Operational Area. Detailed existing environment descriptions of threatened fish species within the Operational Area is described in Appendix 2 Section 3.12.		
		Sharks and Rays	Listed Threatened Species	✓	**Present** Five migratory shark species (or species habitat) may occur within the Operational Area (Appendix 3.1). No rays were identified within the Operational Area. **Threatened species** Five threatened shark species (or species habitat) may occur within the Operational Area (Appendix 3.1): • harrisson's dogfish (conservation dependent) • little Gulper shark (conservation dependent) • school shark (conservation dependent) • whale shark (vulnerable) • white shark (vulnerable). No threatened ray species were identified within the Operational Area. **BIA** The Operational Area is within a distribution BIA for the white shark (Appendix 3.1,Figure 4-4). No habitat or potential habitat critical to the survival of the species was identified. Detailed existing environment descriptions of fish and sharks identified within the Operational Area is described in Appendix 2, Section 3.12.	✓	**Present** 11 shark species (or species habitat) may occur within the spill EMBA (Appendix 3.2). The white shark has a known breeding behaviour within the spill EMBA. Six migratory shark species (or species habitat) may occur within the spill EMBA: • longfin mako • oceanic whitetip shark • porbeagle • shortfin mako • whale shark • white shark. One ray species (or species habitat), giant manta ray, may occur within the spill EMBA (Appendix 3.2). The ray species is not linked with biologically important behaviours. **Threatened Species** Seven listed threatened shark species (or species habitat) may occur within the spill EMBA: • dumb gulper shark (conservation dependent) • grey nurse shark (east coast population) (critically endangered) • little gulper shark (conservation dependent) • scalloped hammerhead (conservation dependent) • school shark (conservation dependent) • whale shark (vulnerable) • white shark (vulnerable). There are no threatened ray species identified within the spill EMBA (Appendix 3.2)
			Listed Migratory Species	✓		✓	
			BIAs and habitat critical to the survival of the species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
							BIA The grey nurse shark has a foraging and migration BIA; potential habitat critical to the survival of the species may occur in known aggregations areas in NSW (Commonwealth of Australia 2014). The white shark has a distribution, foraging and breeding BIA within the spill EMBA (Appendix 3.2, Figure 4-4). Identified foraging areas may represent habitat critical to the survival of the species (Commonwealth Australia 2013). No BIAs were identified for ray species within the spill EMBA. Detailed existing environment descriptions of sharks and rays within the spill EMBA are described in Appendix 2, Section 3.12.
		Syngnathids (Pipefish, seahorse, seadragons)	Listed Marine Species	✓	**Present** 26 marine syngnathid species (or species habitat) may occur within the Operational Area (Appendix 3.1). No important behaviours, BIAs or threatened species were identified. Detailed existing environment descriptions of syngnathids within the Operational Area is described in Appendix 2, Section 3.12.3.	✓	**Present** 38 marine syngnathid species were identified within the spill EMBA (Appendix 3.2). No important behaviours or BIAs were identified. **Threatened species** One syngnathid species (or species habitat), white's seahorse, may occur within the spill EMBA (Appendix 3.2). The syngnathid species is not linked with biologically important behaviours. Detailed existing environment descriptions of syngnathids within the spill EMBA is described in Appendix 2, Section 3.12.3.
			Listed Threatened Species	-		✓	
	Marine Reptiles	Turtles	Listed Marine Species	✓	**Present** Four marine turtle species (or species habitat) may occur within the Operational Area, of which all of them are migratory species (Appendix 3.1): • green turtle • hawksbill turtle • leatherback turtle • loggerhead turtle. **Threatened species** The four turtle species identified are listed as threatened: • green turtle (vulnerable)	✓	**Present** Five marine turtle species were identified within the spill EMBA, of which the occurrence of four is linked to foraging behaviours (Appendix 3.2). • loggerhead turtle • green turtle • leatherback turtle • hawksbill turtle • flatback turtle. **Threatened Species** All five turtle species identified are listed as threatened:
			Listed Threatened Species	✓		✓	
			Listed Migratory Species	✓		✓	
			BIAs and habitat critical to the survival of the species	-		-	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
					• hawksbill turtle (vulnerable) • leatherback turtle (endangered) • loggerhead turtle (endangered). **BIA** No BIAs or Habitat Critical to the survival of the species areas were identified within the Operational Area (Appendix 3.1). Detailed existing environment descriptions of marine turtles identified within the Operational Area is described in Appendix 2, Section 3.13.1.		• loggerhead turtle (endangered) • green turtle (vulnerable) • leatherback turtle (endangered) • hawksbill turtle (vulnerable) • flatback turtle (vulnerable). **BIA** No BIAs or habitats critical to the survival of the species were identified within the spill EMBA. Detailed existing environment descriptions of marine turtles within the spill EMBA is described in Appendix 2, Section 3.13.1.
		Snakes	Listed Threatened Species	-	**Not present** No sea snake species were identified within the Operational Area (Appendix 3.1).	✓	**Present** One sea snake species (or species habitat), Broad-headed Snake, may occur within the spill EMBA (Appendix 3.2). No important behaviours identified within the spill EMBA. Detailed existing environment descriptions of snakes within the spill EMBA is described in Appendix 2, Section 3.13.
	Marine Mammals	Seals and Sealions (Pinnipeds)	Listed Marine Species	✓	**Present** Two pinniped species (or species habitat) may occur within the Operational Area (Appendix 3.1). No important behaviours, BIAs or threatened species were identified. Detailed existing environment descriptions of pinnipeds within the Operational Area is described in Appendix 2, Section 3.14.1.	✓	**Present** Two pinniped species (or species habitat) may occur within the spill EMBA (Appendix 3.2). • long-nosed fur-seal • Australian fur-seal. Australian fur-seal species have important behaviours (breeding) identified. **Threatened Species** No identified Pinnipeds species are threatened species within the spill EMBA (Appendix 3.2). **BIA** No BIAs or habitats critical to the survival of the species were identified within the spill EMBA. Detailed existing environment descriptions of pinnipeds within the spill EMBA is described in Appendix 2, Section 3.14.1.
			Listed Threatened Species	-		-	
			BIAs and habitat critical to the survival of the species	-		-	
		Dugong	Listed Marine Species	-	**Not present**	✓	**Present**

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
			Listed Migratory Species	-	No dugong species were identified within the Operational Area (Appendix 3.1).	✓	Dugong species (or their habitat) may occur within the spill EMBA (Appendix 3.2). The species is classified as migratory. **BIA** No BIAs or habitats critical to the survival of the species were identified within the spill EMBA.
			BIAs and habitat critical to the survival of the species	-			
		Whales	Listed Threatened Species	✓	**Present** 24 whale species (or species habitat) may occur within the Operational Area, of which ten are migratory species (Appendix 3.1): • antarctic minke Whale • blue whale • bryde's whale • fin whale • humpback whale • killer whale • pygmy right whale • sei whale • southern right whale • sperm whale. **Threatened species** Four whale species are likely to occur within the Operational Area: • blue whale (endangered) • fin whale (vulnerable) • sei whale (vulnerable) • southern right whale (endangered). **BIA** The Operational Area intersects BIAs for the following two species (Figure 4-5): • pygmy blue whale (possible foraging area BIA) • southern right whale (migration and reproduction BIA). No habitat critical to survival for the species were identified within the Operational Area. Recent studies indicate occurrences of pygmy blue whales in the Gippsland region are likely of vagrant individuals from the NZ pygmy blue whale population; Antarctic blues may	✓	**Present** 29 whale species (or species habitat) may occur within the spill EMBA, of which ten are migratory species (Appendix 3.2). Foraging behaviours were identified for some species (sei, fin, pygmy right and humpback whales), no other important behaviours were identified. **Threatened Species** Four whales are identified as threatened, of which two have known occurrences within the EMBA. • sei whale (vulnerable) • blue whale (endangered) • fin whale (vulnerable) • southern right whale (endangered). **BIA** The spill EMBA intersects a foraging and distribution BIA for the pygmy blue whale, a migration, resting on migration, connecting habitat and known core range BIA for the Southern right whale and a foraging BIA for the humpback whale (Figure 4-5). Under the Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022), habitat critical to survival for the species has been identified as all reproductive BIAs across the species range. The spill EMBA intersects this BIA (Figure 4-5). Detailed existing environment descriptions of whales within the spill EMBA is described in Appendix 2, Section 3.14.2.
			Listed Migratory Species	✓		✓	
			Listed Cetacean Species	✓		✓	
			BIAs and habitat critical to the survival of the species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]	Spill EMBA[6]
				migrate through the region. Overall numbers of blue whales are expected to be low in the Gippsland region at any time of year with Gippsland being outside of predominant feeding grounds for any population of blue whales ((Barlow et al 2023). Southern right whales occur seasonally in all State coastal waters (DCCEEW 2022). Two populations of southern right whale occur in Australian waters: the western and eastern; however, the geographical boundary between these populations is unclear (DCCEEW 2022). The eastern population comprises the coastal waters of Victoria, Tasmania, New South Wales, and Queensland (DCCEEW 2022). Although current southern right whale abundance in Australian waters is still well below estimated historic abundance (<20%), particularly for the eastern population, it is uncertainty of the population status and trends of this population (DCCEEW 2022). Recent estimates of the population size indicate a 4.7% increase per year. for mother-calf pairs for the eastern population (Stamation, et al. 2020, Smith, et al. 2022) Australian southern right whales predominantly occur in aggregations in coastal water reproductive areas where they calve and nurse their young from May to October with peak period of abundance typically in late July and August, although there is within season variability that differs between females with calves and unaccompanied whales (DCCEEW 2022). Southern right whales show preference to <10 m depth (DSEWPC 2012, Charlton, Ward, et al. 2019) and 1 km from shore (DCCEEW 2022). Female-calf pairs generally stay within the calving ground for 2–3 months (DSEWPC 2012, DCCEEW 2022) between June and September, whereas unaccompanied whales (males and females without a calf) are more variable in their occupancy of coastal areas (DCCEEW 2022). The only known area in the south-eastern Australian region where the southern right whale congregate to calve is Logans Beach in Victoria. However, Watson et al. (2021) observed the relocation of a female to a different calving ground at Head of Bight in South Australia. Southern right whales are capital breeders, and the female reproductive cycle is closely linked to their migratory cycle (DCCEEW 2022). Breeding aggregations of Southern Right Whales occur over a wide environmental range across the entire southern Australian coast, although preferred habitat generally includes shallow sloping sandy bottom bays that	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[5]		Spill EMBA[6]
					provide protection from prevailing wind and weather (Elwen and Best 2004, Pirzl 2008). Feeding whales have been observed in the region of the Subtropical Front (41 – 44°S) in January and December (DCCEEW 2022). Feeding has not been observed in coastal Australian waters, although other parts of the Australian Exclusive Economic Zone (EEZ) may be utilised for feeding (Torres, et al. 2013) Detailed existing environment descriptions of whales identified within the Operational Area is described in Appendix 2, Section 3.14.2.		
		Dolphins	Listed Threatened Species	-	**Present** One dolphin species (or species habitat), dusky dolphin, is likely to occur within the Operational Area, this species is a migratory species (Appendix 3.1). No important behaviours, BIAs or threatened species were identified. Detailed existing environment descriptions of dolphins within the Operational Area is described in Appendix 2, Section 3.14.3.	-	**Present** Ten dolphin species (or species habitat) may occur within the spill EMBA (Appendix 3.2). Of which one is listed as migratory and one has an important behaviour (breeding), which is linked to a BIA: • common dolphin • risso's dolphin • dusky dolphin • southern right whale dolphin • spotted dolphin • striped dolphin • long-snouted spinner dolphin • rough-toothed dolphin • indian ocean bottlenose dolphin • bottlenose dolphin **Threatened Species** No identified dolphin species are threatened species within the spill EMBA (Appendix 3.2). **BIA** The spill EMBA intersects a breeding BIA for the Indo-pacific/spotted bottlenose dolphin (Appendix 3.2, Figure 4-6). Detailed existing environment descriptions of dolphins within the spill EMBA is described in Appendix 2, Section 3.14.3.
			Listed Migratory Species	✓		✓	
			Listed Cetacean Species	✓		✓	
			BIAs and habitat critical to the survival of the species	-		✓	
Marine Pests	Invasive Marine Species (IMS)	Established and Exotic	Introduced marine species	✓	**Present**	✓	**Present**

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[5]		Spill EMBA[6]	
					The New Zealand screw shell (*Maoricolpus roseus*) has been considered common generally in water depths greater than 40 m along the Sole and PB pipeline corridors, offshore of Marlo in the Gippsland Basin (CEE Consultants 2001, CEE Consultants 2003)		Multiple IMS are identified as established within Victorian waters. Detailed existing environment descriptions of IMS within the spill EMBA is described in Appendix 2, Section 3.15.

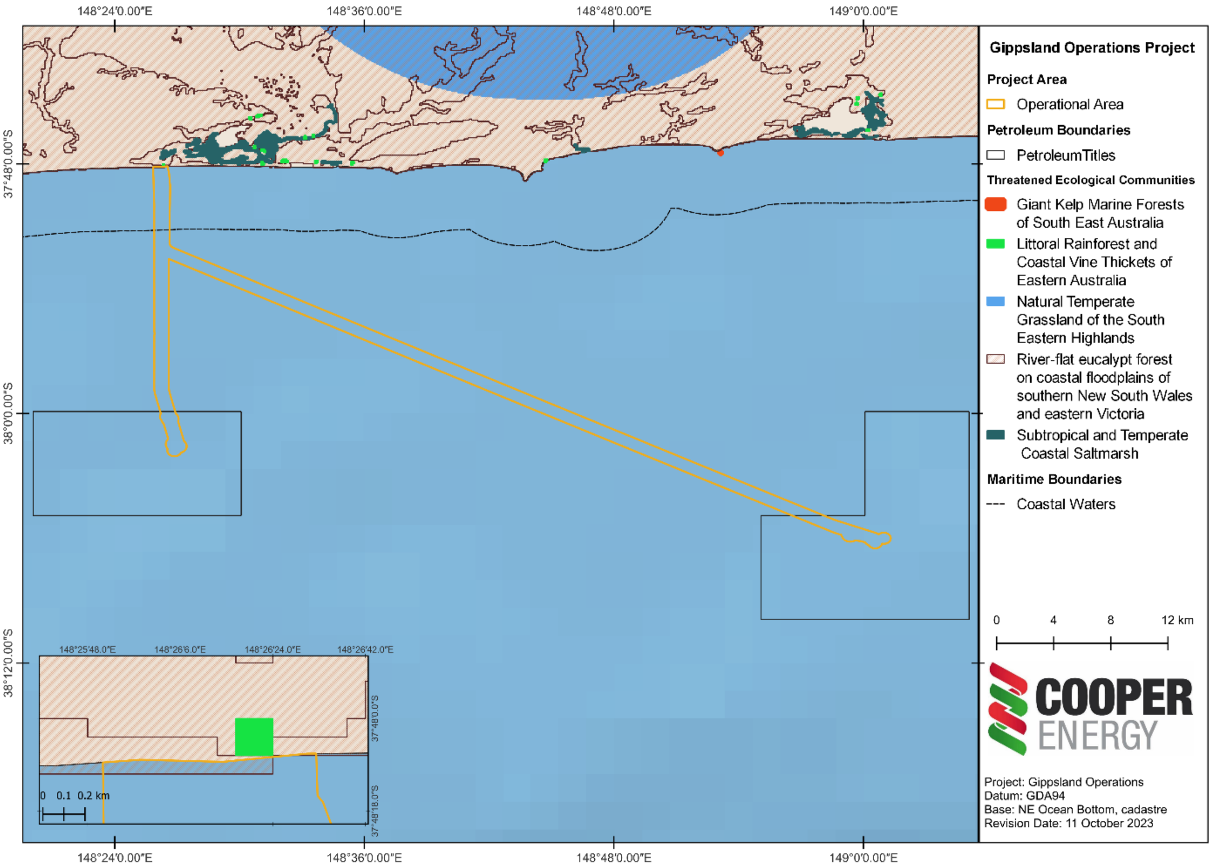


Figure 4-2: TECs within the Operational Area

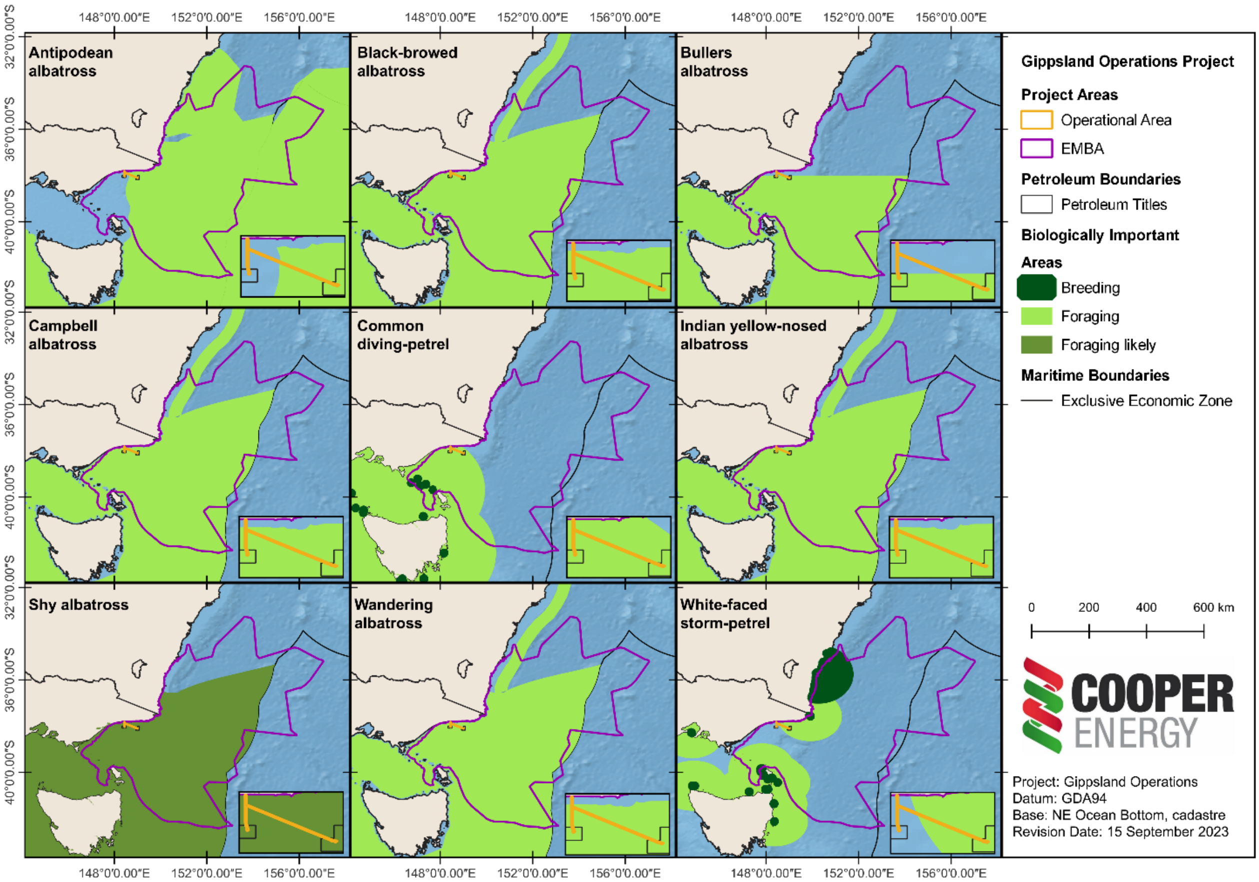


Figure 4-3: Bird BIAs within the Operational Area and Spill EMBA

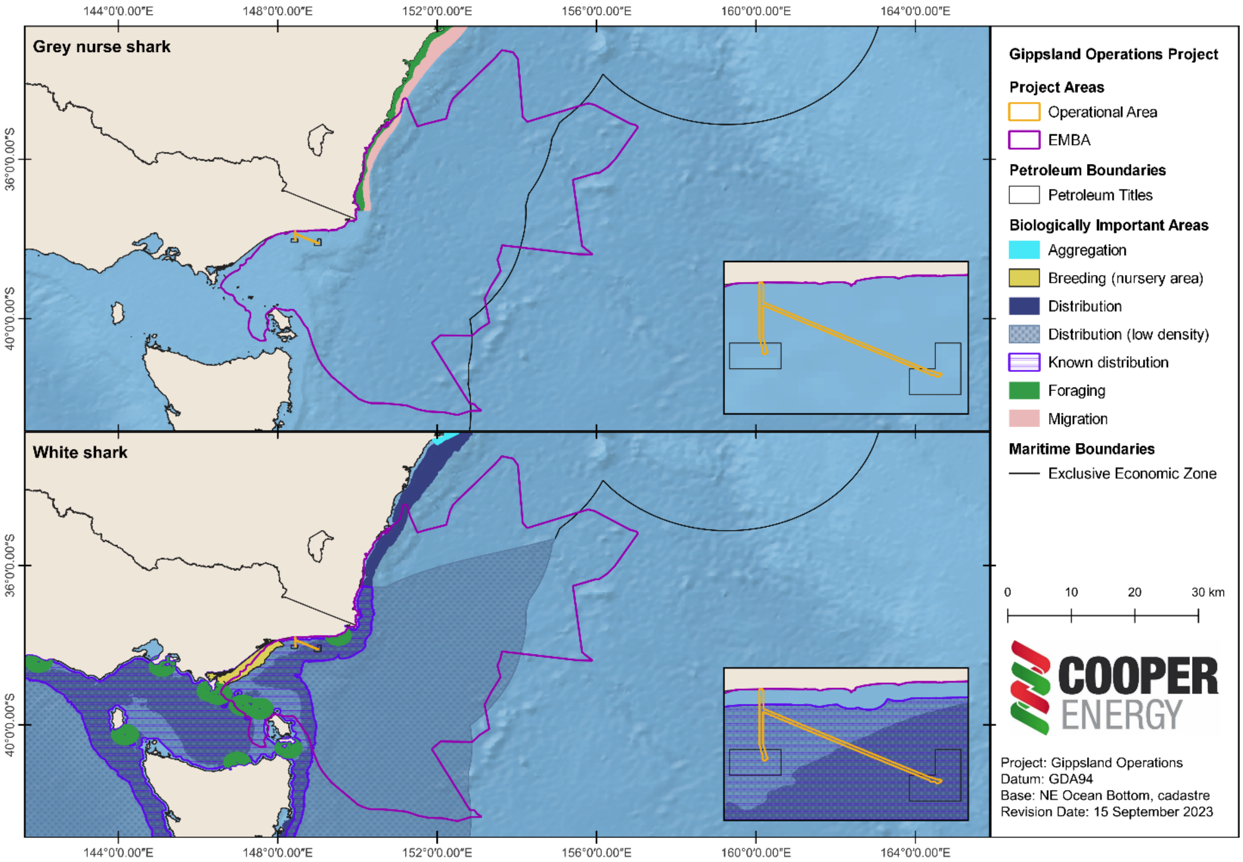


Figure 4-4: Shark BIAs within the Operational Area and Spill EMBA

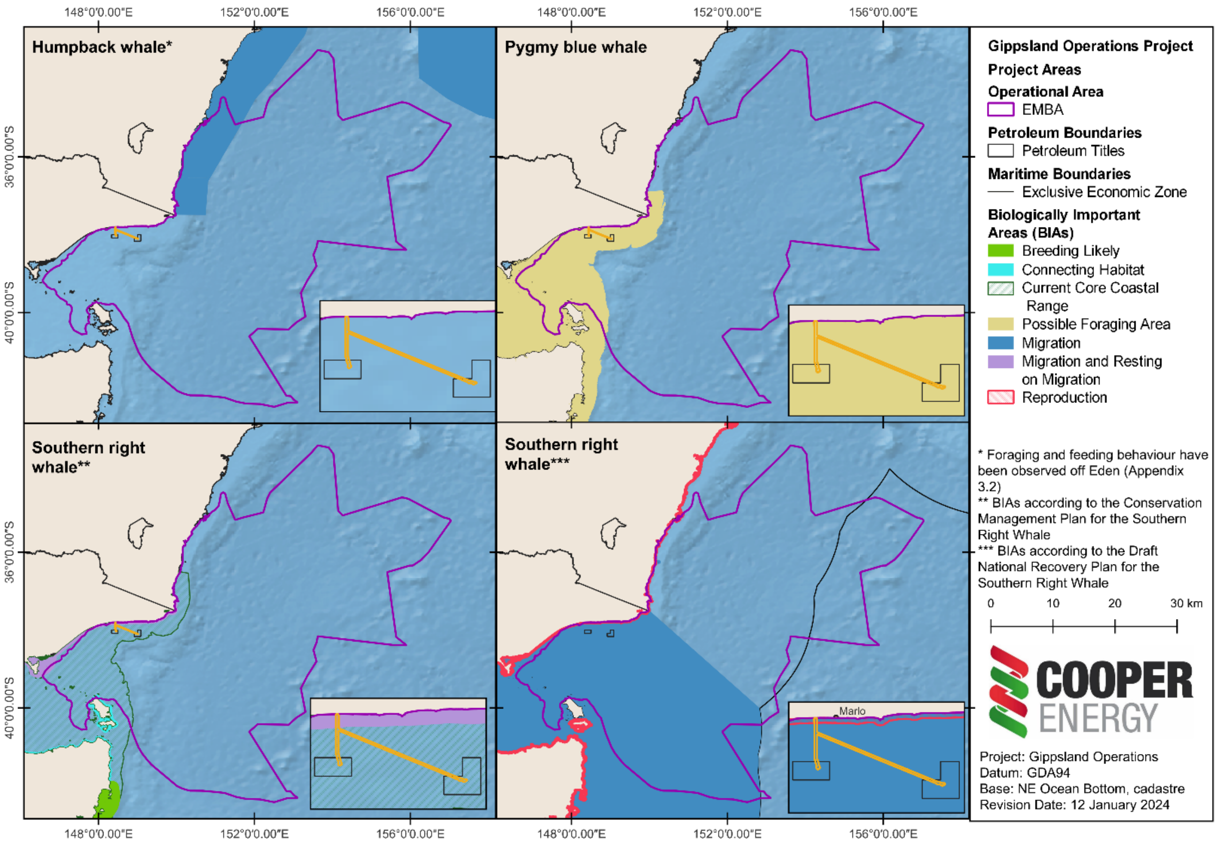


Figure 4-5: Whales BIAs within the Operational Area and Spill EMBA

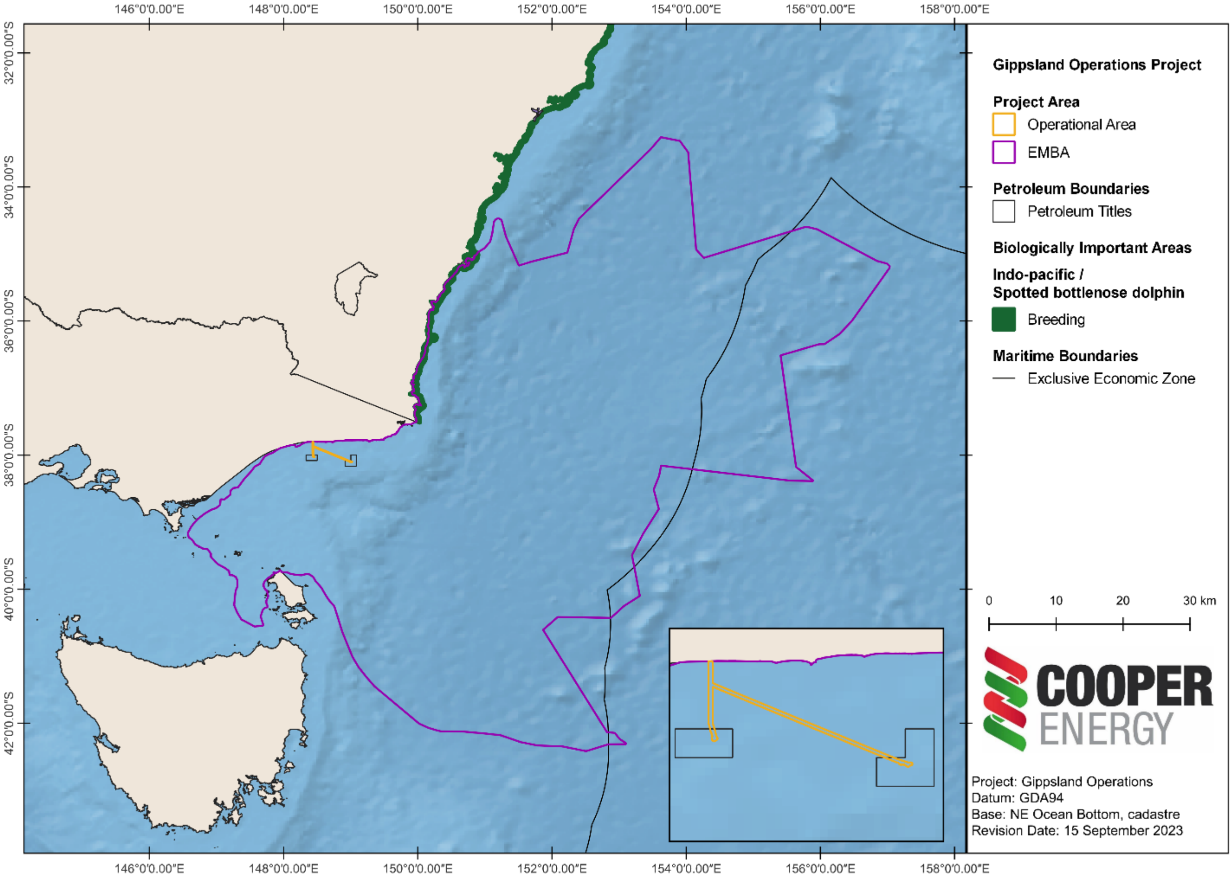


Figure 4-6: Dolphin BIAs within the Operational Area and Spill EMBA

4.4.2 Social Receptors

Table 4-3 Presence of Social Receptors within the Operational Area and Spill EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[7]		Spill EMBA[8]	
Socio-ecological System	Commonwealth Marine Area	Australian Marine Parks	• ecosystems, habitats, communities, species and sea-floor features found • ecological features with high biodiversity value, species richness and endemism • cultural heritage sites	-	**Not Present** No Australian Marine Parks were identified within the Operational Area (Appendix 3.1).	✓	**Present** Five Australian Marine Parks were identified within the spill EMBA (Appendix 3.2): • Jervis • Flinders • Freycinet • Beagle • East Gippsland Detailed existing environment descriptions of these Australian Marine Parks within the spill EMBA is described in Appendix 2, Section 4.3
		KEFs	High productivity (includes episodic productivity)	✓	**Present** The Operational intersects the Upwelling East of Eden KEF (Appendix 3.1, Figure 4-7). The Upwelling East of Eden KEF is an area of episodic upwelling known for high productivity and aggregations of marine life, including blue whales, humpback whales, seals, sharks and seabirds (Appendix 2, Section 4.6). Detailed existing environment descriptions of KEFs within the Operational Area is described in Appendix 2, Section 4.6.	✓	**Present** The spill EMBA intersects six KEFs (Appendix 3.2, Figure 4-7): • Big Horseshoe Canyon • Canyons on the eastern continental slope • Seamounts South and east of Tasmania • Shelf rocky reefs • Tasman Front and eddy field • Upwelling East of Eden Detailed existing environment descriptions of KEFs within the spill EMBA is described in Appendix 2, Section 4.6.
			Aggregations of marine life	✓		✓	
			High biodiversity	-		✓	
			High level of endemism	-		✓	
			Unique Habitat	-		✓	
	State Parks and Reserves	Marine Protected Areas	• ecosystems, habitats, communities, species and sea-floor features found	-	**Not Present** No State Marine Protected Areas were identified within the Operational Area (Appendix 3.1).	✓	**Present** The spill EMBA intersects eight Marine Protected Areas (MPA): • three Victorian MPAs

[7] Combination of an EPBC PMST of the Operational Area, and characteristics of the Gippsland environment sector described in Appendix 2, have been used to describe ecological receptors that may occur within the Operational Area.

[8] Combination of an EPBC PMST for the spill EMBA area, and characteristics of the Gippsland, Bass Strait and Central NSW environment sectors described in Appendix 2, have been used to describe ecological receptors that may occur within the spill EMBA.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
			• ecological features with high biodiversity value, species richness and endemism • cultural and heritage sites				• one Tasmanian MPAs • two NSW MPAs. Detailed existing environment descriptions of these Marine Protected Areas within the spill EMBA is described in Appendix 2, Section 4.5.1.
		Terrestrial Protected Areas	• aggregations of terrestrial life • high productivity • biodiversity	-	**Not Present** No State terrestrial Protected Areas were identified within the Operational Area. However, the northern part of the Operational Area (i.e. shoreline extend) limits with the Ewing Morass Wild Reserve.	✓	**Present** The spill EMBA intersects several terrestrial protected areas that has coastal presence throughout Victoria, NSW and Tasmania. Detailed existing environment descriptions of Terrestrial Protected Areas within the spill EMBA is described in Appendix 2, Section 4.5.2.
	Wetlands	Wetlands of International Importance (Ramsar)	Aggregation, foraging and nursery habitat for marine life	-	**Not Present** No Ramsar wetlands were identified within the Operational Area (Appendix 3.1).	✓	**Present** The spill EMBA intersects with one Ramsar wetland, Gippsland Lakes (Appendix 3.2). Detailed existing environment descriptions of the Ramsar wetland within the spill EMBA is described in Appendix 2, Section 4.4.1.
		Wetlands of National Importance	Aggregation, foraging and nursery habitat for marine life	-	**Not Present** No wetlands of national importance were identified within the Operational Area. However, the northern part of the Operational Area (i.e. shoreline extend) limits with the Ewing's Marsh (Morass). Detailed existing environment descriptions of wetlands of national importance within the Operational Area is described in Appendix 2, Section 4.4.2.	✓	**Present** The spill EMBA intersects 27 Nationally Important Wetlands that has coastal presence (Appendix 3.2): • 15 NSW Nationally Important Wetlands • 11 Victoria Nationally Important Wetlands • One Tasmania Nationally Important Wetlands Detailed existing environment descriptions of wetlands of national importance within the spill EMBA is described in Appendix 2, Section 4.4.2.
	Heritage	Underwater protected Heritage	Historic significance	-	**Not Present** No historic shipwrecks, aircraft or articles associated with these items (older than 75 years) were identified within the Operational Area. No other article protected under the *Underwater Cultural Heritage Act 2018* (UCH Act) was identified within the Operational Area. Presence of underwater historic shipwrecks and aircrafts close to the Operational Area is described in Appendix 2, Section 5.6.1.	✓	**Present** Several shipwrecks were identified within the EMBA. Detailed existing environment descriptions of the present underwater shipwrecks within the spill EMBA is described in Appendix 2, Section 5.6.1.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
		Cultural	• World Heritage Properties • Commonwealth Heritage Places • National Heritage Places	-	**Not Present** No World Heritage Properties, Commonwealth Heritage Places or National Heritage Places were identified within the Operational Area (Appendix 3.1).	✓	**Present** The EMBA does not overlap any World Heritage or National Heritage Places (Appendix 3.2). 12 Commonwealth Heritage Places may exist within the spill EMBA (Appendix 3.2), of which many are buildings or sites without a marine/coastal influence. The following two Commonwealth Heritage Places have coastal interface: • Jervis Bay Territory • Beecroft Peninsula Detailed existing environment descriptions of the culture heritage places within the spill EMBA with a marine or coastal interface are described in Appendix 2, Sections 4.1, 4.2 and 5.6.2
		Indigenous	Indigenous use or connection	✓	**Present** No native titles were identified within the Operational Area. However, the northern part of the Operational Area (i.e. shoreline extend) limits with the Gunaikurnai people native title. The Gunaikurnai people have an approved non-exclusive native title area (VCD2010/001) extending from West Gippsland in Warragul, east to the Snowy River and north to the Great Dividing Range; and 200 m offshore. Research by Holdgate, et. Al (2003) indicates the offshore Gippsland area was subject to a maximum sea-level fall of ~120 m below present, which indicates PB and Sole assets would be present within either terrestrial regions or shallow marine regions in the past. There is therefore potential for sites of archaeological significance to exist; however, during consultation with Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC), no indigenous heritage sites or artefacts were identified in proximity to the offshore infrastructure. During consultation with the Chair of the Eden Local Aboriginal Lands Council, stories were shared on strong links from a local clan of the Yuin Nation to killer whales that would push baleen whales to the shallows where local warriors would kill the whales and share the	✓	**Present** The coastal area of southeast Australia was amongst the most densely populated regions of pre-colonial Australia. Through cultural traditions, Indigenous groups maintain their connection to their ancestral lands and waters. The Gunaikurnai people are recognised as the traditional custodians of the lands and waters within the East Gippsland Shire. The Gunaikurnai people have an approved non-exclusive native title area extending from West Gippsland in Warragul, east to the Snowy River and north to the Great Dividing Range; and 200 m offshore. The GunaiKurnai People are represented by the GLaWAC. No IPAs were identified within the EMBA. Detailed existing environment descriptions of the indigenous heritage within the spill EMBA is described in Appendix 2, Section 5.6.3.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
					soft parts of the whale with the killer whales. This knowledge was shared with whaling fleets around 1800's, who also hired some of the local First Nations community for their whaling skills. There was both a practical symbiotic connection as described, and a spiritual connection, with some clans believing that ancestral spirits would pass into the killer whales. Their Chair also described connections to porpoises that would herd fish to shore with fish then being captured by the community. No Indigenous protected areas (IPAs) were identified within the Operational Area. Detailed existing environment descriptions of the indigenous heritage is described in Appendix 2, Section 5.6.3.		
Socio-economic System	Commercial Fisheries	Commonwealth managed fisheries	Economic benefit	✓	**Present** Fishing effort over a five-year period (2016–2020) (ABARES 2021) was recorded within the 60 nm graticular blocks that overlaps the Operational Area. Seven Commonwealth managed fisheries were identified, of which the following five have recorded fishing effort within the Operational Area (Figure 4-8): • Eastern Tuna and Billfish Fishery • Southern Bluefin Tuna Fishery • Southern and Eastern Scalefish and Shark Fishery (SESSF) Trawl Sector (trawl, danish-seine and squid catch subsectors) • SESSF Scalefish Hook Sector • SESSF Gillnet Hook and Trap Sector (shark hook and net sub-sectors). It is noted that Eastern Tuna and Billfish and Southern Bluefin Tuna Fisheries only have recorded fishing efforts in close proximity to Sole wells. Detailed existing environment descriptions of the Commonwealth fisheries within the	✓	**Present** The spill EMBA overlaps with eight Commonwealth managed fisheries, of which all of them are known to actively fish within the EMBA (Figure 4-8): • Bass Strait Central Zone Scallop Fishery • Eastern Tuna and Billfish Fishery • Southern Bluefin Tuna Fishery • Small Pelagic Fishery • Southern Squid Jig Fishery • SESSF Trawl Sector (trawl, danish-seine and squid catch subsectors) • SESSF Scalefish Hook Sector • SESSF Gillnet Hook and Trap Sector (shark hook and net sub-sectors). Detailed existing environment descriptions of the Commonwealth fisheries within the spill EMBA is described Appendix 2, Section 5.1.1.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
					Operational Area is described Appendix 2, Section 5.1.1		
		State managed fisheries – Vic	Economic benefit	✓	Present Two Victorian state managed fisheries areas overlap the Operational Area, Rock Lobster and Bass Strait fisheries. Note several fisheries active fishing areas are unknown due to limited data available and/or fisher confidentiality. Note, the existing PSZ around operational infrastructure would preclude fishing activity within parts of the Operational Area (i.e. around the wells). Detailed existing environment descriptions of the State fisheries within the Operational Area is described Appendix 2, Section 5.1.2.	✓	**Present** 23 state managed fisheries area overlap the EMBA. Note eight fisheries active fishing areas are unknown due to limited data available and/or fisher confidentiality. • seven Victoria commercial fisheries (sea urchin, scallop, rock lobster, octopus, eel, abalone and corner Inlet) • six NSW commercial fisheries (abalone, lobster, sea urchin and Turban shell, ocean trawl, Ocean Hauling, ocean trap) • ten Tasmania commercial fisheries (abalone, dive, giant crab, Detailed existing environment descriptions of the State fisheries within the spill EMBA is described Appendix 2, Section 5.1.2.
		State managed fisheries – NSW		-		✓	
		State managed fisheries - Tas		-		✓	
	Recreational fisheries	State managed	• Community • recreation	✓	**Present** Most recreational fishing typically occurs in nearshore coastal waters (shore or inshore vessels) and within bays and estuaries. Key fish habitat locations for recreational fishery were identified on major Victorian bays and inlets, such as Port Philip Bay, Western Port, Corner Inlet and Gippsland Lakes (DELWP 2020). Consequently, recreational fishing activity is expected to be minimal in the Operational Area. Note, the existing PSZ around operational infrastructure would preclude fishing activity within some parts of the Operational Area. Detailed existing environment descriptions of the recreational fisheries within the Operational Area is described Appendix 2, Section 5.2.	✓	**Present** Most recreational fishing typically occurs in nearshore coastal waters, and within bays and estuaries; offshore (>5 km) fishing only accounts for ~4% of recreational fishing activity in Australia. The East Gippsland waters have a moderate fishing intensity (relative to other areas within the South-East Marine Region). Detailed existing environment descriptions of the recreational fisheries within the spill EMBA is described Appendix 2, Section 5.2.
	Coastal Settlements	Vic	• economic benefit • community engagement • recreation	-	**Not Present** No coastal settlements were identified within the Operational Area. The community of Marlo (within the Shire of East Gippsland) is the closest coastal settlements to the Operational Area.	✓	**Present** The communities of Lakes Entrance, Mallacoota and Marlo (within the Shire of East Gippsland) are the closest coastal settlements to the Pb and Sole assets. Other coastal communities, such as Eden (NSW) and Flinders Island (Tasmania) are important towns which support a number of communities. The closest heavily populated urban areas to the EMBA, are Melbourne and Sydney.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
	Recreation and tourism	Vic	• economic benefit • community engagement • recreation	✓	**Present** Given the location of the Operational Area, recreation and tourism activities may occur. Primary tourist coastal assets in Gippsland region include the Gippsland lakes, Wilsons Promontory National Park, Phillip Island and Croajingolong National Park (Aither 2019). The Operational Area is outside these areas.	✓	**Present** The Australian coast provides a diverse range of recreation and tourism opportunities, including scuba diving, charter boat cruises, and surfing. Popular tourist destinations include East Gippsland (Victoria); Strahan and the Freycinet Peninsula (Tasmania); Merimbula, Bermagui (New South Wales). Detailed existing environment descriptions of recreation and tourism within the spill EMBA is described Appendix 2, Section 5.4.
	Industry	Shipping	• community engagement • economic benefit	✓	**Present** The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. However, the Operational Area does not coincide with major routes with higher volumes of traffic. Detailed existing environment descriptions of shipping within the Operational Area is described Appendix 2, Section 5.5.1.	✓	**Present** The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. There are several local ports within the EMBA that support shipping industry, such as Eden and Gippsland Lakes. Detailed existing environment descriptions of shipping within the spill EMBA is described Appendix 2, Section 5.5.1.
		Energy Development Areas	Economic benefit	-	**Not Present** The petroleum activity is within Cooper Energy's permits and incorporates the gazetted PSZs (Table 3-2). Therefore, no other petroleum activities are expected within the Operational Area. Offshore wind development is identified as priority area in the Bass Strait region. No declared or proposed areas were identified within the Operational Area. Detailed existing environment descriptions of energy areas within the Operational Area is described in Appendix 2, Section 5.5.2.	✓	**Present** Petroleum infrastructure in Gippsland Basin is well developed, with a network of pipelines transporting hydrocarbons produced offshore to onshore petroleum processing facilities at Longford and Orbost. The Area to Be Avoided is located within the EMBA. Table 4-4 shows the petroleum activities currently being assessed by NOPSEMA or approved (though not yet completed) in the Gippsland region. To evaluate the potential for concurrent petroleum activities, the assessment identified the largest predicted environment that may be affected by planned activities under both the Gippsland EP (~7.82 km around PB wells increasing up to 8.7 km in shallower waters, based on sound emissions [Section 6.5.2.1.3]) and other concurrent petroleum activities. Energy transition has been rapidly growing in Australia. Several offshore areas are declared or waiting to be declared to support the energy transition. Two areas were identified within the spill EMBA: • Gippsland: a declared area ~7 km southwest of the Patricia-1 well

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[7]		Spill EMBA[8]
							• Illawara: a proposed area within NSW ~428 km northeast of the Sole-4 well A renewable energy exploration licence has been granted to Star of the South within Australian Commonwealth waters about 8 to 13 kilometres off the Gippsland coast in Victoria. Detailed existing environment descriptions of energy development areas within the spill EMBA is described Appendix 2, Section 5.5.2
		Submarine Cables and Pipelines	• economic benefit • national utilities	-	**Not Present** No submarine cables were identified within the Operational Area.	✓	**Present** Submarine cables are limited to the subsea floor. Five submarine cables were identified within the spill EMBA. Two additional cables within the spill EMBA are expected to be installed by 2024 and 2025. Detailed existing environment descriptions of the submarine cables and pipelines within the spill EMBA is described Appendix 2, Section 5.5.3.
		Defence	Protection and surveillance	-	**Not present** There are no military areas within the Operational Area.	✓	**Present** The Australian Defence Force conducts a range of training, research activities, and preparatory operations within the EMBA. The closest major base to the Gippsland assets is the multi-purpose wharf at Twofold Bay; and closest primary training ground is the East Australia Exercise Area in southern NSW. Detailed existing environment descriptions of defence areas within the spill EMBA is described Appendix 2, Section 5.5.4.

Table 4-4: Approved and proposed petroleum activities in the Gippsland region

Organisation	Activity	EP and status	Description of activities	Interaction with Gippsland Operations
Esso Australia	Bass Strait Operations	• approved • ongoing activities.	• ongoing operation of subsea hydrocarbon system and facilities • IMR.	• the closest infrastructure (Tuna facility) is ~15 km south of the Operational Area • predicted ensonified area is 4.5 km • interaction is not predicted to occur.
Esso Australia	Gippsland Basin Geophysical and Geotechnical Investigations	• approved • commenced in November 2023.	• geophysical and geotechnical surveys within 11 existing licence areas • activity is expected to take between 2 to 15 days at each of the locations.	• the closest areas of the survey (petroleum titles VIC/L25 and VIC/L4) are ~15 km south of the Operational Area. • predicted ensonified area was not identified in the EP. Therefore, Cooper Energy contours is used as a proxy

Organisation	Activity	EP and status	Description of activities	Interaction with Gippsland Operations
				• interaction is not predicted to occur.
Esso Australia	Gudgeon-1 and Terakihi-1 Plug and Abandonment	• under assessment	• plug and abandonment • activity is expected to take ~30 days per well.	• the wells are located ~53 km south of the Operational Area • predicted ensonified area is 30 km • interaction is not predicted to occur.
Esso Australia	Decommissioning Campaign #1 Steel Piled Jackets	• under assessment	• deviation of section 572(3) of the OPGGS Act • no activities are identified.	• the closest well is located ~30 km south of the Operational Area • interaction is not predicted to occur.
SGH Energy	Longtom Operations	• approved • ongoing activities.	• operation and production of hydrocarbons from subsea wells (temporary shutdown) • IMR (inspections are expected to occur once every three years).	• the closest infrastructure is Longtom gas pipeline and umbilical, which is connected to PB pipeline. Longtom facilities are currently shut down due to an electrical fault. • predicted ensonified area was not identified in the EP. Therefore, Cooper Energy contours is used as a proxy. • temporary interaction may occur around the PB wells, if IMR activities for both projects are undertaken simultaneously.
Carnarvon Hibiscus	West Seahorse-3 Non Production Operations	• approved • ongoing activities.	• West Seahorse-3 well is temporary abandoned • no activities are identified.	• the well is located >100 km west of the Operational Area • interaction is not predicted to occur.
Cooper Energy	BMG Closure Project (Phase 1)	• approved • commenced in October 2023.	• plug and abandonment of BMG wells • removal of structures on the seabed, flowline jumpers and flying leads • activities are expected to take up to ~130 days.	• the BMG Phase 1 Operational Area is ~29 km south of the Operational Area • predicted ensonified area is 30 km • Cooper confirmed that activities under BMG Phase 1 are planned to be completed in 2024. • temporary interaction may occur around PB and Sole wells, as well as the Sole pipeline (water depths >60 m) if vessel activities for both projects are undertaken simultaneously.
Cooper Energy	BMG Closure Project (Phase 2)	• under assessment	• removal of structures on the seabed • removal of flowlines and umbilicals • inspection and maintenance	• the BMG Phase 2 Operational Area is located ~30 km south of the Operational Area • predicted ensonified area is 8.6 km • interaction is not predicted to occur.

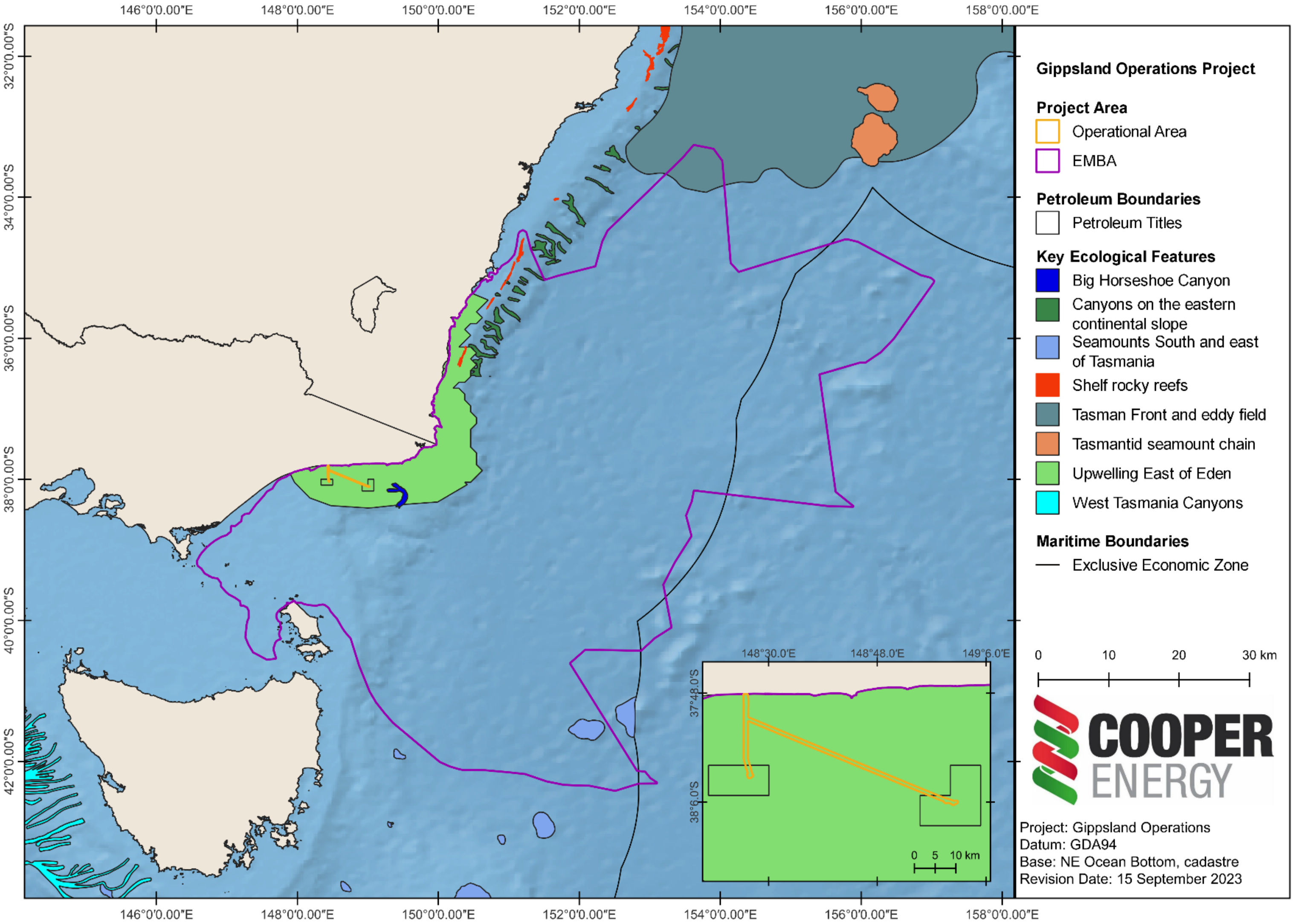


Figure 4-7: KEFs within the Operational Area and Spill EMBA

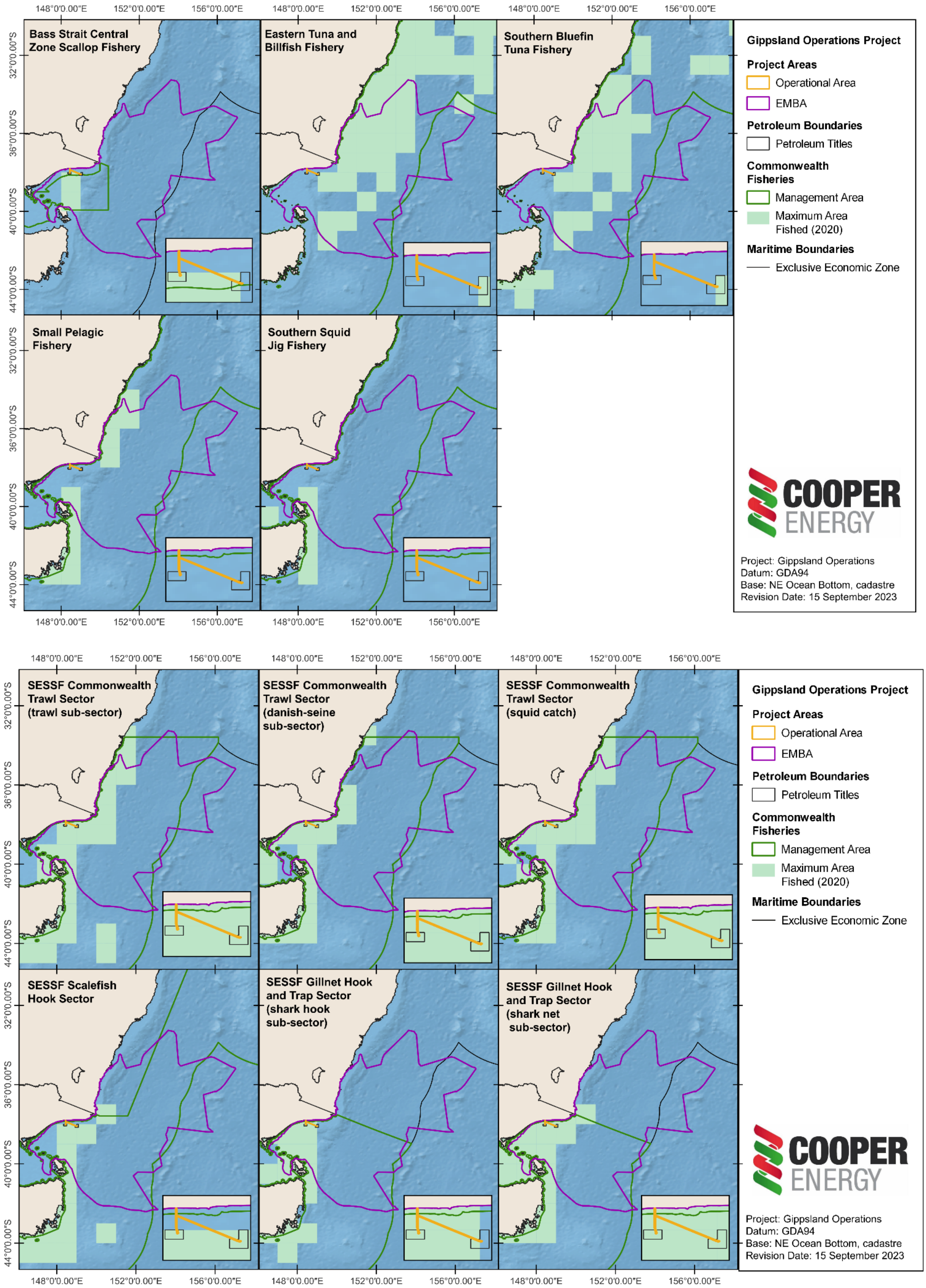


Figure 4-8: Commonwealth managed fisheries with recorded fishing effort within the Operational Area and Spill EMBA

5 Environmental Impact and Risk Assessment Methodology

The Regulations require an EP be prepared which details the impacts and risks, appropriate to the nature and scale of the activity.

This EP provides the environmental impact and risk evaluation for the Gippsland Offshore Operations activities, by adopting the Cooper Energy Risk Management Protocol. This Protocol is consistent with the approach outlined in ISO 14001 (Environmental Management Systems), ISO 31000:2009 (Risk Management) and HB 203:2012 (Environmental Risk Management – Principles and Process).

Figure 5-1 provides the six-step process adopted for the evaluation of impacts and risks associated with the activity, this process is integrated into the Cooper Energy risk assessment methodology.

Figure 5-1: CEMS Risk Management Protocol – Six Step Process

Further details of the environmental impact and risk assessment methodology are provided in the following sections, including criteria for assessment and risk ratings.

A Risk Register is 'the managed repository of key risk information maintained by each Business Area'. It is a living part of risk management that is continually reviewed and updated. In accordance with the CEMS Risk Management Protocol, each Business Area must maintain a Risk Register and conduct risk management as an integral activity within all business processes to help manage uncertainty in achieving objectives and to aid in decision making. Section 6 expands on the project risk register, showing all identified risks, impacts, preventative and mitigative controls.

5.1 Definitions

In this section, Cooper Energy has provided a list of terminology and definitions that will be meet the requirements of the Regulations:

Activity: An activity refers to a component or task within a project which results in one or more environmental aspects.

Aspect: An environmental aspect is an element or characteristic of an activity, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts or may create a risk to one or more environmental receptors.

Impact: An environmental impact is a change to one or more environmental receptors that is caused either partly or entirely by one or more environmental aspects. An impact is something which is certain to occur.

An environmental aspect can have either a direct impact on the environment or contribute only partially or indirectly to a larger environmental change. An environmental aspect may result in a change which puts one or more receptors at risk of being impacted. The relationship between environmental aspects and environmental impacts is one of cause and effect. The term 'impact' is associated with planned activities and known outcomes.

Risk: An environmental risk (or risk event) is a change which could occur to one or more environmental receptors, caused either partly or entirely by one or more environmental aspects. A risk event has a degree of likelihood, it is not certain to occur. The term 'risk' is associated with planned and unplanned activities where the change elicited on or by a particular receptor is uncertain.

Consequence: The consequence of an impact (or risk event) is the outcome of the event on affected receptors. Consequence can be positive or negative.

Likelihood: The likelihood (or probability) of the consequence occurring. Likelihood only applies to risk and risk events.

Risk severity: The risk severity level is determined from the point on the risk matrix where the consequence intersects the likelihood.

Residual risk: Residual risk is the risk remaining after additional control measures have been applied (i.e. after impact or risk treatment).

5.2 Risk Management Process Steps

This section provides a detailed overview of the risk management process steps.

5.2.1 Establish the Context

All components of the petroleum activity relevant to this scope were identified and described in Section 3 of this EP.

After describing the petroleum activity, an assessment was carried out to identify aspects. The Relevant Persons consultation outcomes, also contributed to aspect identification. The environmental aspects identified for the petroleum activity are detailed in Table 6-1.

5.2.2 Risk Identification

Risk identification involved the documentation of risks as they relate to the context established in Section 5.2.1. An Environmental Workshop (ENVID) was held to identify environmental impacts and risks associated with the petroleum activity. The workshop was attended by environmental consultants and project personnel including leader operations safety, which was previously the Gippsland operations engineer, and subsea specialists.

5.2.3 Risk Analysis

All impacts and risks identified during the ENVID were analysed. Impact and risk analysis requires a level of consequence to be assessed for each impact or risk event. For each risk event, the likelihood of occurrence is determined.

Impacts and risks are evaluated using the Cooper Energy Risk Matrix (Table 5-2), which includes:

- a six-level likelihood table to assess the probability of risk occurrence
- a five-level consequences table to assess the risk impact against business objectives
- a matrix of likelihood versus consequence that defines four levels of risk severity and allows a risk to be assessed and plotted. The outcome of the plotted risks is termed a 'Heat Map' and provides a graphic representation of the risks, their respective severities and likelihood
- a four-level risk severity table that defines the actions and escalation required for risks at different severity levels.

The Cooper Energy Risk Matrix is provided in Table 5-2 with definitions of the level of consequence provided in Table 5-1.

Table 5-1: Consequence Assessment Criteria

Consequence Level	Environmental Consequence Description
1	Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems.
2	Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days/weeks.
3	Localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function; remedial, recovery work to land/water systems over months/year.
4	Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats; remedial, recovery work to land/water systems over 1 – 10 years.
5	Severe long-term impact on highly valued ecosystems, species, or habitats. Significant remedial/recovery work to land/water systems over decades.

The Risk Severity can be:

- **extreme (red):** inherent risk at this level is not within the Company's risk appetite; the activity does not proceed until the Managing Director approves the treatment plans to bring the residual risk to an acceptable level. The Board must also be informed of the risk and its treatment.
- **high (orange):** inherent risk at this level requires involvement of the respective General Manager who will approve the treatment plans before the activity proceeds; the Board must also be informed of the risk and its treatment.
- **moderate (yellow):** inherent risk at this level is tolerable if it is also ALARP. General Managers must approve treatment plans and risks should be reported to the Executive Leadership Team during regular reporting.
- **low (green):** this level of risk is largely acceptable. Review of control procedures should occur, and the risk should be regularly monitored for deterioration.

Key descriptor words relating to duration, spatial extent and magnitude from these definitions, are used during the ENVID and risk assessment process for consideration of all elements of the environment, including biological, physical and social receptors. These receptors are identified within the existing environment section and integrated into the risk assessment through activity-aspect interaction scoping.

Table 5-2: Cooper Energy Qualitative Risk Matrix

LIKELIHOOD						CONSEQUENCE				
Qualitative					**Quantitative**	**1**	**2**	**3**	**4**	**5**
Rating	**Level**	**Probability**	**Time Period**	**Description**						
A	Almost certain	>80%	More than one a year	Expected to occur in most circumstances and/or more than once a year, or repeatedly during the activity.	$>10^{-2}$	Moderate	Moderate	High	Extreme	Extreme
B	Likely	>50%	Every 1-2 years	Not certain to happen but an additional factor may result in an occurrence. Expected to occur from time to time during the activity.	$\leq 10^{-2}$	Low	Moderate	Moderate	High	Extreme
C	Possible	>20%	Every 4-5 years	Could happen when additional factors are present. Easy to postulate a scenario for the occurrence but considered doubtful. Expected to occur once during the activity.	$\leq 10^{-3}$	Low	Moderate	Moderate	High	High
D	Unlikely	>5%	Every 5-20 years	A rare combination of factors would be required for an occurrence. Conceivable and could occur at some time. Could occur during the activity.	$\leq 10^{-4}$	Low	Low	Moderate	Moderate	High
E	Remote	>1%	Every 20-100 years	A freak combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances.	$\leq 10^{-5}$	Low	Low	Moderate	Moderate	High
F	Hypothetical	<1%	Not in 100 years	Generally considered hypothetical or non-credible.	$\leq 10^{-6}$	Low	Low	Low	Low	Moderate

5.2.4 Risk Evaluation

5.2.4.1 Identify and Evaluate Controls

Controls are any measures exercised that modify the impact or risk. Controls act on an impact cause to reduce the consequence of the impact. Controls that act on the risk cause to reduce the likelihood of the risk occurring are termed preventative controls. Reactive controls are those that modify the consequence once the risk event has occurred. For each risk, all controls should be captured.

Risk evaluation requires each control to be assessed for its effectiveness in managing the risk causes and consequences. This may be different from the effectiveness of the control to deliver its original designed purpose.

5.2.4.2 Determine ALARP Status

The ALARP status of each impact and risk is assessed based on the sufficiency of the controls already established and the opportunity for new controls to be implemented. A cross-functional team is assembled to ensure the risks and controls are assessed from different perspectives and to identify the possibility of additional controls that can reduce the risk. If no additional realistic and feasible controls are identified for the risk, then it is considered ALARP.

In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, (2022b)), Cooper Energy have adapted the approach developed by Offshore Energies UK (OEUK) (formerly 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).

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

- activity type
- risk and uncertainty
- stakeholder influence.

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

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

A **Type C** decision typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met but additional assessment is required, and the precautionary approach is applied for those controls that only have a marginal cost benefit. In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are ALARP, Cooper Energy has considered the above decision context in determining the level of assessment required. This is applied to each aspect described in Section 6.

The assessment techniques considered include:

- good practice
- engineering risk assessment
- precautionary approach.

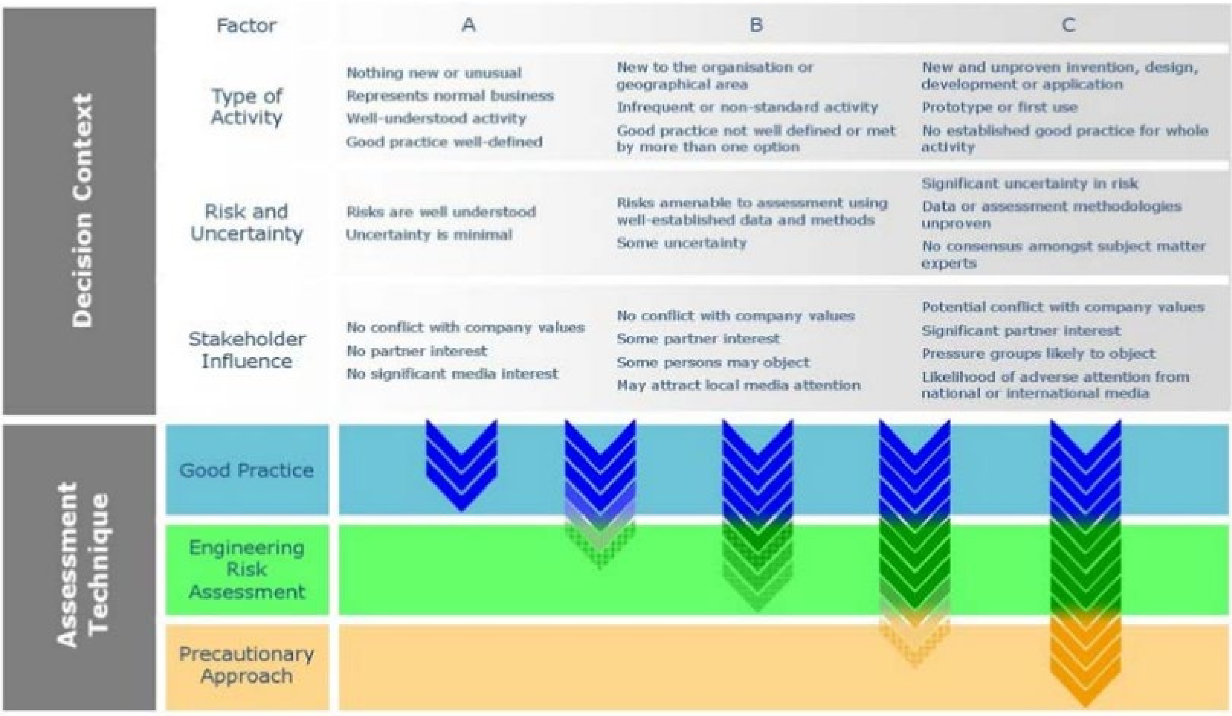


Figure 5-2: ALARP risk related Decision Support Framework (Source (OGUK 2014))

Good Practice

OEUK (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
- changing regulator expectations and/or continuous improvement.

If the ALARP technique determines the controls 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 may be identified.

Engineering Risk Assessment

All potential impacts and risks that require further assessment are subject to an 'Engineering Risk Assessment'.

Based on the various approaches recommended in OEUK (2014), Cooper Energy believes the methodology most suited to this Activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the risk reduction measure can be seen and the reason for the benefit understood.

Precautionary Approach

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

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

5.2.4.3 Evaluate the Acceptability of the Potential Impact and Risk

Cooper Energy considers a range of factors when evaluating the acceptability of environmental impacts or risks associated with its activities. This evaluation is based on NOPSEMA's Guidance Notes for EP Content Requirement (N04750-GN1344, (2022c)) and guidance issued in Guideline – Environment plan decision making (N-04750-GL1721, (2022d)).

The acceptability evaluation for each aspect associated with this activity is undertaken in accordance with Table 5-3.

Table 5-3: Cooper Energy Acceptability Evaluation

Consequence Level	Environmental Consequence Description
Cooper Energy Risk Management Protocol	Is the risk severity Extreme (i.e. inherent risk not within Company's risk appetite), or High (i.e. requires involvement from the Managing Director to approve the treatment plan)?
Principles of ESD	Is there the potential to affect biological diversity and ecological integrity? (Consequence Level 4 and 5) Do activities have the potential to result in serious or irreversible environmental damage? If yes: Is there significant scientific uncertainty associated with aspect? If yes: Has the precautionary principle been applied to the aspect?
Legislative and Other Requirements	Are there any good practice control measures which have not been adopted, including those identified in relevant EPBC listed species recovery plans or approved conservation advices? If no, have alternate control measures been adopted that provide equal or better levels of protection?
Internal Context	Is the impact or risk provided for within CEMS standards and processes? If no, what additional provisions will be made?
External Context	Are there any objections and claims regarding this aspect which have not been resolved? If yes, is there anything which precludes reaching a resolution?

5.2.4.4 Principles of ESD and precautionary principle

The principles of ESD are considered in Table 5-4 in relation to acceptability evaluations.

Under the EPBC Act, the Minister must also take into account the precautionary principle in determining whether or not to approve the taking of an action. The precautionary principle (Section 391(2) of the EPBC Act) is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there may be threats of serious or irreversible environmental damage.

Table 5-4: Principles of ESD

ESD	Principle	Relevance to Acceptability
A	Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations.	This principal is not considered separately for each acceptability evaluation.
B	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	An evaluation is completed to determine if the activity will result in serious or irreversible environmental damage. If so, an assessment is completed to determine if there is significant uncertainty in the evaluation.
C	The principle of inter-generational equity—that the present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.	Where the potential impacts and risk are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations.

ESD	Principle	Relevance to Acceptability
D	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	An assessment is completed to determine if there is a potential to impact biological diversity and ecological integrity.
E	Improved valuation, pricing and incentive mechanisms should be promoted.	Not considered relevant for petroleum activity acceptability demonstrations.

5.2.5 Risk Monitoring, Review and Record

Risks, risk treatments and controls require continual monitoring and review to determine whether assumptions and decisions remain valid. The risk environment and risk continually change, and treatment plans can also alter the risk. Stakeholders (which may be internal and external to the company) need to be consulted and kept informed.

The monitor, review and recording activities provide assurance that:

- emerging risks are identified, and existing risks remain relevant and managed
- controls continue to be effective and efficient in design and operation
- controls required for the risk to be ALARP are effectively implemented and operating as expected
- risk management objectives remain appropriate and are supported by effective treatment activities
- the process for managing risk is operating effectively and efficiently
- information on risk changes and treatment activities are documented
- stakeholders are consulted and informed regularly of risk management progress and performance.

Additional aspects of monitoring and review are described in the Implementation Strategy in Section 9 of this EP include:

- analysing and lessons learnt from events (including near-misses), changes, trends, successes and failures
- detecting changes in the external and internal context (e.g. new conservation plans issued)
- chemical selection and discharge process.

6 Risk and Impact Evaluation

To meet the requirements of the Regulations – Evaluation of environmental impacts and risks, this section evaluates the impacts and risks associated with the petroleum activity appropriate to the nature and scale of each impact and risk and details the control measures that are used to reduce the impacts and risks to ALARP and an acceptable level. Environmental Performance Outcomes (EPOs) and measurement criteria have been developed, described, and summarised in Section 8.

6.1 Impact and Risk Scoping

Interactions between activities and aspects are shown in Table 6-1. Where no disturbance, discharge, or emission has been identified in Section 3, then no planned interactions are shown. If no aspects are identified for an activity, then no impacts or risks are identified, and these are not included in the subsequent section.

Impacts and risks resulting from each of these identified interactions were discussed at the ENVID and analysed further outside of the workshop where necessary to reduce uncertainty. The outcomes of this process, including consequence and likelihood evaluation, control measures identified, risk ranking, and ALARP and acceptability determination, are provided in the following sections. EPOs, Environmental Performance Standards (EPSs) and measurement criteria are summarised in Section 8.

Within this section, impacts are framed as either a “lower order impact” or a “higher order impact”. All impacts are evaluated at the lower level until one or more factors trigger the impact to be evaluated at a higher level. These factors are:

- uncertainty in the impact or risk assessment which requires further analysis, for example where modelling is required to understand the nature and scale of an impact
- ALARP decision context B and above (refer to Section 5.2.4.4)
- residual risk severity moderate and above (refer to Sections 5.2.3)
- Relevant Persons concerns.

Higher order impacts require a higher order of evaluation, as described in the NOPSEMA Environment Plan decision making guideline (N-04750-GL1721 A524696 (2022d)).

Impacts and risks determined to be lower order are presented in Section 8.0, whilst higher order impacts and risks are evaluated in more detail in Section 6.3 onwards. The differentiation between higher and lower order impacts and risks is colour coded in Table 6-1.

Table 6-1 Activity – Aspect Interactions

ACTIVITY	ASPECT														
	Physical Presence		**Planned Emissions**					**Planned Discharges**		**Unplanned Interactions**				**Accidental Release**	
	Displacement of Other Marine Users	Seabed Disturbance	Light Emissions	Underwater Sound Emission - Continuous	Underwater Sound Emission - Impulsive	Atmospheric Emissions	Greenhouse Gas (GHG) Emissions	Subsea Discharges	Routine Vessel Discharges	Marine Fauna Interaction	Introduction, Establishment and Spread of Invasive Marine Species	Seabed Disturbance	Waste (Hazardous and non-hazardous)	Loss of Containment – Minor	Loss of Containment – Hydrocarbon release
Sole Operations															
Operations	X						X	X						X	X
PB non-production															
Non-production phase	X													X	X
IMR															
IMR	X	X			X			X				X			
Support Operations															
Vessel Operations	X	X	X	X		X	X		X	X	X		X	X	X
ROV			X											X	
Helicopter				X		X	X								

Lower Order Impacts and Risks - yellow

Higher Order Impacts and Risks – green

6.2 Lower Order Impact Evaluations

6.2.1 Planned Activities

Table 6-2 Lower Order Planned Activities Impact and Risk Evaluation

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
Physical Presence								
Displacement of Other Marine Users: • physical presence of PB and Sole wells, pipelines, and other subsea infrastructure on seabed within the Operational Area • presence of vessels within the Operational Area during IMR activities.	Changes to the functions, interests and activities of other marine users.	**Commercial fisheries (State and Commonwealth)** The Operational Area has been defined as 500 m buffer either side of the Sole and PB pipelines and 500 m around the Sole and PB wells and subsea infrastructure (Section 3.1.1). PSZs are in place for selected PB and Sole wells within the Operational Area (Section 3.1.1). Displacement of fisheries may occur due to the physical presence of the PB and Sole infrastructure, which will be limited to fisheries using trawling or trapping methods as well as the PSZs around the wells. As described in section 4.4.2, five Commonwealth managed fisheries with recorded fishing effort were identified within the Operational Area. Of which two use seabed gear fishing methods, the SESSF trawl and Gillnet Hook and Trap Sectors. The extent of subsea infrastructure is small (<1%) compared to the SESSF management area. Similarly, the extent of the PSZs is significantly less compared to the management fisheries identified. Any deviation required by fishery vessels around the infrastructure or PSZs is not expected to impact on the functions, interests, or activities of the fisheries. Two Victorian state managed fisheries areas overlap the Operational Area. Fishing effort data is not available but is expected to be low due to the lack of features and therefore, limited habitat and feeding opportunities within the Operational Area. No concerns regarding this aspect have been raised during Relevant Persons consultation or during the last 5-years operations. Therefore, changes to the functions, interests and activities of commercial fisheries due to the long presence of the Gippsland assets are expected to be low. Vessels will be present within the Operational Area during 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks. As such their presence within the Operational Area will be infrequent and short duration. Any changes to the functions, interests and activities of commercial fisheries due to the presence of vessels are expected to be low.	Level 1	A	Control Measure (CM)1: Marine exclusion and caution zones CM2: Pre-start notifications CM3: Marine Order 27 Safety of navigation and radio equipment CM4: Ongoing consultation CM5: Fisheries Damages Protocol CM6: Marine Order 30: Prevention of collision CM29: Asset IMP	N/A	N/A	Acceptable, based on: • impacts well understood. • consequence level is below Level 4, therefore will not have a significant impact to third parties. • activity will not result in serious or irreversible damage. • good practice controls defined and implemented. • legislative and other requirements have been identified and met: - *Navigation Act 2012* • CEMS Standards and Processes have been identified. • no concerns regarding this aspect have been raised during Relevant Persons consultation.

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		Give the details above, the consequence of this impact has been evaluated as **Level 1.**						
		Recreational activities/users Most recreational activities typically occur in nearshore coastal waters (shore or inshore vessels). As identified in Section 4.4.2, recreational activities are expected to be minimal in the Operational Area. Water depths within the Operational Area range from 9-125 m. PSZs are in place for the PB and Sole wells (Section 3.1.1), the wells are located in 54 m and 124 m depth, respectively. As such, tourist and recreational marine users are restricted in these areas. No concerns regarding this aspect have been raised during Relevant Persons consultation. No incidents with tourist or recreational marine users interacting with the PB and Sole assets have occurred since the assets are in place. Therefore, changes to the functions, interests and activities of recreational fisheries and tourist activities due to the long presence of the Gippsland assets are expected to be low. Similarly, vessels within the Operational Area will be sporadic (i.e. during IMR activities) and short duration (up to eight weeks). Any changes to the functions, interests and activities of recreational fisheries and tourist due to the presence of vessels are expected to be low. Give the details above, the consequence of this impact has been evaluated as **Level 1.**						
		Shipping and other industries The Operational Area does not cross any major shipping routes (Section 4.4.2). Recorded shipping traffic within the Operational Area is low. Other industries (i.e. oil and gas, offshore wind development, submarine cables) were not identified within the Operational Area (Section 4.4.2). There are PSZs in place for the PB and Sole wells (Section 3.1.1). Historically Cooper Energy have not experienced interactions with shipping whilst implementing petroleum activities in this area. Cooper Energy has also maintained ongoing consultation with Relevant Persons and no objections have been raised by these industries for this or other campaigns in the region. Given the above details, the consequence of this impact has been evaluated as **Level 1.**						
Planned Emissions								

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
Atmospheric Emissions • fuel combustion from vessel within the Operational Area • fuel combustion from helicopter within the Operational Area	Change in air quality	**Air quality** Atmospheric emissions will be generated by power generation of vessels and helicopters. Vessel will be present within the Operational Area for up to eight weeks during IMR activities (continuous throughout the activity). Helicopters may be used for personnel, equipment, and material transfers (intermittent and short term). The use of marine and aviation fuel to power engines, generators, and mobile and fixed plant will result in emissions such as sulphur oxides (SO_X) and nitrous oxides (NO_X). Emissions will be small in quantity and will dissipate quickly into the surrounding atmosphere, therefore any localised reduction in air quality is not expected to result in any measurable effect. The consequence of this impact has been evaluated as **Level 1**, as impacts from atmospheric emissions will be minor.	Level 1	A	CM9: Planned Maintenance System CM10: Emissions and Discharge Standards	N/A	N/A	Acceptable, based on: • impacts well understood. • consequence level is below Level 4, therefore will not have a significant impact to ambient quality • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - Marine Order 97 (Marine pollution prevention – air pollution) 2013. • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.
Planned Discharges								
Subsea Discharges: • during Sole operations • during IMR activities	Change in water quality	**Water quality** Subsea discharges of operational fluids (i.e. hydraulic fluids) during well testing and normal operations may occur. The estimated discharged ranges from 1 to 5 m^3. During IMR subsea discharges (e.g. well fluids, corrosion inhibitor, treated water, MEG/water mix) may also occur. Discharges will be of low volumes (i.e. in the order of 1 – 5 m^3 depending on the activity) non-continuous and expected to disperse rapidly in the offshore environment. Water quality is expected to be typical of the offshore marine environment. Gippsland Basin is well mixed given it is a higher-energy environment exposed to frequent storms (Section 4.3). Given the small volumes and high energy marine environment, the consequence of this impact has been evaluated as **Level 1**, as subsea discharges are expected to rapidly dissipate and dilute; water quality will return to existing ambient levels following completion of the activity with no remedial or recovery work required.	Level 1	A	CM11: Cooper Energy Offshore Chemical Assessment Procedure CM12: Monitoring of hydraulic fluid use (Sole operations)	N/A	N/A	Acceptable, based on: • impacts well understood. • consequence level is below Level 4, therefore will not have a significant impact to ambient quality • activity will not result in serious or irreversible damage • good practice controls defined and implemented • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.
	Injury/mortality	**Marine fauna** Mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity	Level 1	A	CM11: Cooper Energy Offshore Chemical Assessment Procedure	Remote (E)	Low	Acceptable, based on: • impacts well understood.

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		that produces sporadic bursts in phytoplankton and zooplankton populations (DEWHA 2008). The Operational Area is located within the Upwelling East of Eden KEF, an area of episodic upwelling known for high productivity and marine life. Impacts are expected to be localised and temporary and would not impact on the values and functions of the KEF. A change in water quality as a result of subsea discharges is unlikely to lead to injury or mortality of plankton populations at a measurable level and will not result in a change in the viability of the population or ecosystem (such as the Upwelling East of Eden KEF). Therefore, the consequence of any impacts to plankton from planned subsea discharges have been evaluated as **Level 1**. As previously described, small volumes and low-toxicity fluids discharges are expected to rapidly dissipate given the higher-energy of the marine environment. As such, impacts to larger marine fauna (such as fish, seabirds, marine mammals and marine reptiles) are not credible. Therefore, are not evaluated further.			CM12: Monitoring of hydraulic fluid use (Sole operations)			• consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.
Routine Vessel Discharges • Vessel operations (cooling water, brine, treated bilge, putrescible waste, sewage and greywater)	Change in water quality	**Water quality** Vessel will be present within the Operational Area during 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks. Vessel discharges includes: • cooling water – seawater is used as a heat exchange medium for the cooling of machinery engines. The seawater goes through a heat exchanger that transfers heat from the vessel engines and machinery to the seawater. Once the seawater goes through the system it is discharged back into the ocean • brine – brine is generated from the water supply system. Brine is discharged to the open ocean at a salinity of ~10% higher than seawater. The volume of discharge is dependent on the amount of people on board the vessel that require fresh (or potable) water. • sewage and grey water – the volume of sewage and grey water discharge is dependent on the number of people on board the vessels. Approximately 0.04 m^3 and 0.45 m^3 of sewage/grey water will be generated per person, per day (EMSA 2017). • deck drainage and bilge –may comprise of water, particulate matter, residual chemicals and oils caught in bunds and on deck. Contaminated water, directed to an oily water treatment system	Level 1	A	CM9: Planned Maintenance System CM10: Emissions and Discharge Standards	N/A	N/A	Acceptable, based on: • impacts well understood. • consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - *protection of the Sea (Prevention of Pollution from Ships) Act 1983* - Marine Order 91 – Marine pollution prevention – oil (as relevant to vessel class) - Marine Order 95 – Marine pollution prevention – garbage (as appropriate to vessel class)

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		• putrescible waste – people on-board of vessels will generate putrescible waste which will be discharged to the marine environment. Discharges are estimated to be in the order of 1–2 kg per person per day. Water quality is expected to be good quality and typical of the offshore marine environment. Gippsland Basin is well mixed given it is a higher-energy environment exposed to frequent storms (Section 4.3). Average current speed ranged between 0.18 m/s and 0.24 m/s (RPS 2021). Therefore, vessel discharges are expected to disperse quickly over a small area. Modelling of continuous wastewater discharges (including cooling water) undertaken by Woodside (2014) in the Scott Reef complex found that discharge water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being <1 °C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically. Brine water will sink through the water column where it will be rapidly mixed with receiving waters and dispersed by ocean currents (Woodside 2014). As such, temperature and salinity impacts are expected to be limited to the source of the discharge where concentrations are highest. Woodside conducted a sewage monitoring (2014) and determined that a 10 m^3 sewage discharge reduced to ~1% of its original concentration within 50 m of the discharge location. In addition, monitoring at distances 50, 100, and 200 m downstream of the platform and at five different water depths confirmed that discharges were rapidly diluted and elevations in water quality monitoring parameters (e.g. total nitrogen, total phosphorous, and selected metals) were not recorded above background levels at any station. During the Activity, the amount of sewage and grey water to be discharged per day will be significantly lower than 10 m^3. Therefore, the extent of impact is expected to be localised to the discharge location. Similarly, discharges from putrescible waste will be restricted to the immediate vicinity of the discharge location and is expected to be undetectable further than 500 m from the discharge source (Woodside 2014). Given the details above, the consequence of this impact has been evaluated as **Level 1**, as vessel discharges are expected to be minor; water quality will return to existing ambient levels following completion of the activity with no remedial or recovery work required.						- Marine Order 96 – Marine pollution prevention – sewage (as appropriate to vessel class). • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.
	Injury/mortality	**Marine fauna** Mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity	Level 1	A	CM9: Planned Maintenance System CM10: Emissions and Discharge Standards	Remote (E)	Low	Acceptable, based on: • impacts well understood. • consequence level is below Level 4, therefore will not have a significant

Aspect	Predicted Impacts/Risks	Impact/Risk Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		that produces sporadic bursts in phytoplankton and zooplankton populations (DEWHA 2008). The Operational Area is located within the Upwelling East of Eden KEF, an area of episodic upwelling known for high productivity and marine life. Impacts are expected to be localised and temporary and would not impact on the values and functions of the KEF. A change in water quality as a result of routine vessel discharges is unlikely to lead to injury or mortality of plankton populations at a measurable level and will not result in a change in the viability of the population or ecosystem (such as the Upwelling East of Eden KEF). Therefore, the consequence of any impacts to plankton from planned surface operational discharges have been evaluated as **Level 1**. Impacts to larger marine fauna (such as fish, seabirds, marine mammals and marine reptiles) are not expected. Therefore, are not evaluated further.						impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - *protection of the Sea (Prevention of Pollution from Ships) Act 1983* - Marine Order 91 – Marine pollution prevention – oil (as relevant to vessel class) - Marine Order 95 – Marine pollution prevention – garbage (as appropriate to vessel class) - Marine Order 96 – Marine pollution prevention – sewage (as appropriate to vessel class). • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.

6.2.2 Unplanned Events

Table 6-3 Lower Order Unplanned Events Risk Evaluation

Aspect	Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
Unplanned Interactions								
Marine Fauna Interaction: • physical presence of vessel within the Operational Area during IMR activities.	• change in fauna behaviour (avoidance) • injury/mortality	**Injury/mortality to fauna** Marine fauna interactions could occur as a result of movement of vessels within the Operational Area. Vessel will be present within the Operational Area during 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks. Vessels will be stationary or slow-moving whilst implementing the activities within the scope of this EP. Interactions with marine fauna may cause a change in marine fauna behaviour or injury/mortality. Megafauna that are within the surface waters and breach often are most at risk. The PMST report (Appendix 3.1) for the Operational Area, identifies that several species listed as threatened and/or migratory under the EPBC Act have the potential to present, including: • four marine turtle threatened species • five migratory and threatened shark species (or species habitat) • a distribution BIA for the white shark • 24 whale species (or species habitat) of which four are threatened • a possible foraging area BIA for the pygmy blue whale and a migration BIA for the southern right whale. The Recovery Plan for Marine Turtles (2017a) has identified boat strike as a threat. However, this is particularly an issue in shallow coastal foraging habitats and internesting areas. Given that the Operational Area is located outside both foraging habitats and internesting areas, presence of Marine turtles in shallow coastal are not expected. If marine turtles are found within this area, it is expected that they are transient in nature only, as such vessel disturbance to marine turtles is not expected and is not evaluated further. A review of the documents made or implemented under the EPBC Act identified that either vessel strike or vessel disturbance (i.e. collision) have been identified as a threat for the whale shark (TSSC 2015c), blue whale	Level 2	A	CM13*: EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans and Victorian (Marine Mammals) Regulations 2019 CM14: Whale Disturbance Risk Management Procedure *Cooper Energy will apply an increased caution zone of 500m around whales, providing additional protection to whales from potential vessel strikes.	Unlikely (D)	Low	Acceptable, based on: • impacts and risks are well understood. • consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans • Activity will not impact the long-term recovery of: - marine turtles as per the Recovery Plan for Marine Turtles (2017a) - whale shark as per Conservation Advice for *Rhincodon typus* (TSSC 2015c) - blue whale as per Conservation Management Plan for the Blue Whale (Commonwealth of Australia 2015a) - fin whale as per Conservation Advice for *Balaenoptera physalus* (TSSC 2015b) - sei whale as per Conservation Advice for *Balaenoptera borealis* (TSSC 2015a) - southern right whale as per Conservation Management Plan for the Southern Right Whale (DSEWPC 2012) and Draft

Aspect	Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		(Commonwealth of Australia 2015a), fin whale (TSSC 2015b), sei whale (TSSC 2015a) and southern right whale (DSEWPC 2012, DCCEEW 2022). Whale Sharks are known to spend considerable time close to the surface increasing their vulnerability to vessel strike. A search of the National Database did not identify any previous incidences of vessel strikes with Whale Sharks, indicating that although the risk is possible, previous events are limited. No BIAs were identified for the whale shark within the Operational Area. Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels, however, the reaction of whales to the approach of a vessel is variable. Some individuals may 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) (Cooper Energy MMO Observations 2023). Within Australian waters, there have been ten vessel strike reports (all vessels across all marine industry sectors) of southern right whales between 1997 and 2015, with at least four mortalities including mother-calf pairs in the region of the eastern population have been recorded (Kemper, et al. 2008, Peel, Smith and Childerhouse 2018). Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs (WDCS 2003). Cooper Energy has observed several large baleen whales during previous campaigns in the Gippsland area, which appeared in the vicinity for a short time before moving on. However, the occurrence of vessel strikes is very low with no incidents occurring during the activities to date associated with the Gippsland Offshore Operations. If an incident occurred, it would be restricted to individual fauna and not be expected to have impacts to local population levels. Given the short duration of the activity (i.e. 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks) and the stationary or slow-moving nature of vessels within the Operational Area, the consequence of this impact has been evaluated as **Level 2**, as it will be localised short-term to species of recognised conservation value not affecting local ecosystem function.						National Recovery Plan for the Southern Right Whale (DCCEEW 2022). • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation. A Yuin Nation clan connection to killer whales (Section 4.4.2) was identified. As described previously, no incidents with cetaceans have occurred historically within Cooper Energy offshore activities and measures are implemented to manage the risk of interaction. Therefore, identified cultural values connection to killer whales (Section 4.4.2) are not expected to be at risk of disruption by the planned activities.

Aspect	Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
Seabed disturbance: • dropped objects during IMR activities.	Alteration of benthic habitat	**Benthic habitat** Unplanned seabed disturbance may occur due to dropped objects during IMR activities. Vessel will be present within the Operational Area during 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks. Areas of seabed may be disturbed via smothering (i.e. dropped objects), caused by agitation and re-settling of seabed sediments. Benthic habitats within the Operational Area are predominantly sand and grit. Along Sole pipeline benthic habitat was identified as featureless seabed comprised of clays, silts, sands and gravel and some consolidated bedded sediments (Section 4.4.1). Along the PB pipeline extensive areas with pronounced sand waves were identified as well as areas of shell aggregations and sponge gardens in water depths >40 m (Commonwealth waters). If it occurs, the impact would be localised with limited disturbance to benthic habitats. Therefore, the consequence of unplanned seabed disturbance has been evaluated as **Level 1**.	Level 1	A	CM15: Deployment and recovery procedures	Unlikely (D)	Low	Acceptable, based on: • impacts and risks are well understood. • consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • activity will not impact the recovery of: - albatrosses and petrels as per National Recovery Plan for Albatrosses and Petrels (Commonwealth of Australia 2022) - whale shark as per Conservation Advice for *Rhincodon typus* (TSSC 2015c) - marine turtles as per the Recovery Plan for Marine Turtles (2017a) • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.
	Injury/mortality	**Marine fauna** Dropped objects can cause injury or death to marine fauna or seabirds through ingestion or entanglement (e.g. polymer rope entangling marine fauna or smaller plastic fragments or being ingested). The PMST report (Appendix 3.1) for the Operational Area, identifies that several species listed as threatened and/or migratory under the EPBC Act have the potential to present, including: • four marine turtle threatened species • five migratory and threatened shark species (or species habitat) • a distribution BIA for the white shark • 24 whale species (or species habitat) of which four are threatened • a possible foraging area BIA for the pygmy blue whale and a migration BIA for the southern right whale • foraging BIAs for eight albatross and two petrel species. Although several management plans and conservation advices (e.g. Threat Abatement Plan (Commonwealth of Australia 2018), Wildlife Conservation Plan for Seabirds						

Aspect	Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		(2020), National Recovery Plan for Albatrosses and Petrels (2022), Conservation advice for the *Rhincodon typus* (2015c)) have identified marine debris as a threat for the species, if dropped objects occurs, the impact would be highly localised, and unlikely to have a discernible effect on the species population. Therefore, the consequence of impacts or mortality to marine fauna from unplanned seabed disturbance has been evaluated as **Level 1.**						
Waste (Hazardous and non-hazardous)	Injury/Mortality to fauna	**Marine fauna** The handling and storage of materials and waste on board the vessels has the potential for accidental over-boarding of hazardous/non-hazardous materials and waste. Small quantities of hazardous/non-hazardous materials (solids) will be used, and wastes created, handled, and stored on board until transferred to port facilities for disposal at licensed onshore facilities. However, accidental releases to sea may occur due to rough ocean conditions. Waste accidently released to the marine environment may lead to injury or death to individual marine fauna through ingestion or entanglement. Impacts will be restricted in exposure and quantity and will be limited to individual fauna and not have impacts to local population levels. The PMST report (Appendix 3.1) for the Operational Area, identifies that several species listed as threatened and/or migratory under the EPBC Act have the potential to present, including: • four marine turtle threatened species • five migratory and threatened shark species (or species habitat) • a distribution BIA for the white shark • 24 whale species (or species habitat) of which four are threatened • a possible foraging area BIA for the pygmy blue whale and a migration BIA for the southern right whale • foraging BIAs for eight albatross and two petrel species. Although several management plans and conservation advices (e.g. Threat Abatement Plan (Commonwealth of Australia 2018), Wildlife Conservation Plan for Seabirds (2020), National Recovery Plan for Albatrosses and Petrels (2022), Conservation advice for the Rhincodon typus (2015c)) have identified marine debris as a threat for the species, waste will be limited in quantity. Furthermore, waste will be handled in accordance with Australian	Level 1	A	CM10: Emissions and Discharge Standards CM16: Waste Management Practices	Unlikely (D)	Low	Acceptable, based on: • impacts and risks are well understood. • consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - Marine Order 95 – Marine pollution prevention – garbage (as appropriate to vessel class) - *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* - *Navigation Act 2012*. • activity will not impact the recovery of: - albatrosses and petrels as per National Recovery Plan for Albatrosses and Petrels (Commonwealth of Australia 2022) - whale shark as per Conservation Advice for *Rhincodon typus* (TSSC 2015c) marine turtles as per the Recovery Plan for Marine Turtles (2017a). • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.

Aspect	Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk (Severity)	Acceptability Outcome
		Maritime Safety Authority (AMSA) Discharge Standards and respective vessel Garbage Management Plans. Given the previous details, and the limited impacts expected if waste be accidentally discharged, the consequence of impacts from marine pollution has been evaluated as **Level 1.**						
Accidental Release								
Loss of Containment (LoC): • vessel operations • ROV operations	Change in water quality	Minor spills may occur from: • vessel equipment, bulk storage or package chemical leak (deck spill) • ROV hydraulic hose leak • hydraulic line failure, the volume was based on the loss of an intermediate bulk container (~1 m^3). Water quality is expected to be typical of the offshore marine environment. Gippsland Basin is well mixed given it is a higher-energy environment exposed to frequent storms (Section 4.3). Given the small volumes of fluids that could be released, and high energy marine environment, the consequence of this impact has been evaluated as **Level 1**, as minor spills within the Operational Area would minor and limited to a temporary change in water quality in the vicinity of the release.	Level 1	A	CM1: Marine exclusion and caution zones CM9: Planned Maintenance System CM17: Vessel compliant with International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I, as appropriate to class (i.e. Shipboard Marine Pollution Emergency Plans [SMPEP] or equivalent). CM18: Containment CM26: ROV pre-dive Inspections	Remote (E)	Low	Acceptable, based on: • impacts and risks are well understood. • consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. • activity will not result in serious or irreversible damage • good practice controls defined and implemented • legislative and other requirements have been identified and met: - AMSA's Marine Order Part 91 (Marine pollution prevention – oil Marine) • CEMS Standards and Processes have been identified • no concerns regarding this aspect have been raised during Relevant Persons consultation.

6.3 Light Emissions

6.3.1 Cause of Aspect

Light emissions will occur as a result of the following activities:

- navigation and operational lighting from vessel within the Operational Area during IMR activities
- operational lighting from ROV within the Operational Area during IMR activities.

6.3.2 Aspect characterisation

Sources of light from the activity include navigation and safety lighting from the vessels (continuous source) and lighting from the ROV. Vessels will be present within the Operational Area during 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks.

Modelling of light emissions from a pipelay vessel indicated that light may be visible at distances 5.7 km; however, is not expected to be biologically relevant and therefore not expected to result in behavioural impacts (Woodside 2020) The modelling also indicated that impacts may occur within ~1.8 km of the vessel, depending on moon phase, and are more likely within ~0.6 km of the vessel (Woodside 2020). Lighting from IMR vessels is expected to be the same or less compared to a pipelay vessel. As such, effects of light from the vessel are likely to be limited, in close proximity of the Operational Area. The model outputs are provided in radiance, relative to full moon radiance and are considered applicable to a range of different fauna with similar wave length perception, including turtles and seabirds.

6.3.3 Predicted Environmental Impacts and Risk Events

Potential impacts from light emissions are:

- change in ambient light.

Potential risk events associated with change in ambient light are:

- change in fauna behaviour (attraction, disorientation).

6.3.4 Impact and Risk Evaluation

6.3.4.1 Impact: change in ambient light

Inherent Consequence Evaluation

As described in Section 6.3.2 visible light from the vessel is likely to be limited (5.7 km) and temporary in nature (up to 8 weeks). Therefore, light emissions will result in a change in ambient light within the vicinity of the vessel/s. Lighting generated underwater from ROVs activities are also expected to be limited (illumination of a very small area) and temporary in nature (i.e. a matter of hours at a time while ROVs are in use).

Light emissions from multiple vessels operating in proximity to each other would result in a slightly greater spatial area being exposed, as well as cumulative emissions in the area between two vessels (noting that light intensity is inversely proportional to the distance from the source, and therefore the overlap in emissions is not occurring for the highest light intensities). Up to two vessels may be within the Operational Area at the same time such as for pipeline repair activities (if required).

Given the short duration (i.e. up to eight weeks) of the activity, and localised potential impacts, the consequence of this impact has been evaluated as **Level 1**, as light emissions will return to existing ambient levels following completion of the activity with no remedial or recovery work required.

6.3.4.2 Risk Event: change in fauna behaviour (attraction, disorientation).

Inherent Consequence Evaluation

As described in Section 6.3.2 behavioural impacts are limited within the Operational Area, and temporary in nature (up to 8 weeks).

The PMST report (Appendix 3.1) for the Operational Area, identifies that fish species listed as threatened and/or migratory under the EPBC Act have the potential to present, including:

- Australian grayling (vulnerable)
- blue warehou, eastern gemfish, harrisson's dogfish, little gulper shark, orange roughy, school shark, southern bluefin tuna (conservation dependant)
- oceanic whitetip shark, porbeagle, shortfin mako (migratory)
- whale shark, white shark (vulnerable, migratory).

In addition, a distribution BIA for the white shark was identified within the Operational Area.

Artificial light may result in varied ecological changes to fish, including changes to predatory behaviour and abundance (Bolton, et al. 2017, Marangoni, et al. 2022), acting as an attractant for plankton (Keenan, Benfield and Blackburn 2007), or altering circadian behavioural rhythms (Marangoni, et al. 2022).

A review of the Recovery Plan for the white shark (*Carcharodon carcharias*) (Commonwealth Australia 2013), Conservation Advice for the Australian grayling (*Prototroctes maraena*) (TSSC 2021) and Conservation Advice for the whale shark (*Rhincodon typus*) (TSSC 2015c) did not identify light emissions as a threat.

Given the short duration (i.e. up to eight weeks) of the activity, and localised potential impacts (~1.8 km), the consequence of this impact has been evaluated as **Level 1**, as impacts from light emissions will be minor local impacts or disturbances to fish and sharks.

Light emissions may result in a localised change to marine fauna behaviour. Marine species with the greatest sensitivity to light include marine turtles, seabirds, and migratory shorebirds. The National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) indicate that a 20 km buffer or exposure area can provide a general precautionary light impact limit based on observed effects of sky glow on marine turtle hatchlings and on fledgling seabirds grounded.

Artificial light can disrupt turtle nesting and hatching behaviours (Marangoni, et al. 2022). Once hatchlings reach the water, they use the circular wave motion to orient themselves through the surf (Lohmann, How Sea Turtles Navigat 1992) as well as using sensory abilities that allow them to global position using a bicoordinate magnetic map (Lohmann and Lohmann 1996). As such, impacts to turtles from artificial light in open waters are not credible and has not been evaluated further. The PMST report (Appendix 3.3) for the Light Exposure Area (20 km) did not identify BIAs or habitat critical to the survival of marine turtles, only breeding behaviour for loggerhead and leatherback turtles is likely to occur within the area; therefore the risk of changes in marine turtles behaviour in nearshore waters is not considered credible and has not been evaluated further.

The PMST report identified foraging BIAs for eight albatross and two petrel species. No key nesting, roosting, or resting areas were identified to be associated with these species.

High levels or misdirected light can attract and disorientate birds, particularly during migration (Cabrera, Smolinsky and Buler 2018). The National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) indicate that fledgling seabirds grounded in response to artificial light 15 km away (Rodríguez, Burgan, et al. 2014).

Artificial light at night has also been linked to increased mortality of fledglings of underground-nesting seabird species (Rodríguez, Holmes, et al. 2017) and through interaction with vessels at sea (DCCEEW 2023c).

The mortality of seabird fledglings may occur when they are attracted to artificial lights upon leaving their nests at night (Rodríguez, Holmes, et al. 2017, Rodríguez, Rodríguez and Negro 2015). Birds fly over lit areas or near bright lights, which can blind or disorient them, and collide with structures such as walls, trees, or the ground (Rodríguez, Holmes, et al. 2017).

Studies conducted in the North Sea indicate that migratory birds are attracted to artificial lights when travelling within a radius of <5 km from the light source (Marquenie, et al. 2008), therefore, their migratory paths might be unaffected outside this zone.

Anthropogenic disturbance (including artificial lighting) is identified as a threat within the Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia 2015b) and light pollution is identified as a threat within the Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020) and the National Recovery Plan for Albatrosses and Petrels 2022 (Commonwealth of Australia 2022).

Given the short duration (i.e. up to eight weeks per IMR activity) of the activity, localised potential impacts (<5 km), and no key nesting, roosting, or resting areas were identified, the consequence of this impact has been evaluated as **Level 2**, as impacts from light emissions will be localised short-term to species of recognised conservation value not affecting local ecosystem function.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of light emission causing changes in fauna behaviour is considered **Low.**

6.3.5 Control Measures, ALARP and Acceptability Assessment

Table 6-4 provides a summary of the control measures and ALARP and Acceptability Assessment relevant to light emissions.

Table 6-4 Light Emissions ALARP, Control Measures and Acceptability Assessment

<table>
<tr><th colspan="7">Light Emissions</th></tr>
<tr><td>ALARP Decision Context and Justification</td><td colspan="6">ALARP Decision Context: A
Offshore commercial vessel operations and subsequent light emissions arising from these activities are commonplace in offshore environments nationally and internationally.
No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks.
The consequence level is below Level 4, therefore will not have a significant impact to biological diversity and ecological integrity. Based on this, Cooper Energy believes ALARP Decision Context A should apply.</td></tr>
<tr><th>Control Measure</th><th colspan="6">Source of good practice control measures</th></tr>
<tr><td>CM6: Marine Order 30: Prevention of collision</td><td colspan="6">Navigation, radar equipment, and lighting meets the Marine Order 30 requirements</td></tr>
<tr><td>CM19: Pre-campaign risk review (light)</td><td colspan="6">A pre-campaign risk review will include an assessment against the National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) and additional controls will be implemented where required according to the relevant species conservation management plans. Control measures considered are identified below.</td></tr>
<tr><th>Control Measures Considered</th><th>Related Risk Event</th><th>Benefit</th><th>Recognised Good Practice?</th><th>Sacrifice</th><th>Introduced Risks</th><th>Conclusion</th></tr>
<tr><td>External vessel lighting to use:
• flashing or intermittent lights instead of fixed beam
• motion sensors to turn on lights only when needed
• luminaires with spectral content appropriate for the species present
• avoid high intensity light of any colour.</td><td>Change in fauna behaviour (attraction, disorientation)</td><td>The National Light Pollution Guidelines (DCCEEW 2023c) suggests replacing external lighting on vessels with lighting that is flashing, intermittent, or motion triggered, or of a particular spectral signature and/or intensity, may have the potential to further reduce the impact of artificial light on marine fauna.</td><td>Yes (in some scenarios)</td><td>Cost and time associated with retrofitting external lighting.</td><td>No introduced risks.</td><td>Reject
Rationale: The implementation of these additional light management controls is considered to be of limited environmental benefit and would not result in a reduction of residual risk.</td></tr>
<tr><td>Use curfews to manage lighting</td><td>As above</td><td>The National Light Pollution Guidelines (DCCEEW 2023c) suggests the use of curfews may assist in managing artificial lighting around rookeries during fledgling period (seabirds), or near nocturnal foraging and</td><td>Yes (in some scenarios)</td><td>Cost and time associated with fitting timers to extinguish lighting.
Cost and time associated with</td><td>Increase in overall time required for offshore works if curfews introduced.</td><td>Retain as a contingency option for operations near to rookeries during fledgling period, or near nocturnal foraging and roosting areas in coastal habitat.</td></tr>
</table>

Light Emissions						
		roosting areas in coastal habitats (migratory seabirds). One of the mechanisms for implementing this is the use of motion sensors—considered in the above control measure and is not repeated here. Other mitigation options refer to the user of timers to extinguish lighting near seabird or migratory shorebird rookeries after 7 pm. The intent of the curfews is to manage artificial light in coastal areas to minimise any disruption to biological important behaviours.		curfews, limiting operational hours.		Integrated into CM19: Pre-campaign risk review (light).
Implement a seabird management plan	As above	The National Light Pollution Guidelines (DCCEEW 2023c) suggests the implementation of a seabird management plan when vessels are working in seabird foraging areas during breeding season. The intent of the plan is to prevent seabird landings on the ship, manage birds appropriately and report the interaction.	Yes (in some scenarios)	N/A	No introduced risks.	Retain as a contingency option. Integrated into CM19: Pre-campaign risk review (light).

Impact and Risk Summary	
Residual Impact Consequence	Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems.
Residual Risk Consequence	Level 2 – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function.
Residual Risk Likelihood	**Unlikely (D):** Conceivable and could occur at some time. Although could occur during the activity, a freak combination of factors would be required for an occurrence.
Residual Risk Severity	**Low**
Demonstration of Acceptability	
Principles of ESD	Light emissions is evaluated as having Level 2 risk consequence which 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.
Legislative and conventions	The control measures proposed to manage this risk meet the following requirement: • *Navigation Act 2012* (Cth) • *National Light Pollution Guidelines for Wildlife* • *Recovery Plan for Marine Turtles in Australia* • *Wildlife Conservation Plan for Migratory Shorebirds* • *Wildlife Conservation Plan for Seabirds* • *National Recovery Plan for Albatrosses and Petrels 2022* • *Conservation Advice Rhincodon typus Whale Shark.* An impact assessment for artificial light and consideration of CM as identified within the mitigation toolboxes was undertaken as per National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) The activity will not impact the long-term recovery of Seabirds and Shoreline birds as per National Recovery Plan for Albatrosses and Petrels 2022 (Commonwealth of Australia 2022), the Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020) and the Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia 2015b).
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • MS03 – Risk Management • MS05 -- External Affairs & Stakeholder Management • MS08 – Technical Management.
External context	No concerns regarding this aspect have been raised during Relevant Persons consultation.

Light Emissions	
Acceptability Outcome	Acceptable

6.4 Seabed Disturbance

6.4.1 Cause of Aspect

Seabed disturbance will occur as a result of the following activities:

- IMR
- support activities:
  - vessel anchoring in shallow waters during IMR or emergencies
  - wet parking of ROVs.

6.4.2 Aspect characterisation

IMR activities such as rectification, movement and preparation of seabed directly beneath pipelines and umbilicals may disturb the seabed. ROVs and other subsea equipment may also be temporarily landed on the seabed. The disturbance of these activities typically ranges from ~5 m^2 to ~25 m^2; however, it may increase if major pipeline repair is required. For assessment purposes a disturbance of up to ~12,500 m^2 has been assumed, corresponding to a scenario where a pipeline repair involves a length of ~500 m of pipeline and a disturbance footprint width of ~25 m. Areas disturbed would typically be within previously disturbed areas where infrastructure is already present.

Anchoring may be required in areas along the PB and Sole pipelines in shallow waters, where it is too shallow to use DP, or during emergencies.

Penetration and disturbance footprint of the seabed from vessel anchoring is dependent on several factors such as size, weight and type of anchor which varies based on the vessel size, sediment type and whether the vessel moves or drags the anchor due to environmental conditions (Griffiths, et al. 2007). Rogers and Garrison (2001) identified a scar of 128 m long and 3 m wide (total disturbance of 384 m^2) from a cruise ship anchor in water depths ranges from 6 m to 22 m. Glasby and West (2015) mapped mooring scars within seagrass meadows in Lake Macquarie and Port Stephens, NSW, using broad depth contours (0-2 m, 2-5 m). They found that the average scar size in Lake Macquarie, across all water depths was 167 m^2, while in Port Stephens, it was 305 m^2. The maximum mapped scar size reported in the study (Glasby and West 2015) was 706 m^2. As a conservative approach, a scar size of 706 m^2 will be assumed to inform the extent of impacts and risks from anchoring activities.

6.4.3 Predicted Environmental Impacts and Risk Events

Potential impacts from seabed disturbance are:

- change in benthic habitat.

Potential risk events associated with seabed disturbance are:

- impacts to benthic and demersal invertebrate communities
- impacts to fish and commercial fisheries
- impacts to cultural heritage values.

6.4.4 Impact and Risk Evaluation

6.4.4.1 Impact: Change to benthic habitat

Inherent Consequence Evaluation

Seabed disturbance from IMR activities is expected to occur within the Operational Area. As identified in Section 6.4.2, major pipeline repair is the source of the largest potential disturbance. This repair, which can disturb up to ~12,500 m^2, represents <1% of the Operational Area.

Disturbance associated with anchoring was identified as 706 m^2 (Section 6.4.2). It is noted that anchoring will take place in shallow waters, where it is too shallow to use DP, or during emergencies. This disturbance represents <0.1% of the Operational Area.

Benthic habitats within the Operational Area are predominantly sand and grit. Along Sole pipeline benthic habitat was identified as featureless seabed comprised of clays, silts, sands and gravel and some consolidated bedded sediments (Section 4.4.1). Along the PB pipeline extensive areas with pronounced sand waves were identified as well as areas of shell aggregations and sponge gardens in water depths >40 m (Commonwealth waters).

Areas disturbed from anchor activities are expected to be restricted to the area below or in direct vicinity of the disturbed area (Sagerman, Hansen and Wikström 2020). Disturbance from areas affected by IMR and wet parking, such as equipment placement and seabed preparation beneath pipelines, are also expected to be restricted to the disturbed area. These disturbed areas would typically overlap with previously affected areas, often in proximity to the existing assets. Therefore, the impact would be expected to be minor local disturbance and unlikely to have a discernible effect on benthic habitat; thus, the consequence of planned seabed disturbance has been evaluated as **Level 1**.

6.4.4.2 Risk Event: impacts to benthic and demersal invertebrate communities

Inherent Consequence Evaluation

Seabed disturbance from IMR activities or during anchoring activities will potentially result in the suspension of sediments, and redeposition that could cause an impact on benthic and demersal invertebrate communities.

Benthic habitats within the Operational Area are predominantly sand and grit. Along Sole pipeline benthic habitat was identified as featureless seabed comprised of clays, silts, sands and gravel and some consolidated bedded sediments (Section 4.4.1). Along the PB pipeline extensive areas with pronounced sand waves were identified as well as areas of shell aggregations and sponge gardens in water depths >40 m (Commonwealth waters). Marine growth including hydroid grass, soft coral, bryozoan and sponge can be found in PB and Sole assets (CEE Consultants 2001, Fugro Australia Marin 2022).

Dernie et al. (2003) conducted a study that showed recovery of soft sediment assemblages from physical disturbance could take between 64 and 208 days. Mobile fauna is generally less vulnerable than sessile taxa to sedimentation, as they are able to move to areas with less sediment accumulation or by more efficiently physically removing particles (Fraser, et al. 2017). Sessile invertebrates are particularly vulnerable to sedimentation because they are generally unable to reorientate themselves to mitigate a build-up of particulates. However, some sessile taxa, including species of sponges and bivalves, have the capacity to filter out or to physically remove particulates (Roberts, Davis and Cummins 2006, Tompkins-MacDonald and Leys 2008, Pineda, Duckworth and Webster 2016). Sediment-burrowing infauna and surface epifauna invertebrates (particularly filter feeders) which inhabit the seabed around subsea infrastructure locations are expected to be most impacted by seabed disturbance activities. The sensitivity of such infauna and epibenthic communities to seabed disturbance are expected to be low and recoverable given the resilience to natural stressors including storm events and associated episodic increases in particulate load.

Given the localised disturbance (i.e. within the Operational Area) and the natural resilience of benthic fauna the consequence of this risk has been evaluated as **Level 1**, as seabed disturbance may result in minor local impacts to benthic and demersal invertebrate communities.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of seabed disturbance causing impacts to benthic and demersal invertebrate communities is considered **Low.**

6.4.4.3 Risk Event: impacts to fish and commercial fisheries

Inherent Consequence Evaluation

Seabed disturbance from IMR activities or during supporting activities will potentially result in the suspension of sediments, and redeposition that could cause an impact on fish communities and consequently on commercial fisheries. The duration of the IMR activities is expected to be between 2-4 weeks (per IMR activity) or if a major pipeline repair is required, it could take up to 8 weeks.

Five Commonwealth managed fisheries with recorded fishing effort were identified within the Operational Area (Section 4.4.2). Two fisheries, the Eastern Tuna and Billfish and Southern Bluefin Tuna Fisheries only have recorded fishing efforts in close proximity to Sole wells. It is noted that Eastern Tuna and Billfish and Southern Bluefin Tuna Fisheries only have recorded fishing efforts in close proximity to Sole wells, where the PSZs are gazzeted. Two Victorian state managed fisheries areas overlap the Operational Area. However, fishing effort data is not available but is expected to be low due to the lack of features within the Operational Area.

As described in Section 6.4.4.2, mobile fauna such as fish are able to move to areas with less sediment accumulation (Fraser, et al. 2017). No site-attached commercial species were identified within the Operational Area. Suspension of sediments due to the activity is expected to be localised and recover over a short period of time. Therefore, potential impact would be limited to individuals. Consequently, impacts to commercial fisheries due to seabed disturbance are not expected.

Given the short duration of the activity (i.e. up to eight weeks), and temporary disturbance, the consequence of this risk has been evaluated as **Level 1**, as seabed disturbance may result in minor local impacts to fish species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of seabed disturbance causing changes to cultural heritage values is considered **Low.**

6.4.4.4 Risk Event: impacts to cultural heritage values

Inherent Consequence Evaluation

As identified in Section 4.4.2, no historic shipwrecks (older than 75 years), World Heritage Properties, Commonwealth Heritage Places, or National Heritage Places were identified within the Operational Area. No artefacts of Indigenous cultural heritage have been identified during Gippsland development or consultation with Relevant Persons; therefore, at the time of writing this EP, presence of known artefacts of Indigenous cultural heritage within the Operational Area is not expected.

Analysis of sea-level changes over the Holocene indicates that sea levels, at their lowest point, dropped to ~120 m below current levels during previous glacial maxima (Holdgate, et al. 2003). The Operational Area ranges in water depths from 9 to 125 m, suggesting that some of this area now inundated will have been land in the past, and could therefore have provided for Indigenous peoples at that time. Since sea levels have risen, the region has been subject to significant sedimentation through the Holocene. Mitchel et al (2007) indicate sediment deposition at a rate of 77 mm per thousand years in the inner shelf of the region.

Based on the previous information, although the presence of Indigenous groups (and consequently artefacts of cultural heritage) is plausible, no artefacts have been identified. Therefore, direct impacts to seabed cultural heritage values are not expected.

Indirect impacts to intangible cultural values have the potential to occur if the activity causes change in the environment. However, impacts within the marine environment (including physical and biological aspects that may affect cultural heritage values) are expected to be localised and/or temporary in nature.

Given no cultural heritage sites or artefacts have been identified within the Operational Area, and indirect impacts to intangible cultural values are expected to be localised and temporary, the consequence of this risk is evaluated as **Level 1.**

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of seabed disturbance causing changes to cultural heritage values is considered **Low.**

6.4.5 Control Measures, ALARP and Acceptability Assessment

Table 6-5 provides a summary of the control measures and ALARP and Acceptability Assessment relevant to seabed disturbance.

Table 6-5 Seabed Disturbance ALARP, Control Measures and Acceptability Assessment

Seabed Disturbance	
ALARP Decision Context and Justification	**ALARP Decision Context: A** Seabed disturbance in the offshore environment is a common occurrence both nationally and internationally with well-defined industry good practice. Locally, activities like temporary anchoring and the placement of equipment on the seabed are activities commonly undertaken by established industries. No objections or claims were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. The area of impact, and therefore the scale of the impact, is expected to be within the Operational Area, and the species present associated with the seabed expected to recover. Based on this, Cooper Energy believes ALARP Decision Context A should apply.
Control Measure	**Source of good practice control measures**
CM20: Offshore Scope of Work	Avoid equipment laydown or anchoring within sponge and bryozoan habitat identified along the PB pipeline.
CM21: Installation procedures	Installation procedures shall be developed which take into account seabed relief, sensitive seabed features and underwater cultural heritage. Equipment will be placed according to procedures.
Impact and Risk Summary	
Residual Impact Consequence	Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems.
Residual Risk Consequence	Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems.
Residual Risk Likelihood	Impacts to benthic and demersal invertebrate communities and impacts to cultural heritage value - **Remote (E):** A freak combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances. Impacts to fish and commercial fisheries - **Hypothetical (F):** Generally considered hypothetical or non-credible.
Residual Risk Severity	**Low**
Demonstration of Acceptability	
Principles of ESD	Seabed disturbance is evaluated as having Level 1 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage nor significant to impact biological diversity and ecological integrity. Consequently, no further evaluation against the principles of ESD is required.
Legislative and conventions	The control measures proposed to manage this risk meet the following requirement: • UCH Act
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • MS03 – Risk Management • MS05 -- External Affairs & Stakeholder Management • MS08 – Technical Management • MS09 – HSE Management • MS11 – Supply Chain and Procurement Management.
External context	No concerns have been raised by Relevant Persons during activity consultation regarding seabed disturbance.
Acceptability Outcome	**Acceptable**

6.5 Underwater Sound Emission

6.5.1 Cause of Aspect

Underwater sound emissions will occur as a result of the following activities:

- IMR – use of survey equipment
- Support operations during IMR:
  - vessel activity
  - ROV
  - helicopter activity.

Most of these activities will generate continuous sound, except for the survey equipment (i.e. Multibeam echosounder [MBES], sidescan sonar, sub-bottom profiler) which emits impulsive sound. Sound sources from vessels will be continual throughout the duration of the activity (i.e. up to eight weeks during IMR activities); however, the location of the vessels may vary within the Operational Area. Sound sources from helicopter and survey equipment will be intermittently and for a short duration (i.e. hours).

6.5.2 Aspect characterisation

6.5.2.1 Continuous sound emissions

6.5.2.1.1 Acoustic modelling

Cooper Energy commissioned JASCO Applied Sciences to conduct acoustic modelling to inform the risk assessment associated with underwater sound exposure from DP operations of an IMR vessel and a dive support vessel (DSV) as well as underwater sound of ROV activities (Appendix 7).

To ensure representative and robust modelling, Cooper Energy identify appropriate vessel options based on prior offshore projects and expected campaign requirements. This is discussed with specialist noise modeller who identifies a suitable proxy vessel and associated sound profile.

The activity vessels have similar noise profiles to commercial vessels that operate around Australia year-round. Typical predominant frequencies of commercial shipping occur within the range of 10 Hz to 1 kHz with some frequencies reaching the tens of kHz (Southall et all, 2017). Erbe et al. (Erbe, et al. 2021) identify underwater ship broadband (10 Hz – 2.6 kHz) source levels for commercial ships of 148 dB re: 1 µPa m to 193 dB re: 1 µPa m across size classes <25m to >200m. The typical vessel types for the activities within this EP are estimated to have sound source levels around 184.4 dB re 1 µPa m (IMR Vessel) and 159.8 dB re 1 µPam (DSV) associated with vessel broadband acoustic energy (Appendix 7).

Sound propagation modelling was undertaken for the proxy activity vessels to assist in understanding the potential acoustic impact on receptors including marine mammals (cetaceans and otariid seals), marine turtles and fish. Estimated underwater acoustic levels are presented as sound pressure levels (SPL, L_p), and accumulated sound exposure levels over 24 hours (SEL_{24h}, $L_{E,24h}$) as appropriate for non-impulsive (continuous) noise sources (Appendix 7). Different combinations of activities were modelled at different locations of the Operational Area (Table 6-6 and Table 6-7).

Table 6-6 Location details for the modelled sites, and source depths

Site	Description	Location (Coordinate System: GDA94)		Modelled water depth
		Latitude	Latitude	
1	PB wells IMR	38° 01' 17.22" S	148° 26' 15.20" E	53 m
2	PB wells ROV			
3	PB wells DSV	38° 01' 16.97" S	148° 26' 35.70" E	52 m
4	HDD exit IMR	37° 51' 50.32" S	148° 25' 45.33" E	41 m
5	HDD exit ROV			
6	HDD exit DSV	37° 51' 50.08" S	148° 26' 05.80" E	41 m

Site	Description	Location (Coordinate System: GDA94)		Modelled water depth
		Latitude	Latitude	
7	Sole wells IMR	38° 06' 00.07" S	149° 00' 31.37" E	123 m
8	Sole wells ROV			
9	Sole wells DSV	38° 05' 59.72" S	149° 00' 51.90" E	123 m

Table 6-7 Summary of modelled scenarios

Scenario ID	Associated sites	Location	Scenario description
1	1 + 2	Patricia-Baleen wells	IMR under DP + ROV Cutter
2	1 + 2 + 3		IMR under DP + DSV under DP + ROV Cutter
3	4 + 5	HDD exit	IMR under DP + ROV Cutter
4	4 + 5 + 6		IMR under DP + DSV under DP + ROV Cutter
5	7 + 8	Sole wells	IMR under DP + ROV Cutter
6	7 + 8 + 9		IMR under DP + DSV under DP + ROV Cutter

The source characteristics for the IMR vessel and ROV cutting tools described in the modelling report (Appendix 7) are shown in Table 6-8. In addition, sound characteristics for helicopters, as determined from published literature, are also shown in Table 6-8.

The modelled scenarios considered the concurrent operation of the IMR under DP and the ROV vessel as well as the IMR under DP, ROV and the DSV under DP associated with activities situated alongside the PB and Sole well locations and at the PB HDD exit. The exact position of the vessels and ROV in these scenarios is not known and will vary dependant on the IMR activity. Therefore, the concurrent sound from the IMR vessel and the ROV sources were modelled simultaneously at the same geographic (i.e. horizontal) location but with source depths that reflect the activity being modelled (Appendix 7).

Helicopter operation produces underwater sounds for brief periods when the helicopter is directly overhead (Richardson, et al. 1995). Sound emitted from helicopter operations is typically below 500 Hz. Richardson et al (1995) reports figures for a Bell 214 helicopter (stated to be one of the loudest) being audible in the air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. In the absence of modelling, the estimates of SPL from helicopter operations (149–162 dB re 1 μPa) (Richardson, et al. 1995) has been used for the purposes of impact and risk assessment. However, given the nature of helicopter operations (i.e. contingency support and crew transfers during IMR activities; Section 3.6.4.3) covered under this EP, exposure to sound from this source for an extended period (e.g. 12 or 24 hours) is not credible, and as such, comparison against the cumulative sound exposure level criterions is not relevant. Therefore, no further evaluation has been undertaken.

Table 6-8 Continuous sound sources frequencies and sound levels

Emission source	Source sound level	
IMR vessel	Broadband: 184.4 dB re 1 μPa^2m^2s	(Appendix 7)
DSV vessel	Broadband: 159.8 dB re 1 μPa^2m^2s	(Appendix 7)
ROV cutter	Broadband: 161.4 dB re 1 μPa	(Appendix 7)
Helicopter	SPL: 162 dB re 1 μPa	(Richardson, et al. 1995)

Broadband SPL calculated over 10 Hz to 25 kHz range.

6.5.2.1.2 Noise effect criteria

Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following noise effect thresholds (Table 6-9), based on current best available science, have been used in the impact and risk assessment:

- frequency-weighted accumulated sound exposure levels (SEL_{24h}, $L_{E,24h}$) from Southall et. al (2019) for the onset of PTS[9] and TTS[10] in marine mammals
- un-weighted SPL for behavioural threshold for marine mammals based on NOAA (2019)
- frequency-weighted accumulated sound exposure levels (SEL_{24h}, $L_{E,24h}$) from Finneran et al. (2017) for the onset of PTS and TTS in marine turtles
- sound exposure guidelines for fish, fish eggs, and larvae (Popper, et al. 2014).

Commonwealth guidance has defined “injury to blue whales” as both PTS and TTS hearing impairment, as well as any other form of physical harm arising from anthropogenic sources of underwater sound (Table 2-4).

Numerous studies on marine mammal behavioural responses to sound exposure have not resulted in consensus in the scientific community regarding the appropriate metric for assessing behavioural reactions (Connell, Koessler and McPherson 2021). The NOAA (2019) behavioural threshold for marine mammals of a SPL at 120 dB re 1 µPa is likely to represent a highly conservative threshold in relation to behavioural disturbance resulting in displacement, for context:

- the NOAA (2019) behavioural threshold was derived based on studies examining behavioural responses to drilling and dredging (NOAA 2018), referring to Malme et al. (1983), Malme et al. (1984), and Malme et al. (1986), which were considered in Southall et al (2007). Malme et al. (1986) found that playback of drillship sound did not produce clear evidence of disturbance or avoidance for levels below an SPL of 110 dB re 1 µPa, however, possible avoidance occurred for exposure levels approaching 119 dB re 1 µPa. Malme et al. (1984) determined that measurable reactions usually consisted of rather subtle short-term changes in speed and/or heading of the whale(s) under observation
- previous literature reviews (e.g. Southall et al (2007)) identified varying responses for most marine mammals between SPLs of 140–180 dB re 1 µPa. For low frequency whales (e.g. blue, fin, sei, southern right) the data indicated no or very limited responses at a received level of 90–120 dB re 1 µPa, with an increasing probability of avoidance and behavioural effects from 120–160 dB re 1 µPa. With regard to an exploration drilling program within the Otway Basin, advice provided by Brandon Southall to Beach Energy when asked "what, in your opinion, for this particular project, could be the sound levels which could cause effects starting at ‘response’ and ending at ‘disturbance/displacement’ for blue whales, and thus displace them from food” responded that based on studies on feeding blue whales off California the response change points were in the 130–140 dB re 1 µPa range (Beach Energy 2020)
- Beach Energy’s subsequent analysis of blue whale observations during the Otway drilling program reported that of the 127 blue whales that were observed within the 3 km radius management zone (where received noise levels may exceed 120 dB re 1 µPa), 55% of whales were observed moving towards the noise source, whereas 45% were observed moving away. Whale densities were similar close to the noise source as at increasing distance from the noise source. These observations were interpreted as indicating the whales were not being displaced by the activity underwater sound (Beach Energy 2023) suggesting that behavioural threshold for marine mammals is highly conservative
- during 2023 Cooper Energy have undertaken IMR activities in the Gippsland region. Modelling indicated that behavioural threshold for marine mammals may be received at distances approximately 5.3 km from the vessel whilst on DP (JASCO Applied Sciences 2023). Over the course of a 33-day period of in-field and in-transit activities there were approximately 435 whales sighted by marine mammal observers on board the vessel. Sightings were primarily of humpback whales undertaking their southerly migration, including adults with calves. Whales were observed at distances between 0.05 km and 6.2 km from the vessel. Behaviours observed include fast and slow travel, milling and surface active (e.g. fin slapping and breaching), with the majority being surface active and slow travel within 3 km of the vessel (Figure 6-1 and Figure 6-2). The whales that were observed were not noticeably disturbed by the underwater sound generated by the activity; this may be another indicator that the behavioural threshold for marine mammals is highly conservative.

[9] PTS is a physical injury to an animal’s hearing organs.

[10] TTS is a temporary reduction in an animal’s hearing sensitivity as the result of receptor hair cells in the cochlea becoming fatigued.

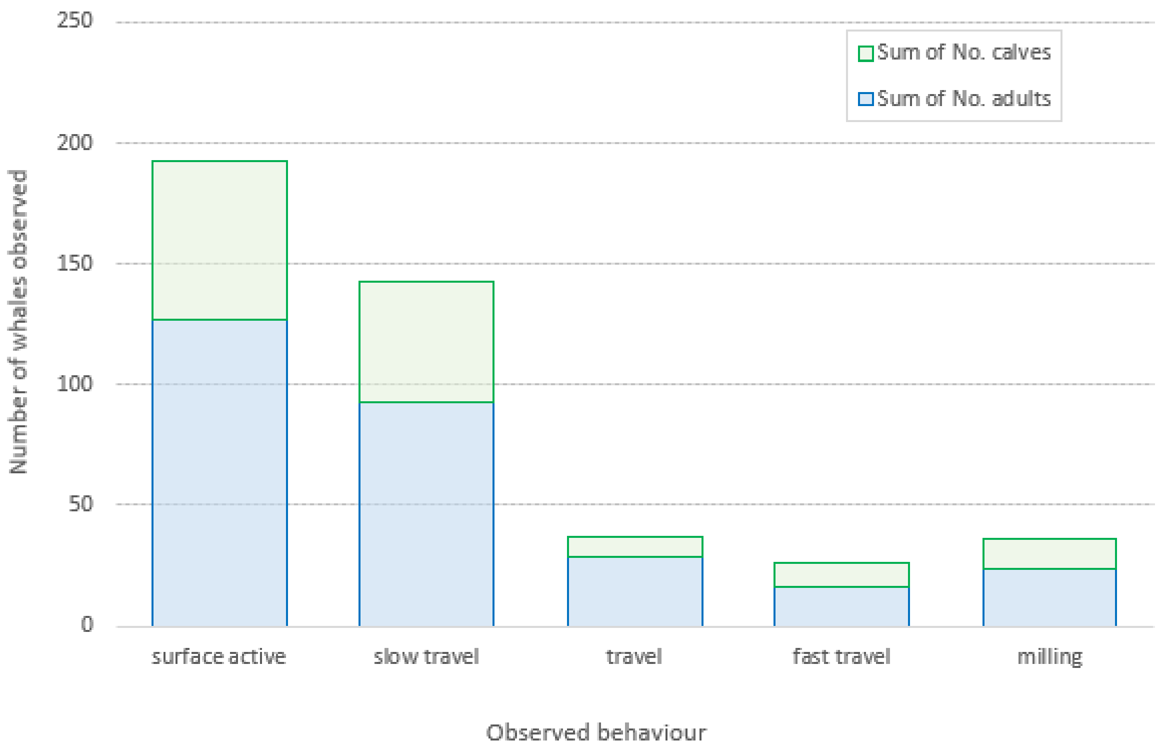


Figure 6-1: Whale observations (behaviour). Cooper Energy vessel based IMR activity in Gippsland 2023

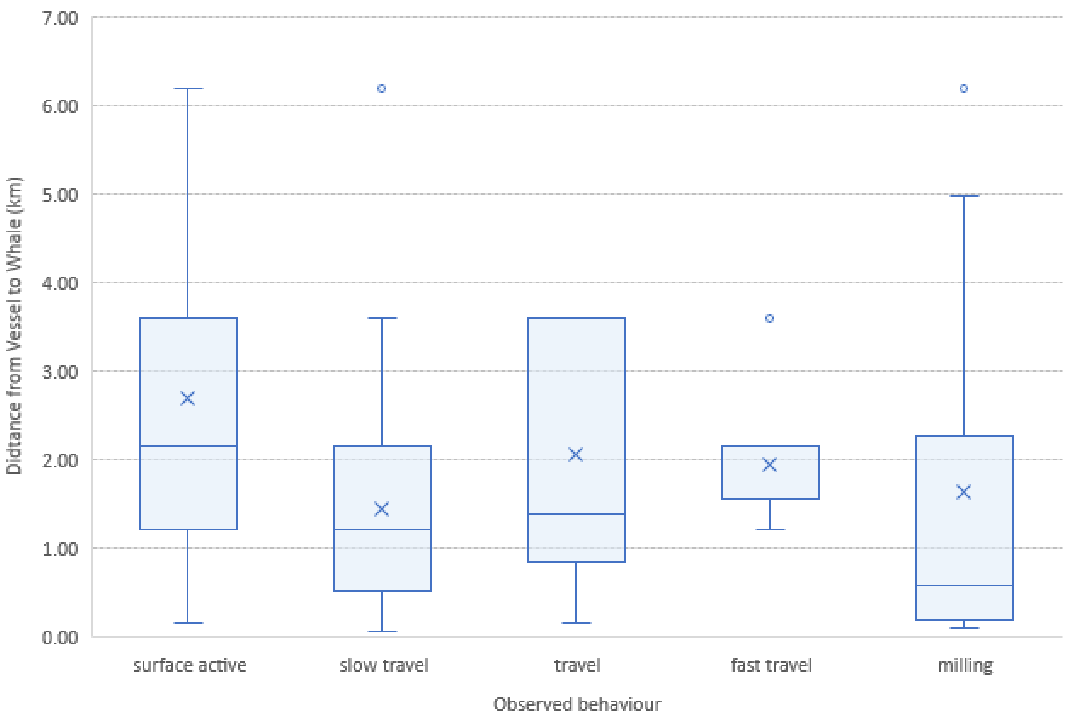


Figure 6-2: Whale observations (behaviour with distance from vessel). Cooper Energy vessel based IMR activity in Gippsland 2023

Table 6-9 Noise effect criteria for continuous sound

Receptor	Behavioural	Impairment			Injury	
		Masking	TTS	Recoverable injury	PTS	Mortality or potential mortal injury
Low-frequency cetaceans	SPL L_p: 120 dB re 1 µPa	N/A	SEL_{24h}, $L_{E,24h}$: 179 dB re 1 µPa²s	N/A	SEL_{24h}, $L_{E,24h}$: 199 dB re 1 µPa²s	N/A
High-frequency cetaceans	SPL L_p: 120 dB re 1 µPa	N/A	SEL_{24h}, $L_{E,24h}$: 178 dB re 1 µPa²s	N/A	SEL_{24h}, $L_{E,24h}$: 198 dB re 1 µPa²s	N/A
Very high-frequency cetaceans	SPL L_p: 120 dB re 1 µPa	N/A	SEL_{24h}, $L_{E,24h}$: 153 dB re 1 µPa²s	N/A	SEL_{24h}, $L_{E,24h}$: 173 dB re 1 µPa²s	N/A
Otariid pinnipeds	SPL L_p: 120 dB re 1 µPa	N/A	SEL_{24h}, $L_{E,24h}$: 199 dB re 1 µPa²s	N/A	SEL_{24h}, $L_{E,24h}$: 219 dB re 1 µPa²s	N/A
Turtles	(N) High (I) Moderate (F) Low	(N) High (I) High (F) Moderate	SEL_{24h}: 200 dB re 1 µPa²s	(N) Low (I) Low (F) Low	SEL_{24h}: 220 dB re 1 µPa²s	(N) Low (I) Low (F) Low
Fish (no swim bladder)	(N) Moderate (I) Moderate (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	N/A	(N) Low (I) Low (F) Low
Fish (swim bladder not involved in hearing)	(N) Moderate (I) Moderate (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	N/A	(N) Low (I) Low (F) Low
Fish (swim bladder involved in hearing)	(N) High (I) Moderate (F) Low	(N) High (I) High (F) High	SPL: 158 dB re 1 µPa for 12 hours	SPL: 170 dB re 1 µPa for 48 hours	N/A	(N) Low (I) Low (F) Low
Fish eggs and fish larvae (also relevant to plankton)	(N) Moderate (I) Moderate (F) Low	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	N/A	(N) Low (I) Low (F) Low

Relative risk (high, moderate, low) is given for fauna at three distances from the source (near [N] = tens of metres, intermediate [I] = hundreds of metres, and far [F] = thousands of metres).

6.5.2.1.3 Modelling outputs

The maximum-over-depth sound fields for the modelled scenarios (Table 6-6) are presented in Table 6-10, Table 6-11, Table 6-12 as the maximum horizontal distance (R_{max}) from the source to each noise effect threshold.

All modelled locations are situated on the continental shelf; however, the geoacoustic profiles at the three sites differed (Appendix 7). SPL results were similar for the three modelled sites. The maximum range to the 120 dB isopleth, which represents the marine mammal behavioural response criterion, was longest for the HDD exit location The difference was primarily influenced by the different seabed profile at the HDD exit modelled location. At all modelled sites, the 120 dB isopleths were relatively circular, and bathymetry had very little influence on propagation, except isopleths from the HDD exit site that interacted with the coastline. There were only minor differences between scenarios considering the IMR and ROV operations only (Scenarios 1, 3 and 5) and scenarios including the DSV (Scenarios 2, 4 and 6) (Appendix 7).

Table 6-10: Modelled maximum horizontal distances (R_{max}) from PB Scenario to reach noise effect criteria

Receptor	Behavioural	TTS	Recoverable injury	PTS
Low-frequency cetaceans	SPL: 7.82 km	SEL_{24h}: 2.22 km	N/A	SEL_{24h}: 0.06 km
High-frequency cetaceans	SPL: 7.82 km	SEL_{24h}: 0.06 km	N/A	SEL_{24h}: -
Very high-frequency cetaceans	SPL: 7.82 km	SEL_{24h}: 0.99 km	N/A	SEL_{24h}:0.08 km
Otariid seals	SPL: 7.82 km	SEL_{24h}: 0.03 km	N/A	SEL_{24h}: -
Turtles	N/A	SEL_{24h}: 0.05 km	N/A	SEL_{24h}: -
Fish (swim bladder involved in hearing)	N/A	SPL_{12h}: 0.03 km	SPL_{48h}: -	N/A

A dash indicates the threshold was not reached within the limits of the modelling resolution (20 m).

Table 6-11: Modelled maximum horizontal distances (R_{max}) from HDD exit scenario to reach noise effect criteria

Receptor	Behavioural	TTS	Recoverable injury	PTS
Low-frequency cetaceans	SPL: 8.70 km	SEL_{24h}: 2.11 km	N/A	SEL_{24h}: 0.08 km
High-frequency cetaceans	SPL: 8.70 km	SEL_{24h}: 0.06 km	N/A	SEL_{24h}: -
Very high-frequency cetaceans	SPL: 8.70 km	SEL_{24h}: 0.95 km	N/A	SEL_{24h}:0.09 km
Otariid seals	SPL: 8.70 km	SEL_{24h}: 0.03 km	N/A	SEL_{24h}: -
Turtles	N/A	SEL_{24h}: 0.06 km	N/A	SEL_{24h}: -
Fish (swim bladder involved in hearing)	N/A	SPL_{12h}: 0.03 km	SPL_{48h}: -	N/A

A dash indicates the threshold was not reached within the limits of the modelling resolution (20 m).

Table 6-12: Modelled maximum horizontal distances (R_{max}) from Sole scenario to reach noise effect criteria

Receptor	Behavioural	TTS	Recoverable injury	PTS
Low-frequency cetaceans	SPL: 7.03 km	SEL_{24h}: 1.43 km	N/A	SEL_{24h}: 0.06 km
High-frequency cetaceans	SPL: 7.03 km	SEL_{24h}: 0.06 km	N/A	SEL_{24h}: -
Very high-frequency cetaceans	SPL: 7.03 km	SEL_{24h}: 0.91 km	N/A	SEL_{24h}:0.07 km
Otariid seals	SPL: 7.03 km	SEL_{24h}: 0.02 km	N/A	SEL_{24h}: -
Turtles	N/A	SEL_{24h}: 0.04 km	N/A	SEL_{24h}: -
Fish (swim bladder involved in hearing)	N/A	SPL_{12h}: 0.03 km	SPL_{48h}: -	N/A

A dash indicates the threshold was not reached within the limits of the modelling resolution (20 m).

6.5.2.2 Impulsive sound emissions

6.5.2.2.1 Acoustic modelling

Cooper Energy commissioned JASCO Applied Sciences to provide empirical estimations of the effect ranges from survey equipment. The source characteristics determined from the literature review (McPherson and Koessler 2021) and used the subsequent impact and risk assessment are shown in Table 6-13.

Table 6-13 Survey Equipment Source Frequencies and Sound Levels

Emission source	Example equipment	Source frequency range	Source sound level
MBES	R2Sonic 2024 Reson SeaBat 8101	200–400 kHz	SPL: 221 dB re 1 µPa @ 1 m SEL_{SS}: 130 dB re 1 µPa^{2}s @ 40 m PK: 170 dB re 1 µPa @ 40 m
Sidescan sonar	EdgeTech 4200	70–400 kHz	SPL: 205 dB re 1 µPa @ 1 m SEL_{SS}: 176 dB re 1 µPa^{2}s @ 1 m PK: 210 dB re 1 µPa @ 1 m
Sub-bottom profiler (with boomer)	Applied Acoustics AP3000	100–1,000 Hz	SPL: 203.3 dB re 1 µPa @ 1 m SEL_{SS}: 172.6 dB re 1 µPa^{2}s @ 1 m
Sub-bottom profiler (with CHIRP)	Edgetech X-star system CHIRP	2–16 kHz	SPL: 191.7 dB re 1 µPa PK: 215 dB re 1 µPa^{2}m^2

SEL_{SS} is per-pulse SEL (i.e. not an accumulated value)

6.5.2.2.2 Noise effect criteria

Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following noise effect thresholds (Table 6-14), based on current best available science, have been used in the impact and risk assessment:

- peak pressure levels (PK) and frequency-weighted accumulated sound exposure levels (SEL_{24h}) from the US NOAA Technical Guidance (NMFS 2018) for the onset of PTS and TTS in marine mammals
- marine mammal behavioural threshold based on the current NOAA (NOAA 2019) criterion for marine mammals of 160 dB re 1 µPa (SPL) for impulsive sound sources
- PK levels and frequency-weighted accumulated sound exposure levels (SEL_{24h}) from Finneran et al. (Finneran, et al. 2017) for the onset of PTS and TTS in marine turtles

- marine turtle behavioural response threshold of 166 dB re 1 µPa (SPL) (Commonwealth of Australia 2017a) as applied by the US NMFS, along with a sound level associated with behavioural disturbance 175 dB re 1 µPa (SPL) (McCauley, et al. 2000)
- sound exposure guidelines for fish, fish eggs and larvae (Popper, et al. 2014).

Commonwealth guidance has defined "injury to blue whales" as both PTS and TTS hearing impairment, as well as any other form of physical harm arising from anthropogenic sources of underwater sound (Table 2-4).

Table 6-14 Noise effect criteria for impulsive sound

Receptor	Behavioural	Impairment			Injury	
		Masking	Temporary threshold shift	Recoverable injury	Permanent threshold shift	Mortality or potential mortal injury
Low-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 168 dB re 1 µPa²s PK: 213 dB re 1 µPa	N/A	SEL_{24h}: 183 dB re 1 µPa²s PK: 219 dB re 1 µPa	N/A
Mid-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 170 dB re 1 µPa²s PK: 224 dB re 1 µPa	N/A	SEL_{24h}: 185 dB re 1 µPa²s PK: 230 dB re 1 µPa	N/A
High-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 140 dB re 1 µPa²s PK: 196 dB re 1 µPa	N/A	SEL_{24h}: 155 dB re 1 µPa²s PK: 202 dB re 1 µPa	N/A
Otariid seals	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 188 dB re 1 µPa²s PK: 226 dB re 1 µPa	N/A	SEL_{24h}: 203 dB re 1 µPa²s PK: 232 dB re 1 µPa	N/A
Turtles	SPL: 166 dB re 1 µPa SPL: 175 dB re 1 µPa	N/A	SEL_{24h}: 189 dB re 1 µPa²s PK: 226 dB re 1 µPa	N/A	SEL_{24h}: 204 dB re 1 µPa²s PK: 232 dB re 1 µPa	N/A
Fish (no swim bladder)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 µPa²s	SEL_{24h}: >216 dB re 1 µPa²s PK: >213 dB re 1 µPa	N/A	SEL_{24h}: >219 dB re 1 µPa²s PK: >213 dB re 1 µPa
Fish (swim bladder not involved in hearing)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 µPa²s	SEL_{24h}: 203 dB re 1 µPa²s PK: >207 dB re 1 µPa	N/A	SEL_{24h}: 210 dB re 1 µPa²s PK: >207 dB re 1 µPa
Fish (swim bladder involved in hearing)	(N) High (I) High (F) Moderate	(N) Low (I) Low (F) Moderate	SEL_{24h}: 186 dB re 1 µPa²s	SEL_{24h}: 203 dB re 1 µPa²s PK: >207 dB re 1 µPa	N/A	SEL_{24h}: 207 dB re 1 µPa²s PK: >207 dB re 1 µPa
Fish eggs and fish larvae (also relevant to plankton)	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	N/A	SEL_{24h}: >210 dB re 1 µPa²s PK: >207 dB re 1 µPa

Relative risk (high, moderate, low) is given for fauna at three distances from the source (near [N] = tens of metres, intermediate [I] = hundreds of metres, and far [F] = thousands of metres).

6.5.2.2.3 Modelling outputs

Empirical estimates of the distances to thresholds were either taken from equivalent and comparable sources in literature or estimated using a simple spreading loss calculation and associated literature inputs (McPherson and Koessler 2021). The estimated maximum from any of the individual positioning or survey equipment to reach the respective noise effect criteria is summarised in Table 6-15.

Where criteria (defined in Section 6.5.2.2.2) contain weighted thresholds, unweighted estimated levels and unweighted literature values were compared to the weighted threshold as part of a conservative distance calculation. If weighted estimates were compared to thresholds, they would be reached at closer distances than the unweighted estimates presented in Table 6-15 (McPherson and Koessler 2021).

Table 6-15: Estimated maximum horizontal distance from any equipment to reach noise effect criteria

Receptor	Behavioural	Impairment			Injury	
		Masking	TTS	Recoverable injury	PTS	Mortality or potential mortal injury
Low-frequency cetaceans	SPL: <130 m	N/A	SEL_{24h}: — PK: —	N/A	SEL_{24h}: — PK: —	N/A
Mid-frequency cetaceans	SPL: <130 m	N/A	SEL_{24h}: — PK: —	N/A	SEL_{24h}: — PK: —	N/A
High-frequency cetaceans	SPL: <130 m	N/A	SEL_{24h}: — PK: —	N/A	SEL_{24h}: — PK: —	N/A
Otariid seals	SPL: <130 m	N/A	SEL_{24h}: — PK: —	N/A	SEL_{24h}: — PK: —	N/A
Turtles	SPL: <130 m	N/A	SEL_{24h}: — PK: within metres	N/A	SEL_{24h}: — PK: within metres	N/A
Fish (no swim bladder)	N/A	N/A	SEL_{24h}: within metres	SEL_{24h}: within metres PK: within metres	N/A	SEL_{24h}: within metres PK: within metres
Fish (swim bladder not involved in hearing)	N/A	N/A	SEL_{24h}: within metres	SEL_{24h}: within metres PK: within metres	N/A	SEL_{24h}: within metres PK: within metres
Fish (swim bladder involved in hearing)	N/A	N/A	SEL_{24h}: within metres	SEL_{24h}: within metres PK: within metres	N/A	SEL_{24h}: within metres PK: within metres
Fish eggs and fish larvae (also relevant to plankton)	N/A	N/A	N/A	N/A	N/A	SEL_{24h}: within metres PK: within metres

6.5.2.3 Cumulative Noise

This section considers ongoing Cooper Energy operations within the context of nearby titleholders who have undertaken individual assessments of their own activities, to assess the combined impact of reasonably foreseeable future projects on key receptors. The nature and scale of underwater sound presented within publicly available sources has been considered in the assessment of the potential cumulative impacts of noise in the event that nearby offshore activities were undertaken concurrently, or sequentially (Table 4-4).

Through identifying the spatial and temporal extent of the underwater sound emissions generated by activities within the published EPs, it is possible to assess the impacts of foreseeable future projects within a suitable timeframe to align with the 5-year period of this EP. The spatial extent used for this assessment is the Gippsland region, which is considered sufficiently broad to capture cumulative impacts relevant to the key receptors.

Behavioural noise contours are greater than TTS and PTS contours and therefore, have been used within the cumulative impact assessment to reflect the greatest potential cumulative footprint of underwater sound emissions from the respective activities.

6.5.3 Predicted Environmental Impacts and Risk Events

Potential impacts of underwater sound emissions are:

- change in ambient sound.

Potential risk events associated with underwater sound emissions are:

- behavioural changes to marine fauna
- auditory impairments (masking, TTS, recoverable injury) or auditory injuries (mortality or potential mortal injuries, PTS) to marine fauna.

6.5.4 Impact and Risk Evaluation

6.5.4.1 Continuous sound

6.5.4.1.1 Impact: Change in ambient sound

Inherent Consequence Evaluation

Ambient underwater sound is the level of sound which exists in the environment without the presence of the petroleum activity. Since 2009 (paused 2017–2018 due to unconfirmed funding), the Integrated Marine Observing System (IMOS) has been recording underwater sound off the Otway coast, south of Portland, Victoria (38°32.5'S, 115°0.1'E). Sound sources identified in recordings include blue and fin whales at frequencies below 100 Hz, ships at 20–200 Hz, and fish at 1–2 kHz (Erbe, Reichmuth and Cunningham 2016). In the Gippsland Basin, primary contributors to background sound levels were wind, rain, and current- and wave-associated sound at low frequencies under 2 kHz (Przeslawski, et al. 2016). Biological sound sources, including dolphin vocalisations, were also recorded (Przeslawski, et al. 2016). Ambient underwater sound levels in the Gippsland Basin within the 100–500 Hz frequency range varied depending on recording location between 89.2–109.9 dB re 1 μPa^2/Hz, likely due to a varied increase in distance from shipping activity, and water depth.

Underwater modelling for the activity (Appendix 7) indicated that sound at an SPL of 110 dB re 1 μPa would extend between 21.2 km and 27.5 km from the source for each of the modelled scenarios (Table 6-7).

Given the short duration (i.e. up to eight weeks per IMR activity) of the activity, and localised extent of change (e.g. up to 27.5 km for an SPL of 110 dB re 1 μPa), the consequence of this impact has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work required.

6.5.4.1.2 Risk Event: behavioural changes to marine mammals

Inherent Consequence Evaluation

Acoustic modelling indicated that the R_{max} from the source to SPL behaviours noise effect criteria was 7.03-8.70 km for marine mammals (Table 6-10, Table 6-11 and Table 6-12). The marine mammal behavioural response criterion was longest for the HDD exit location (8.70 km) followed by PB (7.82 km) and Sole (7.03 km).

The PMST report (Appendix 3.4) for an 8.7 km buffer around the Operational Area, identifies that marine mammal species listed as threatened and/or migratory under the EPBC Act have the potential to be present, including:

- blue whale, southern right whale (endangered, migratory)
- fin whale, sei whale (endangered, migratory)
- Antarctic minke whale, bryde's whale, dusky dolphin, humpback whale, killer whale, pygmy right whale, sperm whale (migratory.)

In addition, a 'possible foraging area' BIA for the pygmy blue whale, and the migration BIA for the southern right whale also overlaps with the predicted ensonified area for behavioural disturbance. It is noted that under Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022) the BIAs identified within this ensonified area are migration and reproductive BIA. The cetacean species that may occur within the ensonified area (Appendix 3.4) identified within the PMST report have also been observed undertaking a biologically important behaviour[11]. These species include:

- fin whale, pygmy right whale, sei whale (foraging, feeding or related behaviour likely to occur within area).

Low-frequency cetaceans are represented by the mysticetes (baleen whales), specialised in hearing low frequencies, and include sei, blue, fin, southern right, minke, Bryde's, pygmy right, and humpback whales. High-frequency cetaceans are represented by most odontocetes (toothed whales) and dolphins, specialised in hearing mid frequencies, and include the dusky dolphin, killer whale, and sperm whale. Very high-frequency cetaceans are represented by a subset of odontocetes (toothed whales) and dolphins, specialised in hearing high frequencies. Low numbers high and very high-frequency cetaceans' species are expected to occur with the Gippsland region; the PMST report (e.g. pygmy sperm whale, dwarf sperm whale, Appendix 3.4) may occur within the ensonsified area, but no BIAs or biologically important behaviours have been identified. However, the presence of these species within the vicinity of PB and Sole assets (up to 125 m water depths) is not considered likely, as both are oceanic species (typically occurring either at or beyond the edge of the continental shelf), and the Australian distribution is not considered to be abundant as historic sightings or standings are rare (Department of the Environment 2023).

The long-nosed fur-seal and the Australian fur-seal are both listed marine species under the EPBC Act (though are not listed as threatened or migratory), that may have a presence within the ensonified area (Appendix 3.4). No BIA, critical habitat, or biologically important behaviours were identified with the potential presence of these seal species.

Given the predominance of low-frequency cetaceans, and that either BIAs and/or biologically important behaviours have been identified for species within this hearing group within the predicted ensonified area for behavioural disturbance, this consequence evaluation is focussed on low-frequency cetaceans.

Australia has two known seasonal feeding aggregation locations, that are supported by upwelling systems, for pygmy blue whales (Commonwealth of Australia 2015a). The Bonney Upwelling is the closest known seasonal feeding area for blue whales (Commonwealth of Australia 2015a, Gill, et al. 2011, McCauley, et al. 2018); however, this feature is located ~550 km from the Operational Area. Outside of the recognised feeding areas, possible foraging areas for pygmy blue whale include the Bass Strait, and canyons off the west coast of Tasmania (Commonwealth of Australia 2015a).

Typically, blue whales migrate between breeding grounds at lower latitudes where mating and calving take place in the winter, to feeding grounds at higher latitudes where foraging occurs in the summer (Commonwealth of Australia 2015a). As identified above, a 'possible foraging area' BIA for pygmy blue whale was identified within the ensonified area. The pygmy blue whale 'possible foraging area' has been defined where "*evidence for feeding is based on limited direct observations or through indirect evidence, such as occurrence of krill in close proximity of whales, or satellite tagged whales showing circling tracks. Blue whales travel through on a seasonal basis, possibly as part of their migratory route*" (Commonwealth of Australia 2015a). The possible foraging area, as delineated within the CMP (Commonwealth of Australia 2015a), is extensive (~181,406 km^2), encompassing all of central and eastern Bass Strait (Figure 4-5).

Three groups of blue whales – Indo-Australian pygmy blue, Tasman-Pacific pygmy blue, and Antarctic blue, have been recorded acoustically in the Bass Strait (McCauley, et al. 2018), with scientists now considering the Bass Strait to be the boundary between the East Indian Ocean and New Zealand sub-populations. No Indo-Australian pygmy blues have been recorded on Australia's east coast (Balcazar, et al. 2015) or in New Zealand, where Tasman-Pacific (NZ subpopulation) pygmy blue whales gather to forage in the South Taranaki Bight west of Cook Strait (Barlow, Torres and Hodge 2018).

Acoustic detections of Tasman-Pacific pygmy blue whales and Antarctic blue whales have been recorded in the Bass Strait and offshore eastern Australia between April to June (Balcazar, et al. 2015, McCauley, et al. 2018). Based on current knowledge of patterns of behaviour elsewhere, it can be assumed that if blue whales are sighted, they are most likely foraging (P. Gill 2021), potentially whilst moving between seasonal feeding grounds to the south and breeding grounds to the north (Appendix 2).

Sightings of blue whales in the Gippsland region have been reported in June 2020 during offshore seismic survey (CGG pers comms) (Appendix 2). The Atlas of Living Australia (ALA) holds <10 sightings records

[11] Biologically important behaviours are those such as breeding, foraging, resting, or migration.

since the 1970s; the ALA data quality test notes multiple deficiencies for each sighting such as missing collection dates, hence the sighting records may be less reliable than contemporary acoustic detections. All of the above sightings were over 20 km from PB and Sole assets. Based on historical catch data (Commonwealth of Australia 2015a), the low sightings may in part be a function of lower levels of monitoring compared to other regions such as the Otway. Studies published in 2023, and which review in detail the existing records base, indicate that the recent historical acoustic records of TP Pygmy blue whales in the Gippsland are considered to be vagrant individuals form the NZ pygmy blue whale population. Sightings of Antarctic blues are expected to be of those on migration to/from breeding grounds at lower latitudes. Overall numbers of blue whales are expected to be low in the Gippsland region at any time of year, with the Gippsland being outside of predominant feeding grounds for any population of blue whales (Barlow, et al. 2023).

Foraging behaviours are dependent upon availability of food sources (e.g. patches of krill), which are not uniformly distributed. Primary and secondary productivity in the Gippsland region is linked to upwelling systems; the closest of which is an interconnected system of upwelling areas along the NSW coastline. The Gippsland region is outside of the area of high upwelling frequency (Huang and Wang 2019), and primary productivity is expected to be low overall. Therefore, given the episodic nature of upwelling and productivity in the Gippsland region, and the particularly low frequency of upwelling near to the shelf and near to PB and Sole assets (Figure 6-3), limited food sources for opportunistic foraging are expected to be present within the vicinity of the Operational Area.

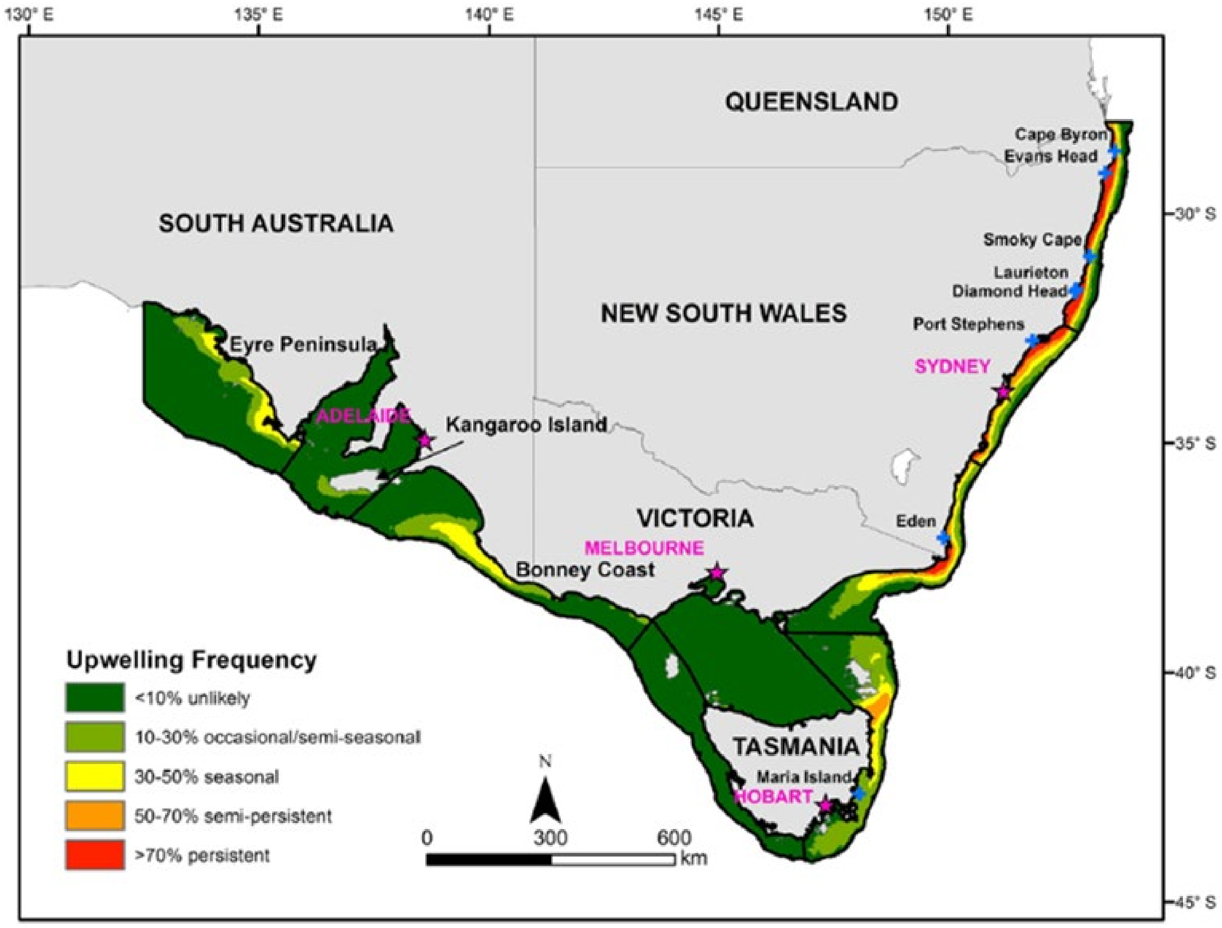


Figure 6-3 Upwelling Frequency in the Bass Straight (Huang and Wang 2019)

The CMP for the blue whale (Commonwealth of Australia 2015a) Action A.2.3 details that "*anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area*". Displacement from a foraging area, consistent with DCCEEW guidance on key terms within the CMP is defined and discussed within Table 2-4.

Following the hierarchy of controls, where practicable the risk will be eliminated. However, it is considered that the CMP and guidance on key terms rationalises that risk elimination is not practicable for all vessel activities in the south east, such as shipping, ferries, research vessels and industry vessels, most of which would have the potential to displace a whale based on typical vessel sound source levels. The guidance on key terms therefore refers to risk reduction, rather than elimination.

The CMP assesses the threat from shipping and industrial noise, including impacts from masking, injury and displacement as a minor consequence which is defined "*as individuals are affected but no affect at a population level*". The CMP acknowledges that "*given the behavioural impacts of noise on pygmy blue whales are largely unknown, a precautionary approach has been taken regarding assignation of possible consequences*"; hence even the minor consequence to individuals is considered a precautionary assessment in the CMP. Given no population level effects are predicted from shipping and industry noise it follows that Action A.2.3 may not be needed to achieve the CMP objective which is ultimately aimed at population recovery: "*to minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list*". Though shipping and industry has been present offshore southeast Australia (and within blue whale BIAs) for decades, estimates indicate blue whale populations are recovering (Branch, et al. 2007, Balcazar, et al. 2015, McCauley, et al. 2018), albeit at a slower rate compared to other species such as the humpback whale (Noad, Kniest and Dunlop 2019, TSSC 2022).

The southern right whale migration BIA includes the areas where whale presence may occur (DCCEEW 2023). Similarly, the 'reproductive' BIA includes areas where mating, calving, nursing and/or presence of neonates are known, or likely, to occur (DCCEEW 2022). Southern right whales are capital breeders, and the female reproductive cycle is closely linked to their migratory cycle (DCCEEW 2022).There is the potential for southern right whales to be transiting through the area offshore Victoria during from May to October with peak period of abundance typically in late July and August as they move to and from coastal aggregation areas. There are no established or emerging aggregation areas on the Gippsland coast, though the recently defined reproductive BIA extends the length of the Victorian coastline and into NSW (DSEWPC 2012) (DCCEEW 2023).

In Australian coastal waters, Southern right whales occur seasonally in all State coastal waters (DCCEEW 2022). Two populations of southern right whale occur in Australian waters: the western and eastern; however, the geographical boundary between these populations is unclear (DCCEEW 2022). The eastern population comprises the coastal waters of Victoria, Tasmania, New South Wales, and Queensland (DCCEEW 2022).

In coastal areas, southern right whales generally tend to be distinctly clumped in aggregation areas (DSEWPC 2012) where they calve and nurse from May to October with peak period of abundance typically in late July and August (DCCEEW 2022). Calving typically occurs in shallow coastal waters; preferred calving and nursing areas are in waters <10 m depth and within 1km of the coastline (DSEWPC 2012) (DCCEEW 2022). On average, southern right whales have a single calf every three years, with a maximum interval of up to five-year between births (DCCEEW 2022). Calving intervals shorter than three years are considered rare, while intervals longer than five years are unlikely, often a result of missed intervening calving's (Bannister 1990, Brandão, Best and Butterworth 2011, Charlton, McCauley, et al. 2022, Cooke, Rowntree and Payne 2001).

During the Austral-summer, these whales are thought to migrate away from coastal waters to feed (Mackay, et al. 2020). Differences in movement patterns were observed in tagged southern right whales during migration, possibly linked to the availability and distribution of prey when each individual whale was tagged (Mackay, et al. 2020).

Southern right whales build up energy stores on high latitude feeding grounds, observed in the region of the Subtropical Front, between 41 – 44°S (outside of the potential ensonified area of the activity), during January and December (DCCEEW 2022). Feeding activities have not been observed in coastal Australian waters (DCCEEW 2022) and therefore, in Gippsland region. These energy stores are then relied upon while on their breeding/calving grounds to enable lactation during a time that they do not feed (Lockyer 2007). As finite energy reserves are available on the calving grounds, and considering the energetic costs of reproduction for females, external factors might impose additional demands on the whales' limited energy reserves, potentially affecting the body condition of lactating females and the reproductive viability of offspring (DCCEEW 2022). Although shipping and industry has been present offshore southeast Australia (and within south right whale BIAs) for decades, recent estimates of the eastern population size indicate a 4.7% increase per year for mother-calf pairs for the eastern population (Stamation, et al. 2020, Smith, et al. 2022).

The CMP for the southern right whale (DSEWPC 2012) assesses the threat from shipping and industrial noise, as a minor consequence which is defined "*as individuals are affected but no affect at a population level*". The CMP acknowledges that "*given the behavioural impacts of noise on southern right whales are largely unknown, a precautionary approach has been taken regarding assignation of possible consequences*". No specific management action for managing underwater sound emissions is defined in the CMP.

The Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022) also assesses the threat from anthropogenic underwater noise (vessel noise), as a minor consequence which is defined "*individuals are affected but not affect at population level*". The National Recovery Plan acknowledges that "*given the behavioural impacts of noise on southern right whales are largely unknown, a precautionary approach is applied regarding the assignation of possible consequences*". Assess and address impacts to Southern Right Whales from anthropogenic underwater noise was identified as management action under the Recovery Plan.

Current National Conservation Values Atlas (DCCEEW 2022) and PMST report (Appendix 3.4) BIA boundaries indicate a reproductive BIA for southern right whales adjacent most of the coastline adjacent southern Australia. The eastern population of southern right whales display site fidelity to calving areas within south-eastern Australia (Watson, et al. 2021). This site fidelity has the potential to be affected if whales are disturbed, with repeated disturbances from different activities increasing the likelihood of changing the species' utilisation patterns of calving and nursery areas. Based on current knowledge as provided within DCCEEW 2022, there are no known reproductive area locations or historical high use areas which are overlapped by the Gippsland operations activities or associated behavioural disturbance contours from activity vessel noise.

Fin whales are generally thought to undertake long annual migrations from higher latitude summer feeding grounds to lower latitude winter breeding grounds; however, the full extent of their distribution in Australian waters is uncertain (TSSC 2015b). Fin whales have been sighted inshore in the proximity of the Bonney Upwelling, along the continental shelf in summer and autumn months (TSSC 2015b). The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC 2015b). No specific management action for managing underwater sound emissions is defined in the conservation advice.

Sei whales are primarily found in deep water oceanic habitats and are thought to complete long annual seasonal migrations from subpolar summer feeding grounds to lower latitude winter breeding grounds (TSSC 2015a). In Australian waters, sei whales have been infrequently recorded off Tasmania, New South Wales, Queensland, the Great Australian Bight, Northern Territory and Western Australia (TSSC 2015a). Sightings of sei whales includes areas such as the Bonney Upwelling, where opportunistic feeding has been observed between November and May (TSSC 2015a). The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC 2015a). No specific management action for managing underwater sound emissions is defined in the conservation advice.

There is no evidence of large-scale movements of the Australian pygmy right whales (Department of the Environment 2023). Pygmy right whales have primarily been recorded in areas associated with upwellings and with high zooplankton abundance (Department of the Environment 2023). Few or no records are available for NSW, eastern Victoria, and the northern part of the Great Australian Bight (Department of the Environment 2023).

Although foraging was identified as a biologically important behaviour within the PMST report (Appendix 3.4) for sei, fin, and pygmy right whales, limited food sources are expected to be present within the vicinity of the predicted ensonified area for behavioural disturbance. Upwelling and productivity in the Gippsland region have been shown to be episodic, and of particularly low frequency near to the shelf edge, and near to Gippsland assets (Figure 6-3). As such, given the limited food sources for opportunistic foraging in the vicinity of the Operational Area, any behavioural disturbances resulting from underwater sound is not expected to significantly impact the foraging success of any cetacean species.

Given the short duration (i.e. 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks) of the activity, localised extent of potential behavioural changes (e.g. up to 8.70 km from a vessel which will decrease in deeper waters) the consequence of this risk has been evaluated as **Level 2**, as underwater sound may result in localised short-term impacts to species of conservation value not affecting local ecosystem function.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Possible (C).**

Inherent Risk Severity

The inherent risk severity of continuous underwater sounds causing behavioural changes to marine mammals is considered **Moderate.**

6.5.4.1.3 Risk Event: TTS and PTS to marine mammals

Inherent Consequence Evaluation

Acoustic modelling indicated that the PTS SEL_{24h} noise effect criteria was not predicted to be exceeded for otariid seals (Table 6-10, Table 6-11 and Table 6-12), and as such, the risk of auditory impairment to otariid seals is not considered credible and has not been evaluated further.

Acoustic modelling indicated that the TTS SEL_{24h} noise effect criteria was between 20 m - 30 m for otariid seals (Table 6-10, Table 6-11 and Table 6-12). The SEL_{24h} is a cumulative metric that assumes a receptor is consistently exposed to the relevant noise effect criteria for a 24-hour period. This requires otariid seals to remain within ~30 m of the sound source for at least a 24-hour period before TTS auditory injury may occur. Given that otariid seals (if present) are expected to be transitory through the area, the risk of auditory impairment (TTS) to otariid seals is not considered credible and has not been evaluated further.

Acoustic modelling indicated that the R_{max} from the source to PTS SEL_{24h} noise effect criteria was 0.06-80 m, and 70-90 m for low-frequency, and very high-frequency cetaceans respectively; and was not predicted to be exceeded for high-frequency cetaceans (Table 6-10, Table 6-11 and Table 6-12). The SEL_{24h} is a cumulative metric that assumes a receptor is consistently exposed to the relevant noise effect criteria for a 24-hour period. Specifically for low-frequency or high-frequency cetaceans, this requires them to remain within ~80 m, and 90 m of the sound source for at least a 24-hour period before PTS auditory injury may occur. Given that cetaceans (if present) are expected to be transitory through the area, the risk of auditory injury (PTS) to cetaceans is not considered credible and has not been evaluated further.

Acoustic modelling indicated that the R_{max} from the source to the TTS SEL_{24h} noise effect criteria was 1.43-2.22 km, 0.06 km, and 0.91-0.99 km for low-frequency, high-frequency, and very high-frequency cetaceans respectively (Table 6-10, Table 6-11 and Table 6-12).

Specifically for high-frequency, and very high-frequency, this requires them to remain within ~60 m, and 990 m of the vessel for at least a 24-hour period before TTS auditory impairments may occur. Given that high-frequency, and very high-frequency cetaceans (if present) are expected to be transitory through the area, the risk of auditory impairment is not considered credible, and has not been evaluated further.

Similarly for low-frequency this requires them to remain within ~1.43-~2.22 km of the sound source for at least a 24-hour period before TTS auditory injury may occur. Some low-frequency cetacean species with BIAs and/or biologically important behaviours (i.e. foraging), have been identified as having the potential to occur within the predicted ensonified area for TTS (i.e. sei, blue, fin, southern right, and pygmy right whales). As described in Section 6.5.4.1.2, there is no indication of a sufficient food source being discretely available in the vicinity of the Operational Area. There are no important behaviours identified which might restrict cetaceans to the near vicinity of the vessel for prolonged periods. Though foraging behaviours in the area are possible, behavioural studies indicate wide ranging movements while foraging:

- If present, blue whales would be expected to be on migration through the Gippsland region and not exposed to activity noise for long enough for TTS onset. Blue whales have been recorded swimming at mean speeds of 2.8 km/hr +/- 2.2 km/hr whilst migrating and foraging (Owen, Jenner and Jenner 2016) or faster (Möller, et al. 2020). Humpback whales have been reported as swimming at mean speeds of circa 2.5 km/h – 4 km/h during migration (Noad, Kniest and Dunlop 2019). Accounting for these range of swimming speeds, a whale would be expected to move through any TTS zone associated with the project well before TTS onset
- a type of foraging behaviour (observed in tagged blue whales) involving area restricted searches was reported by Owen et al. (2016) as occurring out at the 1,000 m isobath, across an area of 220 km^2. The Operational Area is located in water depths <125 km, with maximum project TTS contours covering an area of 12.86 km^2. Therefore, area restricted searches, if any, could be expected to occur outside and/or well beyond any project TTS contour, which would preclude TTS onset.

- If whales were to interrupt their foraging/migration within the TTS zone to feed on a discrete patch of krill for >24 hours, the movement of plankton (and therefore krill) with the currents would move the feeding zone passively through the TTS zone before TTS onset. Minimum average currents in the surface 50 m in the region are ~0.18 m/s. A discrete patch of krill moving with the plankton (and therefore the current) would move at 648 m/h, moving through the TTS zone well before TTS onset.

The evidence suggests that the presence of any cetacean species for extended (≥24 hour) periods, and consistently within close proximity (<2.2 km) to the sound source, is not credible. Therefore, the risk of auditory impairment or injury to marine mammals is not considered credible and has not been evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.5.4.1.4 Risk Event: behavioural changes to marine turtles

Inherent Consequence Evaluation

Continuous sound sources have been identified as high risk of causing behavioural disturbance to turtles within the near (tens of metres), and a moderate risk within the intermediate (hundreds of metres), vicinity of a sound (Table 6-9). This risk reduces to low within the far (thousands of metres) vicinity of a sound (Table 6-9).

The PMST report (Appendix 3.4) for an 8.7 km buffer around the Operational Area, identifies that marine turtle species listed as threatened and/or migratory under the EPBC Act have the potential to be present, including:

- green turtle, hawksbill turtle (vulnerable, migratory)
- leatherback turtle, loggerhead turtle (endangered, migratory).

No BIAs or critical habitat were identified within the predicted ensonified area. Therefore, if marine turtles are found within this area, it is expected that they are transient only.

Noise interference has been identified as a key threat to marine turtles (Commonwealth of Australia 2017a). Marine turtles do not have external ears, but potentially use sound for navigation, locating prey and avoiding predators. Exposure to chronic (continuous) loud noise in the marine environment may lead to avoidance of important habitat (Commonwealth of Australia 2017a).

Given the short duration (i.e. 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks) of the activity, the transient nature of marine turtles within the area, and localised extent of potential behavioural changes (e.g. up to hundreds of metres from the sound source), the consequence of this risk has been evaluated as **Level 2**, as underwater sound may result in localised short-term impacts to species of conservation value not affecting local ecosystem function.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of continuous underwater sounds causing behavioural changes to turtles is considered **Low**.

6.5.4.1.5 Risk Event: TTS and PTS to marine turtles

Inherent Consequence Evaluation

Acoustic modelling indicated that the R_{max} from the source to the TTS SEL_{24h} noise effect criteria was 40-60 m for turtles (Table 6-10, Table 6-11 and Table 6-12). The PTS SEL_{24h} noise effect criteria for turtles was not predicted to be exceeded at any location (Table 6-10, Table 6-11 and Table 6-12).

Note that the SEL_{24h} is a cumulative metric that assumes a receptor is consistently exposed to the relevant noise effect criteria for a 24-hour period. Marine turtles require to remain within ~60 m of the support vessels for at least a 24-hour period before TTS auditory impairments may occur. Given that marine turtles (if present) are expected to be transitory through the area, the risk of auditory impairment is not considered credible, and has not been evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.5.4.1.6 Risk Event: behavioural changes to fish (including eggs and larvae)

Inherent Consequence Evaluation

Continuous sound sources have been identified as medium risk of causing behavioural disturbance to fish with no swim bladders, to fish with bladders not involved in hearing, or to fish eggs or larvae, within the near (tens of metres) and intermediate (hundreds of metres) vicinity of a sound (Table 6-9). Continuous sound sources have been identified as high risk of causing behavioural disturbance to fish with swim bladders involved in hearing within the near (tens of metres), and a medium risk within the intermediate (hundreds of metres) vicinity of a sound (Table 6-9).

The PMST report (Appendix 3.4) for an 8.7 km buffer around the Operational Area, identifies that fish species listed as threatened and/or migratory under the EPBC Act have the potential to present, including:

- Australian grayling (vulnerable)
- blue warehou, eastern gemfish, harrisson's dogfish, little gulper shark, orange roughy, school shark, southern bluefin tuna (conservation dependant)
- oceanic whitetip shark, porbeagle, shortfin mako (migratory)
- whale shark, white shark (vulnerable, migratory).

In addition, a distribution BIA for the white shark was identified within the predicted ensonified area (i.e. hundreds of metres) for behavioural changes for fish. All listed fish species identified are expected to be transiting through the area; no areas of known aggregation within or around the ensonified area have been identified. No habitats likely to support site-attached (listed) fish have been identified (Section 4).

Limited research has been conducted on shark responses to sound. Myrberg (2001) stated that sharks differ from bony fish in that they have no accessory organs of hearing such as a swim bladder and therefore are unlikely to respond to acoustic pressure. Klimley and Myrberg (1979) established that an individual shark may suddenly turn and withdraw from a sound source of high intensity (more than 20 dB above broadband ambient SPL) when approaching within 10 m of the sound source. Thus, any potential impacts are likely to be within tens of metres of vessel operations.

A review of the Recovery Plan for the white shark (*Carcharodon carcharias*) (Commonwealth Australia 2013), Conservation Advice for the Australian grayling (*Prototroctes maraena*) (TSSC 2021) and Conservation Advice for the whale shark (*Rhincodon typus*) (TSSC 2015c) did not identify noise impacts as a threat.

Given the short duration (i.e. 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks) of the activity, and localised extent of potential behavioural changes (e.g. up to hundreds of metres from a vessel), the consequence of this risk has been evaluated as **Level 2**, as underwater sound may result in localised short-term impacts to species of conservation value not affecting local ecosystem function.

The 8.7 km buffer around the Operational Area also overlaps with several Commonwealth and State managed fisheries, three of which (Eastern Tuna and Billfish Fishery, Southern Bluefin Tuna Fishery and Southern Squid Jig Fishery) have recorded fishing effort. However, given that behavioural disturbances to fish are expected only up to hundreds of metres of the vicinity of the sound (Table 6-9), the risk of indirectly impacting commercial fisheries from underwater sound emissions has been evaluated as **Level 1**, as impacts to commercial fish species from underwater sound may result in minor local impacts to fisheries. Note that behavioural disturbances are substantially within the gazetted PSZs (Table 3-2) around the PB and Sole wells; therefore, the risk of indirectly impacting commercial fisheries around the wells from underwater sound emissions is not considered credible.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of continuous underwater sounds causing behavioural changes to fish is considered **Low**.

6.5.4.1.7 Risk Event: masking, TTS, recoverable injury, mortality or potential mortal injury to fish (including Eggs and Larvae)

Inherent Consequence Evaluation

Continuous sound sources have been identified as low risk of causing recoverable injury, or mortality and potential mortal injury, to fish with no swim bladders, to those with bladders not involved in hearing, or to fish eggs or larvae, within all distances of the sound source (Table 6-9). Mortality and potential mortal injury to fish with a swim bladder involved in hearing was also identified as low. The recoverable injury 48-hour SPL noise effect criteria for fish with a swim bladder involved in hearing was not predicted to be exceeded (Table 6-10, Table 6-11 and Table 6-12). As such, recoverable injuries, or mortality and potential mortal injuries are not evaluated further.

Continuous sound sources have been identified as a moderate risk of causing TTS within the near (tens of metres) vicinity of a sound source for fish with no swim bladders, or those with bladders not involved in hearing; at distances further away, this risk reduces to low (Table 6-9). Acoustic modelling indicated that the R_{max} from the source to the $TTS_{12\text{-hour}}$ SPL noise effect criteria was 30 m for fish with a swim bladder involved in hearing (Table 6-10, Table 6-11 and Table 6-12). These results indicates that fish are required to remain within tens of metres of the vessel(s) for at least a 12-hour period before TTS auditory impairments may occur. Given that fish are expected to be transitory through the area, the risk of auditory impairment is not considered credible, and has not been evaluated further.

Continuous sound sources have been identified as a moderate to high risk of causing masking within the near (tens of metres) and intermediate (hundreds of metres) vicinity of a sound source for all fish groups (Table 6-9). As identified in Section 6.5.4.1.6, some threatened and/or migratory species, have been identified within the predicted ensonified area for masking.

Given the short duration (i.e. 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks) of the activity, and localised extent of potential masking (e.g. up to hundreds of metres from a vessel), the consequence of this risk has been evaluated as **Level 2**, as underwater sound may result in localised short-term impacts to species of conservation value not affecting local ecosystem function.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of continuous underwater sounds causing auditory impairment or injury to fish is considered **Low**.

6.5.4.2 Impulsive sound

6.5.4.2.1 Impact: Change in ambient sound

Inherent Consequence Evaluation

Ambient underwater sound is the level of sound which exists in the environment without the presence of the activity. Since 2009 (paused 2017–2018 due to unconfirmed funding), the IMOS has been recording underwater sound south of Portland, Victoria (38°32.5'S, 115°0.1'E). Sound sources identified in recordings include blue and fin whales at frequencies below 100 Hz, ships at 20–200 Hz, and fish at 1–2 kHz (Erbe, Reichmuth and Cunningham 2016). In the Gippsland Basin, primary contributors to background sound levels were wind, rain, and current- and wave-associated sound at low frequencies under 2 kHz (Przeslawski, et al. 2016). Biological sound sources, including dolphin vocalisations, were also recorded (Przeslawski, et al. 2016). Ambient underwater sound levels in the Gippsland Basin within the 100–500 Hz frequency range varied depending on recording location between 89.2–109.9 dB re 1 μPa^2/Hz, likely due to a varied increase in distance from shipping activity, and water depth.

Empirical estimates of impulsive underwater sounds associated with the activity (McPherson and Koessler 2021) indicated that sounds may extend up to ~130 m from the source (Table 6-15).

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the highly localised extent of change (e.g. up to ~130 m), the consequence of this impact has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work required.

6.5.4.2.2 Risk Event: behavioural changes to marine mammals

Inherent Consequence Evaluation

Empirical estimates indicated that the maximum distance from an equipment sound source to the SPL behavioural noise effect criteria was <130 m for marine mammals (Table 6-15). within the potential effect distances associated with continuous vessel noise. This distance was associated with the use of sidescan sonar with a highly directional source output beam pattern (McPherson and Koessler 2021). Other equipment was predicted to have smaller exposure areas (e.g. <10 m from MBES, and <12 m for sub-bottom profilers) (McPherson and Koessler 2021).

The PMST report (Appendix 3.1) for the Operational Area, identifies that marine mammal species listed as threatened and/or migratory under the EPBC Act have the potential to be present, including:

- blue whale, southern right whale (endangered, migratory)
- fin whale, sei whale (endangered, migratory)
- antarctic minke whale, bryde's whale, dusky dolphin, humpback whale, killer whale, pygmy right whale, sperm whale (migratory.)

In addition, a ‘possible foraging area’ BIA for the pygmy blue whale, and the migration BIA for the southern right whale also overlaps with the predicted ensonified area for behavioural disturbance. The cetacean species that may occur within the area (Appendix 3.1) identified within the PMST report have also been observed undertaking a biologically important behaviour[12]. These species include:

- fin whale, pygmy right whale, sei whale (foraging, feeding or related behaviour likely to occur within area).

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the limited spatial area (e.g. up to 130 m) of exposure to impulsive sounds above behavioural thresholds, the consequence of this risk has been evaluated as **Level 1**, as underwater sound may result in minor local impacts to species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of impulsive underwater sounds causing behavioural changes to marine mammals is considered **Low.**

6.5.4.2.3 Risk Event: TTS and PTS to marine mammals

Inherent Consequence Evaluation

Empirical estimates indicated that the SEL_{24h} and PK noise effect criteria for TTS or PTS for all marine mammal groups (i.e. low-frequency cetaceans, mid-frequency cetaceans, high-frequency cetaceans, or otariid seals) was not predicted to be exceeded (Table 6-15). Therefore, the risk of auditory impairment or injury to marine mammals from impulsive sound from survey equipment is not considered credible and has not been evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

[12] Biologically important behaviours are those such as breeding, foraging, resting, or migration.

6.5.4.2.4 Risk Event: behavioural changes to marine turtles

Inherent Consequence Evaluation

Empirical estimates indicated that the maximum distance from an equipment sound source to the SPL behavioural noise effect criteria was <130 m for marine turtles (Table 6-15). As per the discussion above for marine mammals, this distance varied with equipment source (Section 6.5.4.1.2). This is consistent with the relative risk criteria from Popper et al (2014) that suggest that behavioural changes (e.g. avoidance, diving) would only be expected for individuals near the source (high risk of behavioural impacts within tens of metres of source and moderate risk of behavioural impacts within hundreds of metres of the source) (McPherson and Koessler 2021).

The PMST report (Appendix 3.1) for the Operational Area, identifies that marine turtle species listed as threatened and/or migratory under the EPBC Act have the potential to be present, including:

- green turtle, hawksbill turtle (vulnerable, migratory)
- leatherback turtle, loggerhead turtle (endangered, migratory).

No BIAs or critical habitat were identified within the predicted ensonified area. Therefore, if marine turtles are found within this area, it is expected that they are transient in nature only.

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the limited spatial area (e.g. up to 130 m) of exposure to impulsive sounds above behavioural thresholds, the consequence of this risk has been evaluated as **Level 1**, as underwater sound may result in minor local impacts to species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of impulsive underwater sounds causing behavioural changes to turtles is considered **Low**.

6.5.4.2.5 Risk Event: TTS and PTS to marine turtles

Inherent Consequence Evaluation

Empirical estimates indicated that the SEL_{24h} noise effect criteria for TTS or PTS for marine turtles was not predicted to be exceeded (Table 6-15). Therefore, the risk of auditory impairment or injury to marine turtles from impulsive sound from survey equipment is not considered credible and has not been evaluated further.

Empirical estimates indicated that the maximum distance from an equipment sound source to the PK noise effect criteria for TTS or PTS for marine turtles was only within metres of the sound source (Table 6-15).

As described in Section 6.5.4.2.4, four species listed as threatened and/or migratory under the EPBC Act have the potential to present within the predicted ensonified area. However, no BIAs or critical habitat occur for marine turtles within the predicted ensonified area.

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the limited spatial area (e.g. within metres of the sound source) of exposure to impulsive sounds above auditory impairment or injury thresholds, the consequence of this risk has been evaluated as **Level 1**, as underwater sound may result in minor local impacts to species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of impulsive underwater sounds causing auditory impairment or injury to turtles is considered **Low**.

6.5.4.2.6 Risk Event: behavioural changes to fish (including eggs and larvae)

Inherent Consequence Evaluation

Impulsive sound sources have been identified as a high risk of causing behavioural disturbance to fish with no swim bladder, and fish with swim bladder not involved in hearing, within the near (tens of metres) vicinity of a sound, and a moderate risk within the intermediate (hundreds of metres) vicinity of a sound

(Table 6-15). For fish with swim bladder involved in hearing, impulsive sound sources have been identified as a high risk within the near (tens of metres) intermediate (hundreds of metres) vicinity of a sound (Table 6-15). Impulsive sound sources have been identified as a moderate risk of causing behavioural disturbance to fish eggs and larvae within the near (tens of metres) vicinity of a sound; this reduces to a low risk beyond this distance (Table 6-15).

However, the only survey equipment with energy below 1 kHz is the sub-bottom profiler using a boomer acoustic source, all other equipment which operates at higher frequencies is unable to be heard by most fish, which further reduces the risk of any behavioural change (McPherson and Koessler 2021).

The PMST report (Appendix 3.1) for the Operational Area, identifies that fish species listed as threatened and/or migratory under the EPBC Act have the potential to present, including:

- Australian grayling (vulnerable)
- blue warehou, eastern gemfish, harrisson's dogfish, little gulper shark, orange roughy, school shark, southern bluefin tuna (conservation dependant)
- oceanic whitetip shark, porbeagle, shortfin mako (migratory)
- whale shark, white shark (vulnerable, migratory).

In addition, a distribution BIA for the white shark was identified within the predicted ensonified area (i.e. hundreds of metres) for behavioural changes for fish. All listed fish species identified are expected to be transiting through the area; no areas of known aggregation within or around the ensonified area have been identified. No habitats likely to support site-attached (listed) fish have been identified (Section 4).

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the limited spatial area (e.g. within metres of the sound source) of exposure to impulsive sounds above behavioural thresholds, the consequence of this risk has been evaluated as **Level 1**, as underwater sound may result in minor local impacts to species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of impulsive underwater sounds causing behavioural changes to fish is considered **Low**.

6.5.4.2.7 Risk Event: masking, TTS, recoverable injury, mortality or potential mortal injury to fish (including eggs and larvae)

Inherent Consequence Evaluation

Based on the relative risk criteria from Popper et al (2014), there is a low risk of masking for all fish groups, apart from those with a swim bladder involved in hearing, which have a moderate risk at a far (thousands of metres) distances of the sound source (McPherson and Koessler 2021). However, this is only relevant for a sub-bottom profiler using a boomer acoustic source, as all other sources have signals outside the hearing range of most fish in the region (McPherson and Koessler 2021).

Impulsive sounds from survey equipment could result in physiological impacts to fish from the sidescan sonar, but not for the MBES equipment (McPherson and Koessler 2021).

Empirical estimates indicated that the SEL_{24h} noise effect criteria for TTS, recoverable injury, and mortality or potential mortal injury for fish was only within metres of the sound source (Table 6-15). Note that the SEL_{24h} is a cumulative metric that assumes a receptor is consistently exposed to the relevant noise effect criteria for a 24-hour period. Specifically for fish, this requires them to remain within metres of the sidescan sonar for at least a 24-hour period before auditory impairments or injuries may occur. Given that fish (if present) are expected to be transitory through the area, the risk of auditory impairments or injuries from an accumulated 24-hour exposure is not considered credible and has not been evaluated further.

Empirical estimates indicated that the PK noise effect criteria for recoverable injury, and mortality or potential mortal injury for fish was only within metres of the sound source (Table 6-15).

Given the intermittently and short duration (i.e. hours) of use of survey equipment, and the limited spatial area (e.g. within metres of the sound source) of exposure to impulsive sounds above auditory impairment or injury thresholds, the consequence of this risk has been evaluated as **Level 1**, as underwater sound may result in minor local impacts to the species.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Remote (E).**

Inherent Risk Severity

The inherent risk severity of impulsive underwater sounds causing auditory impairment or injury to fish is considered **Low**.

6.5.4.3 Cumulative impacts

6.5.4.3.1 Risk Event: Cumulative impacts from concurrent activities

Inherent Consequence Evaluation

Underwater sound emissions will occur as a result of support activities during IMR (Section 6.5.1). The duration of IMR activities is 2-4 weeks per IMR activity or if a major pipeline repair is required, it could take up to 8 weeks.

As identified in Table 4-4, other petroleum activities that may overlap with those described in this EP include Longtom Operations and BMG Phase 1 decommissioning activities. These activity scopes involve continuous underwater sound (e.g. vessels under DP, ROV cutting, etc.) that may be associated with once-off scopes activities (Table 4-4).

Noise modelling indicates temporary spatial sound overlap of behavioural noise contours if vessel activities at PB and Longtom wells are undertaken simultaneously. Given distances between the Sole wells, BMG activities and PB wells, levels of noise above behavioural disturbance thresholds would be expected to remain spatially discrete from one-another, in the unlikely event vessel activities were undertaken concurrently at these facilities.

No habitat critical to the survival of species (e.g. resting areas for southern right whales) was identified within the potential concurrent activity area.

The nature of potential concurrent activities is temporary, spatially limited, and as such limited cumulative impacts above those assessed for the individual activities is not expected. Therefore, the consequence of this risk has been evaluated as no greater than **Level 2**, whereby underwater sound generated by the activity may result in localised short-term impacts to species of conservation value not affecting local ecosystem function.

Inherent Likelihood

The inherent likelihood of this consequence occurring is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of cumulative impacts from concurrent activities is considered **Low**.

6.5.5 Control Measures, ALARP and Acceptability Assessment

Table 6-16 and Table 6-17 provide a summary of the control measures and ALARP and Acceptability Assessment relevant to underwater continuous sound emission, including the controls required to ensure the activity is managed such that residual impacts and risks will not be inconsistent with relevant conservation management plans.

Table 6-16 Underwater continuous sound emission ALARP, Control Measures and Acceptability Assessment

Underwater continuous sound emission	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** Impacts from sound emissions are relatively well understood, however there is the potential for uncertainty in relation to the level of impact. Noise modelling was conducted within the PB and Sole assets to reduce the uncertainty. Activities are well practiced, and there are no conflicts with company values, no partner interests, and no significant media interests. Because the potential impacts to marine fauna of conservation value are evaluated as Level 2, Cooper Energy believes ALARP Decision Context A should apply.

<table>
<tr><th colspan="2">Underwater continuous sound emission</th></tr>
<tr><td></td><td>ALARP Decision Context: Type B
ALARP decision context B has been applied in relation to blue whales and southern right whales because there is a residual (low) risk in relation to behavioural disturbance to this species within a BIA. The CMPs for these species and the Draft National Recovery Plan for southern right whale indicate that at certain times of year and for certain activities, additional mitigation actions and an adaptive management plan may be required in keeping with a precautionary approach.
Further controls to manage residual risks have been considered and several additional controls have been adopted. The adopted controls ensure the project environmental outcomes can be met and are not inconsistent with the objectives and relevant actions of species recovery plans.</td></tr>
<tr><th>Control Measure</th><th>Source of good practice control measures</th></tr>
<tr><td>CM9: Planned Maintenance System</td><td>Power generation and propulsion systems on vessels will be operated in accordance with manufacturer’s instructions and ongoing maintenance to ensure efficient operation.
<u>Risk event addressed</u>: Behavioural changes, auditory impairment or auditory injury from continuous sound.</td></tr>
<tr><td>CM13: EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans and Victorian (Marine Mammals) Regulations 2019</td><td>• all vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations within respective jurisdictions, as a minimum, and shall report vessel interactions with dolphins and whales
• helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on
• marine mammal sightings will be recorded and submitted to DCCEEW via the National Marine Mammal Data Portal. Sighting will be reported as per Section 9.13.4.
<u>Risk event addressed</u>: Behavioural changes.</td></tr>
<tr><td>CM31: CEMS MS11 Supply Chain and Procurement management.
Supplier Assessments.</td><td>Vessel selection process includes consideration of:
• vessels with silent notation, where tendered.
• relative nature/scale of potential underwater sound impacts from vessels tendered.</td></tr>
<tr><td>CM46: Vessel speed</td><td>Vessels undertaking petroleum activities in operational areas overlapping with preferred calving and nursing areas (<10 m water depth) within 1 km of the coastline will operate at <10 knots during times when southern right whales are expected to be present.</td></tr>
<tr><th colspan="2">Additional Control Measure adopted</th></tr>
<tr><td>CM14: Whale Disturbance Risk Management Procedure</td><td>The impact and risk assessment has shown the potential for interaction between whales and the activity, with some uncertainty around the likelihood of impacts. This uncertainty is addressed through the implementation actions and adaptive management measures detailed in the Cooper Energy Whale Management Protocol (Section 9.10).
The Whale Disturbance Risk Management Procedure for the activity provides details on level of whale observation effort, triggers for actions and the actions to be taken to manage potential impacts to endangered whale species (blue whales and southern right whales).
Action A.2.3 (Anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area) will be implemented in accordance with DAWE guidance on key terms (2021a), where the action is needed to achieve the objective of the blue whale CMP (EPO7). This will involve:
• application of precautionary criteria including suitable thresholds to establish parameters for impact and risk assessment
• actions and adaptive management measures, as detailed in the Whale Disturbance Risk Management Procedure, will be implemented for DP vessel activities to reduce the risk of blue whales injury and/or displacement.
Following review of the Conservation Management Plan for the southern right whale (2012) Cooper Energy did not identify any relevant Management Actions to be implemented. The interim objective 2 of the Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022) states “Anthropogenic threats are managed in a manner consistent with ecologically sustainable development principles and do not impede the recovery of southern right whales”. The following actions associated with this objective were identified:
• Action A.5.2: actions within and adjacent to Southern Right Whale BIAs and habitat critical to survival should demonstrate that it does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.
• Action A.5.3: ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g. EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to southern right whales to the lowest possible level
• Action A.5.4: quantify risks of anthropogenic underwater noise to southern right whales, including behavioural disturbance, changes to vocalisations, and physiological effects to whales.
Cooper Energy will implement the actions needed to achieve the objective of the southern right whale CMP. This will involve:
• application of precautionary criteria including suitable thresholds to establish parameters for impact and risk assessment</td></tr>
</table>

Underwater continuous sound emission	
	• actions and adaptive management measures, as detailed in the Cooper Energy Whale Management Procedure, will be implemented for vessel activities to reduce the risk of southern right whale displacement. The Whale Disturbance Risk Management Procedure provides details on the level of whale observation effort, triggers for actions and the actions to be taken to manage potential impacts to endangered whales (blue whales and southern right whales). This includes trigger points to cease operations where safe to do so, where individuals are observed to be at risk of disturbance. The protocol also identifies requirements for surveillance effort and expected communications on the vessel and between vessel and shore-based project team. Therefore, the activity will not impact the long-term recovery of blue whale or southern right whales and will be conducted in a manner which is not inconsistent with the recovery plans. Risk event addressed: Behavioural changes, TTS and PTS.
CM22: pre-IMR Campaign Risk Review (noise)	As part of pre-campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will focus on aspect: underwater sound, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. The review will seek to identify an environmental window where risks to endangered whales (from underwater sound) are avoided, where practicable, and in any case, ensure that risks are continually reduced to levels that are ALARP and acceptable. The review framework is described in Section 9.10 and considers: • facility drivers e.g. integrity management and mandated shutdown windows • campaign drivers e.g. vessel availability, consideration of vessels with silent notation, works duration and schedule • seasonal environmental sensitivities e.g. conservation advice, exclusion zones, sensitivity of species across the broader region • campaign risk events (underwater sound) e.g. undertake noise modelling appropriate for selected DP vessel, evaluation of overlap of noise contours with expected sensitivities, review of temporal overlap with seasonal sensitivities and neighbouring activities with potential for cumulative impacts • campaign Risk controls e.g. reassess suitability of control measures, reconsider discounted measures and consider new techniques. The review will be undertaken within the 6-months prior to a IMR activity commencing to assess any new or updated information to avoid or reduce overlap with endangered whales, where practicable, and to determine if additional controls are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. Risk event addressed: Behavioural changes, TTS and PTS.
Impact and Risk Summary	
Residual Impact Consequence	Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems
Residual Risk Consequence	Level 2 – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days / weeks
Residual Risk Likelihood	Due to the proposed controls, behavioural changes from continuous sound: **Unlikely (D)** – Conceivable and could occur at some time. Could occur during the activity although a rare combination of factors would be required for the occurrence. Behavioural changes from impulsive sound**: Remote (E)** – Not expected to occur during the activity. Not expected to occur during the activity although a freak combination of factors would be required for the occurrence. Auditory impairment or auditory injury from impulsive sound**: Remote (E)** – Not expected to occur during the activity. Not expected to occur during the activity although a freak combination of factors would be required for the occurrence.
Residual Risk Severity	Low
Demonstration of Acceptability	
Principles of ESD	The risk associated with this aspect is a localised short-term impact to species, which is not expected to result in effects at a population level that would prevent their long-term recovery or survival. Underwater continuous sound emissions are evaluated as having **Level 2** consequence which 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.
Legislative and conventions	Sound emissions will be managed in accordance with legislative requirements. Sound emissions will: • not impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a) • not impact southern right whale established or emerging aggregation BIAs or the migration and resting on migration BIA (DSEWPC 2012) • not impact the recovery of the southern right whale as per the Conservation Management Plan for the Southern Right Whale (DSEWPC 2012) • not impact the recovery of the white shark as per the Recovery Plan for the White Shark (Commonwealth Australia 2013)

Underwater continuous sound emission	
	Actions from the CMP for the Blue Whale (Commonwealth of Australia 2015a) applicable to the activity in relation to assessing and addressing anthropogenic sound emissions have been addressed as per: • assessing the effect of anthropogenic noise on blue whale behaviour (Sections 6.5.4.1.2 and 6.5.4.2.2 assess the effects of anthropogenic noise from the activity on blue whale behaviour) • anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. Section 6.5.5 demonstrates that the activity can be conducted in a manner that is consistent with the CMP and will not result in injury of blue whales. The applied control measures also serve to reduce the risks of displacement, in line with DAWE guidelines (2021a) which advise: 'Mitigation measures must be implemented to reduce the risk of displacement occurring etc...' • not impact the recovery of the blue whale.
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • MS03 – Risk Management • MS09 – Health, Safety and Environment Management • MS11 – Supply Chain and Procurement Management. Activities will be undertaken in accordance with the Implementation Strategy (Section 9).
External context	No objections or claims from Relevant Persons have been received regarding underwater sound emissions. A Yuin Nation clan connection to killer whales (Section 4.4.2) was identified. As described in Section 6.5.4.1.2, low numbers of high frequencies cetaceans (e.g. killer whales) may occur within the ensonified area with potential behavioral impacts to cetaceans identified as short-term and no credible risk of auditory impairment or injury. Therefore, identified cultural values connection to killer whales (Section 4.4.2) are not expected to be at risk of disruption by the planned activities.
Acceptability Outcome	**Acceptable**

Table 6-17 Underwater sound emissions extended control measures and ALARP assessment for cetaceans

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
Eliminate Activity	PTS, TTS and behavioural disturbance of whales from vessel noise. Rated as Level 2 consequence and Low risk in relation to these project activities.	By not undertaking the activity, sound sources would be eliminated.	N/A	N/A	N/A	Reject Rationale: Option not feasible. The activity is existing and IMR vessel activities are required as part of integrity management.
Eliminate use of DP vessels during defined periods when blue whales and/or southern right whales are more likely to occur	As above	By avoiding use of DP during periods when blue whales and/or southern right whales are more likely to occur, impacts from sound emission to species of conservation significance during biologically important behaviours can be eliminated (for the species of concern).	There are examples of this type of control being applied in well defined, discrete areas, for example, the exclusion of vessels from Logans Beach, Warrnambool (June-Oct) which is an established nursery for southern right whales in the south east. This type of control is not typical of entire BIAs such as blue whale foraging areas, which encompass the entire south-east coastline. It would not be viable for existing and emerging industries to operate offshore south east Australia if activities were only permitted outside of periods when blue whales or southern right whales occur in the region, as this represents almost the entire year. Blue whales occurs predominately between January to April in western Bass Strait, although the within-season distribution trends in Bass Strait are unknown (Commonwealth of Australia 2015a) while Southern right whale occurs from May to October (DSEWPC 2012).	Eliminating the use of DP vessels during blue whale and/or southern right whale seasons limits schedule flexibility.	This introduces significant risks, whereby vessel use would be restricted to two months operational window making operating impracticable and would not be compatible with the safe and efficient operation of the project.	Reject Rationale: Option not feasible. The activity is already being undertaken and IMR is necessary for the optimal performance of the project. As previously mentioned, Blue whales occurs predominately between January to April in western Bass Strait, (Commonwealth of Australia 2015a) while Southern right whale occurs from May to October (DSEWPC 2012).
No planned activities involving vessel DP operations if those activities are predicted to result in noise above the behavioural disturbance threshold within preferred calving	As above	Temporal avoidance removes anthropogenic underwater noise (above potential behavioural disturbance thresholds) when whales that are pregnant or nursing calves are present in areas where they may be particularly sensitive to noise.	Yes. This aligns with the actions within the draft National Recovery Plan for the Southern Right Whale.	Reduces schedule flexibility. Increased costs. This reduced operating window would apply to activities using a DP	DP vessel use would have a restricted operational window reducing the practicability of operations. Scheduling to avoid southern right whale reproduction times would result in increased	Accept Rationale: This limitation would only apply to IMR activities within a small area and avoid the risk of displacement of southern right whales from the reproductive BIA during sensitive times.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
and nursing areas (<10 m water depth) within 1 km of the coastline when occupied by pregnant or nursing southern right whales.		This prevents disruption to reproduction and key life history behaviours of southern right whales, prevents injury and enables any southern right whales to continue utilising the area.		vessel within areas which overlap southern right whale calving and nursing areas. This is a relatively small area with relatively long intervals between IMR.	likelihood of overlap with the presence of foraging blue whales.	Integrated into CM22: pre-IMR Campaign Risk Review (noise).
Vessels undertaking petroleum activities in operational areas overlapping within preferred calving and nursing areas (<10 m water depth) within 1 km of the coastline will operate at <10 knots during times when southern right whales are expected to be present.	As above Physical disturbance	Reduces load on vessel propulsion system with expected reduction in associated noise propagation. Reduces potential for physical interaction with southern right whales that could be calving/resting.	There are examples of vessel speed restrictions in discrete areas globally (e.g. north Atlantic right whale, North America) and Logans beach (southern right whale, Victoria Australia)	Slight increase in vessel transit times. Not considered material to IMR schedules.	Reduced vessel operational limits. These can be over-ridden in the event of safety critical actions as directed by the vessel master or their delegate.	Accept Rationale: This limitation would only apply to activities within a limited area to the north of the Operational Area and avoid the risk of displacement of southern right whales from the reproductive BIA during sensitive times. Developed CM46: vessel speed.
Vessel selection process includes consideration of relative nature/scale of potential underwater noise impacts.	As above	Provides opportunity to influence reduction in underwater noise associated with the activity.	There are examples of vessels being designed to minimise noise (e.g. Australian Antarctic Research vessel) but typically vessels are selected on the basis of capability for the work scope.	Cost associated with time for vessel option evaluation.	No introduced risks.	Implement Rationale: supports reducing risk of displacement. Costs are not considered to be grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM22: pre-IMR Campaign Risk Review.
Anchoring of vessels to hold position rather than use DP	As above	By anchoring vessels, sound emissions related to vessel DP would be reduced (but not eliminated). The risks remain low.	This is not feasible. For IMR activities, vessels need to be able to both hold position within a narrow margin of error and be able to move at a consistent pace along facilities when undertaking inspections, maintaining a narrow path above the facilities. Anchoring does not allow for this.	Not considered feasible.	N/A	Reject. Rationale: Option not feasible.
Limit power to thrusters of DP vessels to reduce underwater sound emissions.	As above	Limiting thruster power could reduce impacts from underwater sound emissions. Limiting thruster power is possible where	Not typically applied to vessels as thruster power is determined by safety limits and operational requirements. Thruster levels are optimised to operating	Considered feasible if safe to reduce thruster power.	N/A	Implement. Rationale: Thruster power can be reduced if safe to do so.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		activities can be first made safe. This action would not be immediate but should reduce the risk of displacement if whales are foraging or transiting in the vicinity. Risks would remain low.	modes and conditions but can be reduced if safe to do so.			Integrated into CM14 Whale Disturbance Risk Management Procedure.
DP vessel underwater sound reduction in design (DNV Silent notation)	As above	Vessel design can reduce underwater sound.	Stakeholder feedback: Australian Antarctic Division (AAD) advised their new state of the art survey/ice breaker vessel *Nuyina* which will operate in the Antarctic has been designed to reduce underwater sound and vibration. The vessel has been assigned DNV Silent R notation equivalence at 8 kn electric propulsion for science acoustic work. Currently not typical for industry. A review of industry vessels operating inside and outside of Australian waters has not identified any vessels assigned the DNV Silent notation.	Given the current absence of industry vessels with silent notation, this measure is not considered to be feasible for the project at this point in time but can be a point of consideration during planning and vessel selection.	N/A	**Implement:** consider available vessel options with silent notation during vessel selection process. Integrated into CM31: CEMS MS11 Supply Chain and Procurement management.
Implement safe shut-down points	As above	Shutting down vessel DP could reduce impacts from underwater sound emissions. Shutting down vessel DP is possible where activities can be first made safe. This action would not be immediate but should reduce the risk of displacement if whales are foraging or transiting/aggregating in the vicinity. Risks would remain low.	Not typically applied to DP vessels. Typically applied to activities that generate impulsive underwater sound such as piling and seismic survey. During consultation, the Australian Antarctic Division noted use of shutdown zones for explosive use (during wharf construction) in Antarctica, not for vessels.	Cost associated with shutting down DP, requiring suspension of program. Potential cost >$100 K.	Retrieval of any subsea equipment (e.g. ROV) required prior to DP shutdown. Increased frequency of handling through the splash zone and on deck increases personnel HS risk exposure. This is considered manageable through existing systems for control of work. Good reliability at project operational level.	Implement Rationale: reduces risk of displacement of whales. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational underwater sound emissions. Integrated into CM14: Whale Disturbance Risk Management Procedure.
Deploy bubble curtains around vessels.	As above	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be displaced.	Bubble curtains were raised as an idea during previous Cooper Energy ALARP workshops and also by the AAD during previous Cooper Energy consultation. No known examples of bubble curtains being used as mitigation for DP vessels.	Not considered feasible.	Discussions with technology providers indicates the deployment of bubble curtains offshore in environments like the Gippsland presents a number of challenges, including: Providing oil-free air to the seabed would require a large quantity of large	Reject Rationale: Option not feasible.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
					diesel-run air compressors. An additional dedicated DP support vessel would likely be required for these compressors. Currents – Bubble curtains are drastically impacted by currents. Current speeds and directional shifts with wind and tide, which in the dynamic environment of the Gippsland would result in bubble curtains being distorted and ineffective by the time bubbles rise from the seabed to surface. Alternate options such as the deployment of hoses on close to vessel thruster locations or offset on buoys present simultaneous plans and safety risks including congestion of the vessel safety zone and potential interference with/from thrusters. As a result, the use of bubble curtains is not considered effective, feasible or practicable.	
Dedicated daily aerial surveys during activities	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Risks would remain Low.	Aerial survey typically applied to activities that generate impulsive noise such as seismic survey.	Daily aerial surveys could introduce significant costs to the IMR activities (more than double) accounting for the cost of survey, and cost of wait on weather if survey flights are grounded.	HSE risks associated with aerial survey (can be managed via existing control of work processes). Low-Moderate reliability at the project operational level. Getting an aerial survey off the ground and back safe is weather dependent; hence introduces additional variable to project schedule risk.	Reject Rationale: significant costs with limited increased benefit.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
Aerial survey (with trained marine mammal observer [MMO]) in the 24 h prior to commencing vessel DP.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Useful where full extent of the behavioural sound disturbance contours cannot be observed from vessel. Risks would remain Low.	Aerial survey typically applied to activities that generate impulsive noise such as seismic survey.	Small increase in costs relative to cost of vessel campaign.	HSE risks associated with aerial survey (can be managed via existing control of work processes). Low-Moderate reliability at the project operational level. Getting an aerial survey off the ground and back safe is weather dependent, hence introduces additional variable to project schedule risk.	Retain as a contingency option to support pre-start survey (in BIA / in season) in the event behavioural sound contours extend beyond the limits of observation by vessel-based observer. Integrated into CM14: Whale Disturbance Risk Management Procedure.
Aerial Survey (with trained MMO) which extends beyond the behavioural disturbance corridor in the 24 hours prior to commencing vessel DP.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Useful where full extent of the behavioural sound disturbance contours cannot be observed from vessel. Risks would remain Low.	Aerial survey typically applied to activities that generate impulsive noise such as seismic survey.	Small increase in costs relative to cost of vessel campaign.	HSE risks associated with aerial survey (can be managed via existing control of work processes). Low-Moderate reliability at the project operational level. Getting an aerial survey off the ground and back safe is weather dependent, hence introduces additional variable to project schedule risk.	Retain as a contingency option to support pre-start survey (in BIA / in season) in the event behavioural sound contours extend beyond the limits of observation by vessel-based observer. Integrated into CM14: Whale Disturbance Risk Management Procedure.
Opportunistic monitoring and observation by vessel crew Crew observers are inducted into Monitoring and Communications Protocols including requirement to report all sightings to vessel master. Crew to continue observations during MMO rest breaks.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Risks would remain Low.	Yes. Opportunistic monitoring is typically integrated into offshore industry operations including from vessels. Crew are typically engaged to support MMO and are experienced in keeping watch offshore.	Costs associated with inducting crew accounted for in planning.	No introduced risks. Good reliability at the project operational level.	Implement Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational underwater sound emissions. Integrated into CM14: Whale Disturbance Risk Management Procedure.
A dedicated MMO on IMR vessel when operating inside BIA and in-season.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the	Yes. This has been applied to vessels in the Otway region where important behaviours are known to occur.	Additional cost of MMO mobilisation / demobilisation and time offshore	No introduced risks. Good reliability at the project operational level.	Implement for vessels. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		vicinity of the activity area. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone. Risks would remain Low.	Feedback from Beach Energy undertaking drilling in the Otway Basin indicates the use of MMOs on vessels was an effective risk management measure. Australian Antarctic Division (AAD) has previously advised in relation to rock blasting activities (wharf construction) in the Antarctic, dedicated MMOs were used where sensitive species may be present.	accounted for in planning.		achieved in relation to temporary operational underwater sound emissions. Integrated into CM14: Whale Disturbance Risk Management Procedure.
Additional dedicated MMO or support from crew member (trained in whale ID and distance estimation) during breaks or when daylight hours extend beyond 12 hours a day.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone. Risks would remain Low.	This has been applied to vessels in Otway region where important behaviours are known to occur to manage fatigue issues for long duration activities during periods daylight hours are >12 hour. Crew member (e.g. Officer of the Watch) will receive training from the MMO in whale observation and distance estimation to assist the MMO during daylight hours.	Additional cost of MMO mobilisation / demobilisation and time offshore not accounted for in planning. Potential for limited bed space on vessels. Time to train vessel crew in whale ID and distance estimation.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability at the project operational level. Crew/Officers of the Watch are experienced in working and watch keeping at sea.	Implement for vessels. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational underwater sound emissions. Integrated into CM14: Whale Disturbance Risk Management Procedure.
Drone surveillance from vessel	As above	May provide slight increase in visibility beyond nominal MMO viewing platform height for the duration of drone flight. This could provide slight increased confidence no foraging blue whales or southern right whales, which could be displaced, are present in the vicinity of the activity area. Risks would remain Low.	Not for this type of activity. Some examples of drone use nearshore and offshore particularly for scientific study, though weather sensitive, and not for sustained periods.	Additional cost of drone hire/purchase and pilot for the duration of the campaign. Circa $60K.	Dropped object risks. Risks of loss of equipment. Not considered reliable at the operational level for this activity.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk, whilst adding cost and additional operational HSEC risks. The costs/risks are grossly disproportionate to the risk reduction achieved in relation to temporary operational underwater sound emissions.
Monitor oceanographic precursors (early warning system)	As above	There are oceanographic and biological precursors such as SST, eddies and primary production which may provide an indication of increased secondary production (including krill), which may then be conducive to successful foraging (e.g., Murphy et al. 2017). The benefit of this early warning system is	Not typically applied in offshore industries. Primary productivity measurements are not an accurate pre-cursor to feeding activity. There can be a significant lag between peaks in Chl-A levels and peaks in krill presence. Other factors determine presence of foraging marine mammals aside from prey levels.	Administrative costs of monitoring and interpreting environmental precursors estimated circa $50K.	Reliability is likely to be low, which could lead to many false positives with significant cost and schedule impact to the project.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		dependent on reliability of these precursors as indicators of blue whale foraging; currently, reliability is likely to be low, which could lead to many false positives. Risks would remain Low.				operational subsea underwater sound emissions.
Satellite imagery	As above	Satellite imagery can be used to gather oceanographic and biological information to support the understanding of presence of marine mammals in the area. Risks would remain Low.	Not typically applied in offshore industries. Sourcing and interrogating satellite imagery is possible, however at the operational level is not considered reliable.	Administrative costs of monitoring and interpreting satellite images.	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Infra-red systems	As above	Infra-red (IR) systems could enhance the ability of MMOs to visually detect the presence of foraging whales. Risks would remain Low.	Infra-red systems are not available as a real-time monitoring tool for operations and have the following limitations: • Poor performance of the system in sea states greater than Beaufort Sea State 4 (due to the inability to adequately stabilise the camera) (Verfuss et al. 2018; Smith et al. 2020). • Conditions such as fog, drizzle, rain limit detections to be made using IR (Verfuss et al. 2018). • Detection range for large baleen whales is 1 to 3 km.	Additional cost of IR tech hire/purchase and operators for the duration of the campaign estimated circa $100K.	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Passive Acoustic Monitoring (PAM)	As above	PAM can be used to detect marine mammal calls, and support sightings made by MMO. Feedback from AAD indicated PAM was utilised during rock blasting activities in the Antarctic to verify subsea noise levels; if noise levels were higher than anticipated then explosive charges could be reduced.	Not typical for offshore vessel activities. Likely to be some interference from vessel noise at close range. PAM will not pick up on whales that are not communicating. Not safe to adjust vessel DP thrust on the basis of subsea noise profiles; operational safety considerations take precedence.	Additional cost of PAM tech hire / purchase and operators for the duration of the campaign estimated circa $100K.	Reliability considered lower than direct observations, with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
						operational subsea underwater sound emissions.
Extend the Marine Mammal Risk Management provisions to beyond peak foraging/calving season, to include shoulder season.	As above	Increased confidence no foraging blue whales or southern right whales, which could be displaced from areas important for foraging/calving, are present in the vicinity of the activity area.	Not typical for offshore vessel activities.	Additional costs associated with mobilising MMO and/or inducting crew to implement the risk management provisions.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability at the project operational level. Crew/Officers of the Watch are experienced in working and watch keeping at sea.	Implement. Integrated into CM14: Whale Disturbance Risk Management Procedure which includes provisions for monitoring during foraging/calving season, including peak and shoulder seasons.
Extend the application of the Marine Mammal Risk Management provisions to all areas where endangered whales have the potential to be affected by noise, not just BIA's	As above	Slight reduction in likelihood of a whale being affected by sound emissions (injury/displacement is already assessed as Unlikely)	Not typical for offshore vessel activities.	Additional costs associated with inducting crew to implement the risk management provisions.	None	Reject. The Marine Mammal Risk Management provisions are scalable based on the level of potential impact/risk.
Pre-Campaign Risk review at a minimum timeframe in advance of a campaign to ensure the control is effective at avoiding or reducing overlap with biologically important whale behaviours.	As above	Including a minimum timeframe in advance of the campaign allows for further information (e.g. recent baseline information) to be considered in the risk review.	Yes – reflects intent of Cooper Energy Risk Management (including change management) Processes.	Cost of risk review accounted for as part of project planning.	None	Implement The Pre-Activity Risk Review Process includes provision for completing the risk review prior the campaign commencing.

6.6 GHG Emissions

6.6.1 Cause of Aspect

GHG emissions will be generated as a result of the following activity:

- support operations (i.e. vessel and helicopter activities) during IMR
- production, and processing of Sole hydrocarbon products
- end-use of Sole hydrocarbon products.

6.6.2 Aspect characterisation

6.6.2.1 Source of emissions

GHG emissions are released into the atmosphere when hydrocarbons are burned, flared, vented or released as fugitive emissions, either at a plant or through transmission. The activities and sources that will produce GHG emissions covered under this EP (either direct or indirect emissions) are detailed in Table 6-18 and described further in the following sections.

Table 6-18 GHG Emissions Sources

Activity type	Emissions Source
Direct emissions	
IMR	Fuel combustion from vessel activity
	Fuel combustion from helicopter activity
Offshore operations	Fugitive emissions
	Embedded emissions
Indirect emissions	
Routine operations (OGP)	Fuel gas usage
	Electricity usage
	Embedded emissions
	Fugitive emissions
Non-routine operations (OGP)	Shutdown/pipeline blowdown and restart (fuel, flare, vent)
	Shutdown/pipeline blowdown and restart (electricity use above baseline)
End-use (third-party)	Gas product usage (customers)
	Condensate product usage (customers)

6.6.2.2 Types of emissions

Section 572E of the EPBC Act defines impact of an action taken as an event or circumstance which is:

- a direct consequence of the action
- an indirect consequence of the action, if the action is a substantial cause of the event or circumstance.

Direct consequences in relation to GHG emissions are identified as the direct GHG emissions generated by the planned petroleum activities under the scope of this EP. Indirect consequence are identified as the indirect GHG emissions. Therefore, the GHG emissions inventory in this EP is presented with respect to direct and indirect emissions only and does not correspond to the internationally recognised scopes. The GHG emissions inventory in this EP will also not directly equate to values reported under other (e.g. *National Greenhouse and Energy Reporting Act 2007* [NGER Act]) legislation due to the differing boundaries and facility definitions.

6.6.2.2.1 Direct emissions

As previously mentioned, direct emissions identified for this EP have been identified as GHG emissions generated from the planned petroleum activities (as described in Section 3). Any unplanned activities, including repairs, or emergency events, are considered out of scope of this emissions inventory.

Direct emissions sources for planned activities are:

- fuel combustion from vessel activity within the Operational Area
- fuel combustion from helicopter activity within the Operational Area
- fugitive emissions from offshore operations
- embedded emissions from offshore operations.

ROV equipment used during IMR activities is powered by the vessel; therefore, its emissions are already accounted for by the vessel.

6.6.2.2.2 Indirect emissions

To determine the relevance of indirect emissions to the activities covered by this EP, an assessment based on the Section 527E Policy Statement was conducted. The outcome identified the following activities as indirect emissions:

- production, and processing of Sole hydrocarbon products which includes routine and non-routine operations at OGP (Table 6-18)
- end-use of Sole hydrocarbon products (gas and condensate product usage by costumers).

6.6.2.3 Quantity of emissions

GHG emissions estimates produced by the Gippsland Offshore Operations are detailed in Table 6-18. The following assumptions were made:

- production emissions pressure at OGP is 3800 kPag and it is expected to reduce to 3200 kPag from August 2028 (Section 3.5.2)
- five campaigns, each lasting 60 days, over the next 5-years (Section 3.2). This is expected to be an over-estimate, with offshore campaign time and associated emissions more likely half those shown below.

Table 6-19 Approximate GHG Emissions Predicted for the 5-years Offshore Operations

Activity type	Emissions Source	Annual average ($kTCO_2$-e)	Cumulative ($kTCO_2$-e)
Offshore Operations (direct emissions) for next 5-years			
IMR	Fuel combustion from vessel activity and helicopter activity	6.8	34
Offshore operations	Embedded emissions	0.27	1.48
Total Offshore Operations (next 5-years)		**7.07**	**35.48**
Onshore Operations (indirect emissions) for remaining field life (Sole)			
OGP operations	Aggregated sources	49.9	461
End-use (third-party)	Gas product usage (customers)	1,190	11,011
	Condensate product usage (customers)	0.3	2.4
Total Onshore Operations (remaining field life [Sole])		**1,240**	**11,474**

It is predicted that a small component of the of the total emissions (~<1%) is contributed by Offshore Operations (i.e. activities covered under this EP). The majority of emissions are expected to be downstream of production and processing and are associated with the use of the products (i.e. indirect emissions). The emissions associated with OGP Plant operations is currently under review to establish an accurate baseline against which emissions can be compared going forward. This is addressed via Cooper Energy's emissions forecasting and implementation of the Cooper Energy Emissions Reduction Protocol

(CM33 and CM36 respectively). The emissions estimate shown in this EP is expected to be within the range +/- 40%.

6.6.2.4 Cooper Energy's Offset Strategy

Since financial year 2019/20 Cooper Energy has voluntarily offset its scope 1, scope 2 and relevant upstream scope 3 emissions. In June 2021, Cooper Energy received a carbon neutral certification[13]. Through this voluntary process, Cooper Energy has gained a detailed understanding of its emissions profile and has introduced a real cost of carbon for business activities. Both of these aspects support emissions reduction planning across the business, including the Gippsland Offshore Operations.

6.6.2.5 Gas Product Emissions Intensity

Cooper Energy calculates the emissions intensity of the gas it sells to customers (net of offsets associated with the organisation emissions) to promote discussion around emissions compensation for emissions associated with distribution and combustion of gas by customers.

6.6.3 Predicted Environmental Impacts and Risk Events

Potential impacts of GHG emissions are:

- reduction of the global carbon budget

Potential risk events associated with GHG emissions are:

- contribution to the anthropogenic influence on the global climate system.

6.6.4 Impact and Risk Evaluation

6.6.4.1 Impact: reduction of the global carbon budget

Inherent Consequence Evaluation

Direct GHG emissions from activities within this EP are estimated to be ~7.07 kTCO_2-e per year, and indirect GHG emissions are estimated to be ~1,240 kTCO_2-e per year. Combined these emissions represent ~1.07% of national Australian emissions (when compared to June 2023 inventory (DCCEEW 2023d)).

According to the Intergovernmental Panel on Climate Change (IPCC), Sixth Assessment Report for Working Group 1, "the total anthropogenic effective radiative forcing in 2019, relative to 1750, was 2.72 [1.96 to 3.48] Wm^{-2} (medium confidence) and has been growing at an increasing rate since the 1970s, [and]… Over 1750–2019, CO_2 increased by 131.6 ± 2.9 ppm (47.3%)[14] (Arias, et al. 2021).

The IPCC defines the term "carbon budget" as "refer[ing] to the maximum amount of cumulative net global anthropogenic CO_2 emissions that would result in limiting global warming to a given level with a given probability, taking into account the effect of other anthropogenic climate forcers. This is referred to as the total carbon budget when expressed starting from the pre-industrial period, and as the remaining carbon budget when expressed from a recent specified date. Historical cumulative CO_2 emissions determine to a large degree warming to date, while future emissions cause future additional warming. The remaining carbon budget indicates how much CO_2 could still be emitted while keeping warming below a specific temperature level."[15]. The remaining carbon budget for a 50% likelihood to limit global warming to 1.5°C, 1.7°C, and 2°C is respectively, 500 Gt CO_2, 850 Gt CO_2, and 1350 Gt CO_2[16].

[13] Accounting for the Company's scope 1, scope 2 and relevant scope 3 emissions.

[14] IPCC, AR6, WG1, at TS-35

[15] IPCC, AR6, WG1, at SPM-48 footnote 43

[16] IPCC, AR6, WG1, at SPM-29 Table SPM.2

If the total direct and indirect GHG emissions from activities associated with this EP are ~1,247.07 kTCO_2-e, then the activities under this EP may contribute ~ 0.0001-0.0002% to the reduction in the total remaining global carbon budget, which is a *de minimis* decrease. This estimated contribution to the total global carbon budget is based the current emissions estimates (as shown in Table 6-19).

It is noted that Cooper Energy has voluntarily offset its organisation emissions; this relates to the total direct emissions from the activity described within this EP, and indirect emissions where under Cooper Energy organisational control.

Given the low contribution to the reduction of the global carbon budget and the voluntary process to compensate the emissions, the consequence of this risk has been evaluated as **Level 1**, as GHG emissions may result in minor local impacts.

6.6.4.2 Risk Event: contribution to the anthropogenic influence on the global climate system.

As described in Section 6.6.4.1, the total direct and indirect GHG emissions from activities associated with this EP are ~1,247.07 kTCO_2-e, then the activities under this EP may contribute ~0.0001-0.0002%% to the reduction in the total remaining global carbon budget, which is a *de minimis* decrease.

This consequence evaluation considers the contribution of emissions attributed to this petroleum activity to global emissions and the potential impacts of climate change on sensitive receptors.

6.6.4.2.1 Changes to climate systems

IPCC (2023) states with high confidence that many extreme heat events and global surface temperature rise would not have occurred without human influence and could be irreversible for several decades to millennia, "[H]uman activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020. Global GHG emissions have continued to increase over 2010-2019, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals (high confidence). Human-caused climate change is already affecting many weather and climate extremes in every region across the globe" (IPCC 2023).

The report (IPCC 2023) also states that heat extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s while cold extremes have become less frequent and less severe. Marine heatwaves have approximately doubled in frequency since the 1980s. The frequency and intensity of heavy precipitation events have increased since the 1950s over most land areas for which observational data are sufficient for trend analysis. It is likely that the global proportion of major (Category 3–5) tropical cyclone occurrence has increased over the last four decades (IPCC 2023).

6.6.4.2.2 Potential ecosystem-related effects

A summary of the potential climate change impacts to different ecosystems is described in Table 6-20. Most marine and terrestrial ecosystems are susceptible to climate change; however, the predicted impact is highly variable, both between ecosystems and within individual ecosystems.

Table 6-20 Projected Impacts of CO_2 Rise and Climate Change on Australian Ecosystems

Key Component of Environmental Change	Projected Impacts of Ecosystems
Coral Reefs	
CO_2 increases leading to increased ocean acidity	Reduction in ability of calcifying organisms, such as corals, to build and maintain skeletons.
Sea surface temperature increases, leading to coral bleaching	If frequency of bleaching events exceeds recovery time, reefs will be maintained in an early successional state or be replaced by communities dominated by macroalgae.
Increase in cyclone and storm surge	Increased physical damage to reef structure
Rising sea levels	Fast-growing corals are advantaged over slow-growing species, leading to changes in structure and composition of reef communities.
Oceanic Systems (including planktonic systems, fisheries, sea mounts and offshore islands)	

Key Component of Environmental Change	Projected Impacts of Ecosystems
Ocean warming	Many marine organisms are highly sensitive to small changes in average temperature (1-2ºC), leading to effects on growth rates, survival, dispersal, reproduction, and susceptibility to disease.
Changed circulation patterns, including increase in temperature stratification and decrease in mixing depth, and strengthening of the East Australian Current	The distribution and productivity of marine ecosystems is heavily influenced by the timing and location of oceanic currents; currents transfer the reproductive phase of many organisms. Climate change may suppress upwelling in some areas and increase it in others, leading to shifts in location and extent of productivity zones.
Changes in ocean chemistry	Increasing CO_2 in the atmosphere is leading to increased ocean acidity and a concomitant decrease in the availability of carbonate ions.
Estuaries and Coastal Fringe (including benthic, mangrove, saltmarsh, rocky shore, and seagrass communities)	
Sea level rise	Landward movement of some species as inundation provides suitable habitat, changes to upstream freshwater habitats will have flow-on effects to species.
Increase in water temperature	Impacts on phytoplankton production will affect secondary production in benthic communities.
Savannas and Grasslands	
Elevated CO_2	Shifts in competitive relationships between woody and grass species due to differential responses.
Increased rainfall in north and northwest regions	Increased plant growth will lead to higher fuel loads, in turn leading to fires that are more intense, frequent and occur over larger areas.
Tropical Rainforests	
Potential increases in frequency and intensity of fires	Increased probability of fires penetrating into rainforest vegetation resulting in shift from fire-sensitive vegetation to communities dominated by fire-tolerant species.
Warming and changes in rainfall patterns	Potential increases in productivity in areas where rainfall is not limiting; reduced forest cover associated with soil drying projected for some Australian forests.
Inland Waterways and Wetlands	
Reduction in precipitation, increased frequency, and intensity of drought	Reduced river flows and changes in seasonality of flows.
Changes in water quality, including changes in nutrient flows, sediment, oxygen and CO_2 concentration	May affect eutrophication levels, incidence of blue-green algal outbreaks.
Sea level rise	Saltwater intrusion into low-lying floodplains, freshwater swamps and groundwater; replacement of existing riparian vegetation by mangroves.
Arid and Semi-arid Regions	
Increasing CO_2 coupled with drying in some regions	Interaction between CO_2 and water supply critical, as 90% of the variance in primary production can be accounted for by annual precipitation.
Shifts in seasonality of intensity of rainfall events	Any enhanced runoff redistribution will intensify vegetation patterning and erosion cell mosaic structure in degraded areas. Changes in rainfall variability and amount will also impact on fire frequency. Dryland salinity could be affected by changes in the timing and intensity of rainfall.
Warming and drying, leading to increased frequency and intensity of fires	Reduction in patches of fire-sensitive mulga in spinifex grasslands potentially leading to landscape-wide dominance of spinifex.
Alpine and Montane Areas	
Reduction in snow cover depth and duration	Potential loss of species dependent on adequate snow cover for hibernation and protection from predators; increased establishment of plant species at higher elevations as snowpack is reduced.

Source: Adapted from Steffen et al. (2009).

6.6.4.2.3 Potential species-related effects

A summary of the predicted potential taxa level effects (potential vulnerabilities) is described in Table 6-21. Usually, the impacts of climate change on biodiversity are exacerbated by other pressures such as land clearing and invasive species, but in some cases, impacts can be unequivocally attributed to climate change (Hughes, et al. 2019).

Table 6-21 Potential effects of climate change on future vulnerability of particular taxa

Taxa	Potential Vulnerability
Mammals	Narrow-ranged endemics susceptible to rapid climate change in situ; changes in competition between grazing macropods in tropical savannas mediated by changes in fire regimes and water availability; herbivores affected by decreasing nutritional quality of foliage as a result of CO_2 fertilisation.
Birds	Changes in phenology of migration and egg-laying; increased competition of resident species with migratory species due to migratory birds staying longer at breeding grounds; breeding of waterbirds susceptible to reduction in freshwater flows into wetlands; top predators vulnerable to changes in food supply as a result of increased sea temperatures; rising sea levels affecting birds that nest on sandy and muddy shores, saltmarshes, intertidal zones, coastal wetlands and low-lying islands; saltwater intrusion into freshwater wetlands affecting breeding habitat.
Reptiles	Warming temperatures may alter sex ratios of species with environmental sex determination such as turtles and crocodiles; some species may modify their use of microhabitats to cope with warming in situ.
Amphibians	Frogs may be the most at-risk terrestrial taxa; amphibians may experience altered interactions between pathogens, predators and fires
Fish	Freshwater species vulnerable to reduction in water flows and water quality; limited capacity for freshwater species to migrate to new waterways; all species susceptible to flow-on effects of warming on the phytoplankton base of food webs.
Invertebrates	Expected to be more responsive than vertebrates due to short generation times, high reproduction rates and sensitivity to climatic variables. Flying insects such as butterflies may be able to adapt by shifting ranges; non-flying species with narrow ranges are susceptible to rapid change in situ; invertebrate herbivores also affected by reduced foliar quality under elevated CO_2.
Plants	Climate change may impact various functional dynamics of plants due to changes in fires, plant phenology and insect life cycles and specific environmental characteristics; longer lived plants may be more vulnerable if climate change “moves” suitable establishment sites for seedlings beyond their dispersal distances; narrow-ranged endemic plants requiring specific conditions will have limited capacity to disperse to sites with similar conditions.

Source: Adapted from Steffen et al. (2009).

6.6.4.2.4 Anthropogenic influence on the climate system

Anthropogenic changes to the global climate system cannot be directly attributed to any one development or emission source or product. Since the start of the Industrial Revolution, in 1750s, human activities have increased GHG concentrations in our atmosphere (NSW Government n.d.).

The changing regulatory and international initiatives on climate change (e.g. which may result in changing reduction targets and timeframes) will also influence the total global GHG emissions into the future – making a future prediction of changes to climate systems, inaccurate.

6.6.4.2.5 Conclusion

Human activities have been identified as the principal cause of global warming due to emissions of GHGs. These emissions result from the net accumulation of global GHGs in the atmosphere particularly over recent decades. Though the impacts on the climate cannot be attributed to one specific sector or activity, each contribution of GHGs may be considered as relative. In the context of Australia’s remaining Carbon budget; the direct emissions associated with the Gippsland operations account for 0.006%, and indirect emissions 1.066%.

Since 2020, Cooper Energy has voluntarily addressed the emissions footprint by offsetting its organisational emissions through various local and international projects (Cooper Energy Limited 2023). This is planned to be continued for the Gippsland offshore operations whereby total direct emissions from the activity described within this EP, and indirect emissions from the activity, where under Cooper Energy organisational control, will be offset.

Given these conclusions, no further evaluation has been conducted.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.6.5 Control Measures, ALARP and Acceptability Assessment

Table 6-22 provides a summary of the control measures and ALARP and Acceptability Assessment relevant to atmospheric and GHG emissions.

Table 6-22 Atmospheric and GHG Emissions ALARP, Control Measures and Acceptability Assessment

Atmospheric and GHG Emissions	
ALARP Decision Context and Justification	**ALARP Decision Context: Type A** Activities identified as generating GHG emissions are well understood. The control measures to manage the impact associated with GHG emissions are also well understood and implemented by industry and Cooper Energy. The impacts associated with Cooper Energy activities are assessed as Level 1. There are no conflicts with company values, no significant partner or media interests. The climate is influenced by the concentration of GHG emissions in the atmosphere. Cooper Energy has a detailed understanding of its emissions profile. Given this, Cooper Energy believes ALARP Decision Context A should apply.
Control Measure	**Source of good practice control measures**
Upstream	
CM10: Emissions and Discharge Standards	Prior to commencing the offshore activity, the following will be verified, as relevant to vessel class: • a valid International Air Pollution Prevention certification and International Energy Efficiency Certificate • active Ship Energy Efficiency Management Plan.
CM31: CEMS MS11 Supply Chain and Procurement management. Supplier Assessments (IMR Vessels).	CEMS Standard MS11 includes provision for the assessment of supplier carbon reduction initiatives, collaboration opportunities and lower carbon emission intensive alternatives through the contractor evaluation process. The tender evaluation for the IMR vessel contracts will include an evaluation of atmospheric and GHG emissions management. The selection process for key services during offshore campaigns will include a review of opportunities for low carbon alternatives within the supply chain which allow Cooper Energy to reduce their GHG emissions associated with the activities assessed in this EP.
Downstream	
CM32: OGP Leak Detection and Repair Program	Cooper Energy undertakes gas leak detection at the OGP. Faulty equipment identified is managed through the equipment maintenance program.
CM33: Emissions forecast integrated with production forecast	Production, sales and emissions forecasts are integrated within the Company's Portfolio process.
CM34: OGP production metering	Fuel gas use, production and sales volumes are metered at the OGP, informing emissions accounts, through: • metering of production through the OGP • tracking of gas (and associated emissions) attributed to fuel and flare • tracking of gas sales.
CM35: Monitoring and reporting of emissions	Emissions (actuals vs budget) broken down by asset, are reported monthly to the Executive. Investigation and comments are provided for any material deviation from budget, including actions if appropriate.
CM36: Emissions Reduction Protocol	The Cooper Energy Climate Action Policy states that Cooper Energy identifies and, where practicable, implements opportunities for GHG emissions reductions within its' operations and through its' supply chain. These ambitions are operationalised via the Emissions Reduction Protocol, which establishes a systematic process to identify, assess and implement GHG emissions reduction opportunities across Cooper Energy's business. It sets a continual improvement cycle such that new technologies and approaches can be incorporated as they are developed. The objectives of the Emissions Reduction Protocol are to: • identify internal and external requirements relating to GHG emissions reduction • provide a framework for identifying, assessing and implementing emissions reduction opportunities • align emissions reduction activities with other business processes • identify roles and responsibilities for emissions reduction activities. With respect to the Gippsland Operations the process establishes a Marginal Abatement Cost Curve for OGP operations. The Marginal Abatement Cost Curve is used to assess emissions reduction opportunities that have met the screening criteria. It is populated with estimated project costs and corresponding energy and emissions savings to establish key business case metrics, compare opportunities and ultimately inform capital allocation.
CM37: Cooper Energy Scope 1 and 2 carbon neutrality	Cooper Energy maintains carbon neutrality for its organisational emissions associated with the Gippsland Offshore Activity. This is reflective of the Company's strategy which includes an intention to remain carbon neutral with respect to its scope 1, scope 2 and relevant upstream scope 3 emissions.

Atmospheric and GHG Emissions						
CM38: pre-IMR Campaign Risk Review (GHG emissions)	Risk reviews are standard practice for offshore campaigns. The Cooper Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities which includes IMR activities. As part of pre-campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will include a review of campaign emissions profile and management to determine whether new or additional controls are required to ensure GHG emissions are managed to ALARP and acceptable levels. The review will be undertaken within the 6-months prior to a IMR activity commencing to assess any new or updated regulatory information.					
CM39: NGER Scheme Reporting	Operational control-based reporting as part of the national reporting framework for GHG emissions, energy consumption and energy production to meet the objectives of the NGER Act.					
CM40: Domestic customer base	All gas and condensate from the Gippsland Offshore Operations is sold to domestic customers who are subject to Australian statutory instruments for regulating GHG emissions.					
CM41: Customer engagement on emissions intensity	Cooper Energy calculates the emissions intensity of the gas it sells to customers (net of offsets associated with the Company's certification). This figure is communicated with customers to promote discussion around compensation for emissions associated with the distribution and combustion of gas by customers.					
CM42: Environment & Sustainability Risk Review	Cooper Energy's Functional Environment & Sustainability risk register considers the risk of customers becoming mis-aligned with National emissions reduction strategies and establishes controls to monitor and manage. Functional risks are owned and reviewed by Functional Managers and reported annually to the Executive.					
Control Measures Considered	**Related Risk Event**	**Benefit**	**Recognised Good Practice?**	**Sacrifice**	**Introduced Risks**	**Conclusion**
Use of non-hydrocarbon powered vessels	Contribution to the anthropogenic influence on the global climate system.	Reduction in emissions; however, the overall reduction is relatively small (~<1% direct and indirect emissions). works.	There is a lack of vessels that do not use hydrocarbons. Currently it would not be commercially viable to implement this measure for the activities discussed in this EP.	N/A	N/A	This control has been rejected; however, it will continue to be assessed where proposed via Tenders for offshore.
Use of autonomous underwater vehicles for IMR campaigns to reduce fuel.	As above	Reduction in emissions.	Cooper Energy usually combines inspection work with maintenance activities, such as equipment replacement, to enhance overall campaign efficiency. However, autonomous underwater vehicles would not have the capability to perform equipment replacement.	N/A	N/A	This control has been rejected; however, it will continue to be assessed where proposed via Tenders for offshore works.
Electrify OGP with 100% renewable power.	As above	Reduction in emissions.	In some circumstances yes. Purchased electricity is used in a metering station and at some accommodation properties; emissions from this are ~40 tCO_2e per year. However, OGP generates the majority of its electricity using produced natural gas.	The capital cost of achieving 100% renewable power at OGP is currently disproportionately high compared to the reduction in GHG emissions.	Reduced certainty in electricity supply. Would continue to require back-up supply in case of shortage into the grid or distribution issues.	This control has been rejected; however, it will continue to be assessed in accordance with the Coopers Energy Emissions Reduction Protocol.
Impact and Risk Summary						
Residual Impact Consequence	Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/water systems.					

Atmospheric and GHG Emissions		
Residual Risk Consequence	N/A	
Residual Risk Likelihood	N/A	
Residual Risk Severity	N/A	
Demonstration of Acceptability		
Principles of ESD	GHG emissions is evaluated as having Level 1 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage. However, an assessment against the principles of ESD is presented below in relation to GHG emissions given the broader ESG governance focus on this aspect.	
	Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations.	The Cooper Energy Values and CEMS integrates long and short-term economic, environmental, social and equity considerations, providing the framework, policies and process to guide responsible decision making and subsequent implementation. Refer to internal context section below.
	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	Cooper Energy acknowledges the influence of GHG emissions on the climate and the associated risks posed by climate change. While the total GHG emissions from the activity are expected to be small in the context of the remaining global carbon budget, the company is actively implementing measures to reduce emissions from its operations. Additionally, Cooper Energy is committed to compensating for any residual emissions through offset initiatives.
	The principle of inter-generational equity	Energy is fundamental to society, and access to reliable and affordable energy sources is interlinked with their ability to sustainably develop and maintain health, diversity, and productivity for future generations (Waage, et al. 2015). Natural gas provides both a reliable and affordable energy source and is one of the lower emission fossil fuels. Cooper Energy provides domestic gas supply in Australia. In addition, gas has the potential to contribute to an incremental reduction in GHG emissions by displacing more carbon intensive power generation (e.g. coal), or in hard-to-abate sectors.
	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	Cooper Energy considers health, biological diversity, productivity and ecological integrity through the implementation of CEMS, this includes: • control measures identified previously are considered to reduce impacts to ALARP and acceptable levels • specialist environment input and support • environmental incidents are investigated in accordance with Cooper Energy requirements and learnings are disseminated appropriately • maintenance of knowledge of environmental legal and statutory obligations • environmental performance is monitored, evaluated and reported within the organization • adoption of the United Nations' definition on Sustainable Development.
Legislative and conventions	Australia has ratified the Paris Agreement and set Nationally determined contributions (NDCs). As gas from the OGP is provided to customers within Australia, GHG emissions arising from third party consumption of Gippsland gas are covered and accounted for through Australia's GHG legislative frameworks and commitments to achieve net zero emissions by 2050. This includes but is not limited to: • NGER Act (Cth) • Safeguard Mechanism under Carbon *Farming Initiative Amendment Act 2014* (Cth) • *Climate Change Act 2022* (Cth) • *Climate Change Act 2017* (Vic) • ACCU Scheme (formerly known as the Emissions Reduction Fund) under *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) As an example, the NGER Act (Cth) provides a single, national framework for the reporting and distribution of information related to GHG emissions, energy production, and energy consumption. Cooper Energy reports direct emissions associated with their facilities under the NGER Act (Cth).	
Internal context	The following elements of CEMS apply: Cooper Energy's 'Climate Action Policy' outlines the Company's objective to commit to sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Policy outlines three purpose statements: • to provide clean, reliable, and affordable energy focused on south-eastern Australia, with active participation in society's decarbonization journey	

Atmospheric and GHG Emissions	
	• to inspire our people to contribute to future energy solutions for our customers and our communities • to operate in innovative and responsible ways, with an emphasis on care, shareholder value and sustainability The Policy also identifies that Cooper Energy: • recognises the important role of renewables and the key role gas plays in complementing and supporting the deployment of renewable technologies • are making our contribution to a low emissions economy by prioritising Environmental, Social and Governance with investment in offset projects and consideration of future sustainable energy projects • identifies and, where practicable, implement opportunities for greenhouse gas emission reduction within our operations and through our supply chain • factors carbon pricing into business decisions and commercial models • identifies, manage and mitigate material climate change risks to our activities • voluntarily align our climate change related disclosures, including our emissions, with the Task Force on Climate-Related Financial Disclosures principles • disclose Cooper Energy's governance around climate change, including: material short, medium and long-term climate-related risks and opportunities on our business, strategy and financial planning; and – the resilience of our strategy, taking into account different climate scenarios, including Paris-aligned scenarios • aligns with our customers' sustainability and emissions reduction initiatives which will enable collaboration to address the broader challenge of reducing downstream Scope 3 emissions • work with governments and stakeholders in the design of climate change regulation and policies. Cooper Energy's Risk and Sustainability Committee oversees the Company's sustainability policies and practices. High level management standards relevant to managing hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11).
External context	Cooper Energy and its customer base are subject to Australian statutory instruments for regulating GHG emissions in line with Australia's NDC under the Paris Agreement. Gas demand in the local South Eastern Australia energy market is predicted to remain strong over the coming years (ACCC 2022). This demand relates to critical and necessary energy needs for current and next generations as the energy transition progresses. The majority of gas use within Australia relates to manufacturing and electricity generation, where gas is will continue to firm and support renewables (DISER 2021, AEMO 2022). The AEMO report '2022 Integrated Systems Plan' for the National Electricity Market is described by DCCEEW as Australia's roadmap to Net Zero. The report anticipates a continued critical role for gas-fired power generation for peak loads and firming through the time horizon to 2050, and describes how, over time, gas fired generation emissions will need to be offset elsewhere. Cooper Energy has already begun establishing the mechanisms for this via its offsetting initiatives. Projections for gas demand in the Southeastern Australian market are in the region of ~380 PJ/year and ~4000 PJ in aggregate over the next decade. Gas demand under accelerated energy transition scenarios may be reduced; Victoria's gas substitution roadmap predicts, for a rapid transition scenario, gas demand in the order of 1800 PJ in aggregate over the next decade (DELWP 2022). Gas supplied from Cooper Energy's Gippsland Offshore Operations, without additional production from new fields, are projected to provide around 195 PJ (2P Developed Reserves) aggregated gas into the Southeastern market from 1st July 2023 to end of field life in 2032, representing a small but crucial proportion of the projected domestic demand, via local, established infrastructure. During consultations with Relevant Persons, Cooper Energy was asked to consider offsetting emissions whilst there is still a need for gas. Cooper Energy has been asked to consider sourcing offsets locally to support local communities and businesses. For example, a business chamber in Gippsland suggested considering a more active role in the region and looking at carbon offsetting projects locally, and a shire council in the Otway area noted the community sees risk with few local benefits from the energy industry generally. These comments were address (refer to table 3 of Appendix 5); no additional actions to the identified in this section were required. No objections or claims from Relevant Persons have been received regarding GHG emissions.
Acceptability Outcome	**Acceptable**

6.7 Introduction, Establishment and Spread of Invasive Marine Species

6.7.1 Cause of Aspect

Unplanned introduction of IMS may occur as a result of the following activity:

- support operations (vessels).

6.7.2 Aspect characterisation

Discharge of ballast water and biofouling has the potential to introduce, establish and translocate (spread) IMS.

IMS are marine plants or animals that have been introduced into a region beyond their natural range and can survive, reproduce and establish founder populations.

IMS have historically been introduced and translocated around Australia by a variety of natural and human means including biofouling and ballast water. Species of concern are those that are not native and are likely to survive and establish in the region; and are able to spread by human mediated or natural means. Factors that dictate their survival and invasive capabilities depends on environmental factors such as water temperature, salinity, nutrient levels and habitat type.

The New Zealand screw shell (*Maoricolpus roseus*), classed as a marine pest, is known to occur within the Bass Strait and has been identified within the Operational Area at the PB subsea facilities.

During vessel activities the vessel may move between the Operational Area. To reduce the potential to spread IMS, prior to and during operations the Cooper Energy IMS Risk Management Protocol will be implemented for all vessels. Further information on the risk management process is provided within Section 9.9.

6.7.3 Predicted Environmental Impacts and Risk Events

The potential risk events associated with IMS introduction (assuming their survival, colonisation and spread) include:

- displacement or reduction in native marine species diversity and abundance causing changes to conservation values of protected areas.
- changes in the functions, interests or activities of commercial fisheries.

6.7.4 Impact and Risk Evaluation

6.7.4.1 Risk Event: displacement or reduction in native marine species diversity and abundance causing changes to conservation values of protected areas.

Inherent Consequence Evaluation

The introduction of an IMS can have a range of impacts on the receiving environment and can potentially alter the ecosystem dynamics of an area. Due to the complexity of ecosystems and level of interactions between and amongst biotic and abiotic receptors, there is no sure way to predict how an individual species may interact with the foreign environment.

Once an IMS is established, its level of invasiveness and ecosystem damage is determined by a range of factors detailed in Section 6.7.2. IMS have the potential to change ecosystem dynamics by competing for natural resources, reducing the availability of natural resources, predation, change natural cycling processes, segregation of habitat, spread of viruses, change in water quality, producing toxic chemicals, disturb, injure or kill vital ecosystem organisms (ecosystem engineers and keystone species), change surrounding ecosystems, change conservation values of protected areas and create new habitats. The Australian Government Bureau of Resource Sciences (BRS) established that the relative risk of an IMP becoming established around Australia decreases with distance from the coast. Modelling conducted by BRS (2007) estimates that the median risk of establishment at 3 nm, 12 nm and 24 nm is ~40%, ~30%, and ~20% respectively.

Predicted impacts from IMS if introduced to the Operational Area could affect marine fauna and benthic habitats that may utilise the Operational Area and protected marine areas present in the wider region. Benthic habitats within the Operational Area are predominantly sand and grit. Along Sole pipeline benthic habitat was identified as featureless seabed comprised of clays, silts, sands and gravel and some consolidated bedded sediments (Section 4.4.1). Along the PB pipeline extensive areas with pronounced sand waves were identified as well as areas of shell aggregations and sponge gardens in water depths >40 m (Section 4.4.1).

The Operational Area within Commonwealth waters is in waters ranging from ~40 to ~125 m; consequently, IMS colonisation is expected to be limited and decreases with distance from the coast. In State waters, successful colonisation of IMS may occur on hard substrates or artificial structures; however, the benthic habitats are predominantly sand and grit.

IMS have proven economically damaging to areas where they have been introduced and established, particularly as IMS are difficult to eradicate from areas once established (Hewitt, et al. 2002). If the introduction is captured early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life. It has been found that highly disturbed nearshore environments (such as marinas) are more susceptible to colonisation than open-water environments, where the number of dilutions and the degree of dispersal are high (Paulay, et al. 2002).

Consequently, if an IMS is introduced there is the potential for extensive medium-term impacts to benthic communities which support listed marine fish species and commercial fish and invertebrate species resulting in a **Level 4** consequence.

Inherent Likelihood

Any IMS introduced to the Operational Area would be expected to remain fragmented and isolated, and only within the vicinity of the infrastructure (i.e. it would not be able to propagate to nearshore environments). The chances of successful colonisation inside the Operational Area are considered small given the nature of the benthic habitats near the Operational Area where seabed contact is made (i.e. predominantly sand and grit.

The likelihood of IMS becoming established within the Operational Area as a result of Gippsland Offshore Operations activities is considered **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of IMS causing displacement or reduction in native marine species diversity and abundance is considered **Moderate**.

6.7.4.2 Risk Event: changes in the functions, interests or activities of commercial fisheries

Inherent Consequence Evaluation

IMS have proven economically damaging to areas where they have been introduced and established, particularly as IMS are difficult to eradicate from areas once established (Hewitt, et al. 2002). If the introduction is captured early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life. It has been found that highly disturbed nearshore environments (such as marinas) are more susceptible to colonisation than open-water environments, where the number of dilutions and the degree of dispersal are high (Paulay, et al. 2002).

IMS can have a primary and/or secondary impact on socio economic receptors. Primary impacts include direct damage to vessels, equipment and infrastructure which may then cause flow on affects and lead to a reduction in efficiency, productivity and profit. The presence of fouling organisms within a marine environment is likely to have the same or similar impacts to socio-economic receptors.

Secondary impact includes ecological impacts associated with IMS introduction may also have an impact to socio-economic receptors through reduction in ecological values. Marine pest species can deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion. For example, the introduction of the Northern Pacific Seastar (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (Dommisse and Hough 2004).

Predicted impacts from IMS if introduced to the Operational Area could affect commercial fisheries that may utilise the Operational Area. As described in Section 4.4.2, five Commonwealth managed fisheries with recorded fishing effort and, two Victorian state managed fisheries were identified within the Operational Area. Habitats for these resources exist across the area, any colonisation of IMS in the area around the PB and Sole assets are unlikely to represent a limited resource for native species.

If an IMS was introduced, and if it did colonise an area, IMS could be translocated and introduced to other local areas beyond the Operational Area; ports and other offshore industry could potentially be exposed through both ballast and biofouling. If an IMS is spread, there is the potential for local impacts to receptors where IMS has become established, including fish species, coastal and offshore industry.

Consequently, if an IMS is introduced there is the potential for extensive medium-term impacts to socio-economic receptors resulting in a **Level 4** consequence.

Inherent Likelihood

The likelihood of IMS becoming established within the Operational Area as a result of Gippsland Offshore Operations activities is considered **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of IMS causing impacts to socio-economic receptors is considered Moderate.

6.7.5 Control Measures, ALARP and Acceptability Assessment

Table 6-23 provides a summary of the control measures and ALARP and Acceptability Assessment relevant to Introduction, Establishment and Spread of IMS.

Table 6-23 Introduction, Establishment and Spread of IMS ALARP, Control Measures and Acceptability Assessment

Introduction, Establishment and Spread of IMS	
ALARP Decision Context and Justification	**ALARP Decision Context: B** The introduction, establishment and spread of IMS has been assigned a **Level 4** consequence; the likelihood of this consequence occurring is considered Remote (E). The causes resulting in an introduction of IMS from a planned release of ballast water or vessel, or equipment biofouling are well understood and effectively managed by international, national and State requirements and industry guidance. Cooper Energy is experienced in industry requirements and their operational implementation through their existing ongoing operations. No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. Based on a Moderate inherent risk severity, Cooper Energy believes ALARP Decision Context B should apply.
Control Measure	**Source of good practice control measures**
CM23: Cooper Energy IMS Risk Management Protocol	The National biofouling management guidelines for the petroleum production and exploration industry (Marine Pest Sectoral Committee 2018) recommend a biofouling risk assessment is undertaken for vessel, where necessary, conducting in water inspection, cleaning and antifouling renewal. These guidelines should also be read in conjunction with the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* which enacts the Marine Order 98: Marine pollution – anti-fouling systems In line with these recommendations. Cooper Energy uses an IMS Risk Assessment to evaluate IMS risks. Prior to and during operations the Cooper Energy IMS Risk Management Protocol will be implemented for all vessels and submersible equipment and will consider all regions visited (international and domestic). The Protocol includes requirements for wash down of inspection equipment (ROVs) when it is recovered to surface, prior to use within in a different field. Project inductions also include information on particular IMS for offshore crews to be aware of (such as NZ screw shell) and reporting requirements. The Cooper Energy IMS Risk Management Protocol has been prepared to align with: • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee 2018) • Australian Ballast Water Management Requirements (DAWE 2020) • Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (Biofouling Guidelines) (IMO 2011) • reducing marine pest biosecurity risks through good practice management Information paper (NOPSEMA 2022e) Further information on the Cooper Energy IMS Risk Management Protocol is provided in Section 9.9.
CM24: Australian biofouling management requirements	Prior to and during operating in Australian water, international vessels must demonstrate compliance of the Australian Biofouling Management Requirements (DAWE 2022). The Australian Biofouling Management Requirements (DAWE 2022) outline the requirements for biofouling management. Vessel operators can demonstrate compliance through the mandatory pre-arrival report by applying one of these requirements: • implementing an effective biofouling management plan, as described in the Biofouling Management Requirements • demonstrating that all biofouling was cleaned within 30 days prior to arrival in Australian territory • implementing an alternative biofouling management method pre-approved by the department.

Introduction, Establishment and Spread of IMS						
Control Measures Considered	**Related Risk Event**	**Benefit**	**Recognised Good Practice?**	**Sacrifice**	**Introduced Risks**	**Conclusion**
Only use vessels that are based in Victoria to reduce the potential for introducing IMS.	Introduction of IMS	Using vessels that are based in Victoria may reduce the likelihood of introducing an IMS but would depend on the IMS risk level of the port where the vessel is based.	No. There is a standard suite of management measures to manage this risk (as detailed in Coopers IMS Risk Management Protocol) – the use of local vessels is not one of these.	IMR activities on the Gippsland assets are typically undertaken vessels that are based out of Victorian ports. Limiting the vessel activities to local vessels only, also would result in potentially both schedule and financial costs.	None.	Not selected. Rationale: the project cost (operational and schedule constraints) this would implement is too high. Further to this, if no local vessels are identified as being suitable to complete this activity in the future, then further assessment would be required. Given this management measure removes all operational flexibility, the costs are grossly disproportionate to the level of risk reduction achieved.

Impact and Risk Summary	
Residual Impact Consequence	N/A.
Residual Risk Consequence	**Level 4:** Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats.
Residual Risk Likelihood	**Remote (E):** Not expected to occur during the activity. Not expected to occur during the activity although a freak combination of factors would be required for the occurrence.
Residual Risk Severity	Moderate.
Demonstration of Acceptability	
Principles of ESD	Introduction, establishment and spread of IMS is evaluated as having a Level 4 consequence which has the potential to result in serious or irreversible environmental damage. However, Cooper Energy has completed a number of seabed surveys and facility inspections in the region and have a good understanding of the benthic environment, IMS to be aware of, and has consulted with biosecurity specialists on appropriate measures to manage IMR risks. The likelihood of this event occurring is remote; as such, the activity is not expected to result in the loss of biological diversity or ecological integrity. Although uncertainty exists regarding the vessel(s) required to implement this activity, this is sufficiently managed through the implementation of the controls identified – specifically, Australian Ballast Water Management Requirements (DAWE 2020), Australian Biofouling Management Requirements (DAWE 2022), and Cooper Energy's IMS Risk Management Protocol; together these address IMS risks from either international or domestic vessels.
Legislative and conventions	The control measures proposed to manage this risk meet the following requirements: • *Biosecurity Act 2015* (Cth) – Chapter 5, Part 3 (Management of discharge of ballast water) & Chapter 4 (Managing biosecurity risks) • International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 (the Ballast Water Management Convention) • *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* • AMSA Marine Order 98: Marine Pollution Prevention - Anti-fouling Systems. • *Environment Protection Act 1970* (Vic) • Environment Protection (Ships Ballast Water) Regulations 2006 • Australian Ballast Water Management Requirements (DAWE 2020) • Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (IMO 2011) • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee 2018) • Australian biofouling management requirements (DAWE 2022).
Internal context	The environmental controls proposed reflects the Cooper Energy HSEC Policy goals of utilising best practice and standards to eliminate or minimise impacts and risks to the environment and community to a level which is ALARP. Relevant management system processes adopted to implement and manage hazards to ALARP include: • MS03 – Risk Management • MS09 - Health, Safety and Environment Management • MS11 – Supply Chain and Procurement Management.

Introduction, Establishment and Spread of IMS	
External context	No concerns have been raised by Relevant Persons during activity consultation regarding the introduction of IMS.
Acceptability Outcome	**Acceptable**

6.8 Accidental Hydrocarbon Release

Accidental hydrocarbon releases to the environment could include both gas and liquid hydrocarbons.

There are infinite variations in the nature and scale of a spill from these activities. This section addresses the higher order (most severe or worst-case) spill scenarios. Minor loss of containment scenario is assessed in Table 6-3.

6.8.1 Cause of Aspect

Activities associated with the Gippsland Offshore Operations have the potential to result in an accidental release of hydrocarbons to the marine environment. Guidance on the identification of worst-case credible spills scenarios is given in the AMSA's Technical guidelines for preparing contingency plans for Marine and Coastal Facilities (AMSA 2015) and Technical Report on Calculation of Worst-Case Discharge (SPE 2016). A range of credible accidental release scenarios up to and including worst case scenario loss of containment caused by vessel collision, are described in Table 6-24.

Table 6-24 Accidental Release Types, Causes and Estimated Volumes

Accidental Release	Cause of Aspect	Fluid Type and Volume	Release location
LoC: PB pipeline	Loss of containment from the PB pipeline as a result of erosion, corrosion or external forces (e.g. fishing vessel interactions or dropped object).	Gas: 2,700 m^3 MEG/water mix (40:60): 150 m^3 Nitrogen: 4,550 m^3 Longtom condensate: 5 m^3	VIC/PL31 VIC/PL31(V)
LoC: PB umbilical	Loss of containment from an umbilical as a result of third-party damage.	Hydraulic fluid: 3.2 m^3	VIC/PL31 VIC/PL31(V)
Loss of well control: PB	Patricia-1 well has been suspended to industry standards. Patricia-2 and Baleen-4 wells were leak-tested prior to being shut in with two tested barriers which met the requirements of API 14B. A significant well release is not deemed credible from these well on this basis. As detailed in Table 3-6, the WCD was identified at Baleen-4 well.	Dry gas: 2.4 bbl/d (0.4 m^3/d)	Baleen-4
Loss of containment: Sole pipeline	Loss of containment from the Sole pipeline as a result of erosion, corrosion or external forces (e.g. fishing vessel interactions or dropped object). Sole release volumes as a result of pipeline loss of containment were identified during a Front End Engineering & Design study (Santos 2016). Pressure in the pipeline will quickly decline, hence isolation time of 30 minutes was assumed for the pipeline rupture events (Santos 2016).	Total volume: ~0.5 m^3	VIC/PL43 VIC/PL006401(V)
Loss of containment: Sole umbilical	Loss of containment from an umbilical as a result of third-party damage.	MEG: 61.4 m^3 Hydraulic fluid HP: 41.0 m^3 Corrosion inhibitor: 9.5 m^3 Hydraulic fluid LP: 17.7 m^3	VIC/PL43 VIC/PL006401(V)
Loss of well control: Sole	Loss of well integrity or third-party damage leading to loss of well control (LOWC). Volume assumes well head has been completely removed and LoC is via open hole through the production tubing at the seafloor. This is not a likely scenario but has been used as a conservative approach for operating wells (i.e. Sole-3 and Sole-4).	Dry gas: 10 bbl/d (1.6 m^3/d)	Sole-3 Sole-4

Accidental Release	Cause of Aspect	Fluid Type and Volume	Release location
	Potential failure scenarios for the Sole wells during normal operations include (Wild Well Control 2021): • defective material/bolting • corrosion • valve failure • external impact In each scenario, multiple valves/barriers would have to fail for a leak to eventuate. Wild Well Control (2021) consider these scenarios unlikely and note that subsurface safety valve (SSSV) failure would have to accompany the tree damage in these scenarios to result in an uncontrolled release of hydrocarbons. Regular testing of the SSSV during operations would reveal mechanical issues that would cause the SSSV functionality to falter. A full LOWC as presented above is possible during well intervention operations through the main well bore; this activity would be subject to a separate EP, if needed. Credible potential release scenario during Gippsland Offshore Operations is based on advice provided by Wild Well Control (2021) and involves a low leak rate via tortuous leak path through subsurface and surface equipment. The Sole-2 well was plugged and abandoned to industry standards in 2018. The wellhead remains in place.		
Vessel collision	Navigational error or loss of DP resulting in a high energy collision between the project vessel and third-party vessel could result in hull damage allowing water ingress. Damage will mainly be in the outer hull, which is typically ballast or other water tanks. Fuel tanks could be at risk of impact. For the impact assessment the vessel largest fuel tank volume was used as recommended by AMSA's guideline for indicative maximum credible spill volumes for other, non-oil tanker, vessel collision (AMSA 2015). This was assessed to be 500 m^3 of MDO. There are no emergent features within the Operational Area. The closest distance to shore that a vessel would operate at the PB or Sole HDD sites is ~300 m from shore and in waters depths of >9 m. As such, vessel grounding was not assessed as a credible risk.	500 m^3 of MDO	Surface release around the Operational Area.

6.8.2 Aspect characterisation

6.8.2.1 LoC at PB and Sole pipeline

LoC from Sole pipeline was estimated to be ~0.5 m^3, while at PB, the component with a minor release was identified as the Longtom condensate (~5 m^3). For impact assessment and response planning purposes a loss of the entire inventory of the PB pipeline has been used. It is noted that this consequence is highly unlikely (even in a rupture scenario) given the condensate is distributed along the length of the pipeline and pressure equalisation would occur prior to the loss of the entire contents.

As detailed in Table 6-24 the PB pipelines contain gas, MEG, nitrogen and condensate.

Gas

An assessment of gas release is detailed in Section 6.8.2.3.

MEG

MEG is a colourless, moderately viscous compound that is miscible with water. Since it is miscible, MEG would not be expected to accumulate in sediments and quickly disperse. It is readily biodegraded and is broken down in a matter of days in a variety of environmental media (Sharon, et al. 2016). Refer to Section 6.8.4.1 for risk assessment.

Condensate

The PB pipeline contains ~5 m^3 of condensate.

The physical characteristics of Longtom condensate is detailed in Table 3-7. It is a low viscosity, low pour point and highly evaporative Group I oil, given its low percentage of persistent hydrocarbons considered to be non-persistent under international oil property benchmarks (i.e. ITOPF). An Automated Data Inquiry for Oil Spills (ADIOS) modelling was undertaken to identify weathering characteristics. Table 6-24 shows the environmental conditions used in the ADIOS modelling. These environmental conditions were identified by RPS (2021) for LOC Vessel Collision Scenario. As shown in Figure 6-4, when released into the environment, >82% (~4.2 m^3) of Longtom condensate is expected to quickly dissipate due to evaporation and dispersion weathering process. Due to the weathering characteristics and low release volume of Longtom condensate, impact assessment from MDO is considered appropriated (although extremely conservative). Refer to Section 6.8.4.3 for risk assessment.

Table 6-25 ADIOS parameters

Wind Speed	Wave height	Current
21 knots from 270 °	1.0 m	0.2 m/s towards 44 °

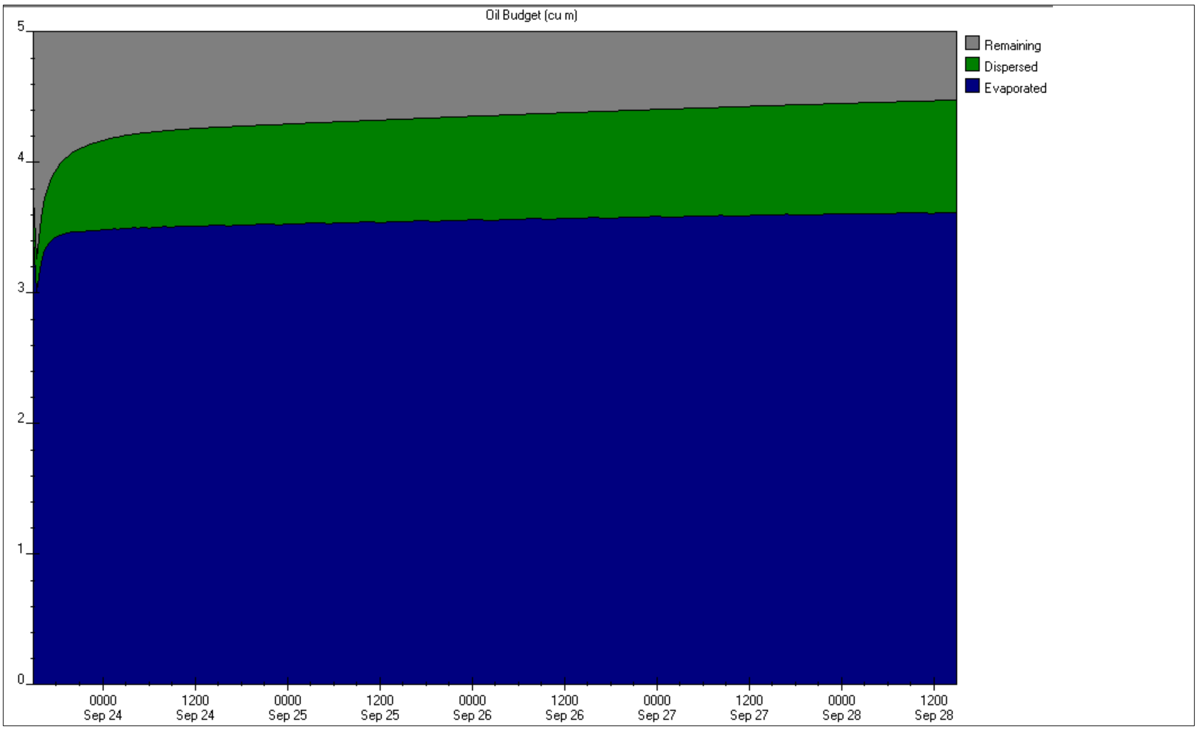


Figure 6-4 Predicted Fate and Weathering for an Instantaneous release of 5 m^3

6.8.2.2 LoC at PB and Sole umbilical

LoC from PB umbilical included ~3.2 m^3 of hydraulic fluids, while at Sole, the LoC comprised ~61.4 m^3 of MEG, 41.0 m^3 of hydraulic fluid, 9.5 m^3 of corrosion inhibitor.

These components are generally non-toxic, readily degradable or dispersible. The hydraulic fluids consist of a base oil and various additives, with MEG being the predominant component. As described in Section 6.8.2.1 MEG it is readily biodegraded and is broken down in a matter of days in a variety of environmental media (Sharon, et al. 2016). Refer to Section 6.8.4.1 for risk assessment.

6.8.2.3 Loss of well control at PB and Sole

As identified in Table 6-24, LOWC at PB was identified as 0.4 m^3/d and 1.6 m^3/d at Sole. Sole scenario is used as is it provides the worst case LOWC.

The physical characteristics of Sole condensate is detailed in Table 3-9. It is identified as Group II oil given it is moderately volatile. An ADIOS modelling was undertaken to identify weathering characteristics. Table 6-24 shows the environmental conditions used in the ADIOS modelling. As shown in Figure 6-5, when released into the environment, ~50% of Sole condensate is expected to quickly dissipate due to evaporation and dispersion weathering process. The remaining condensate is expected to persist in the marine environment for longer periods and be subject to relatively slow degradation. Although the residual proportion of the condensate is higher compared to MDO, the Sole condensate would be released with chemicals entrained in the gas, which increases its potential for dispersion. Therefore, considering the low release volume of the Sole condensate, the impact assessment from MDO is considered appropriated (although conservative). Refer to Section 6.8.4.2 and 6.8.4.3 for risk assessments.

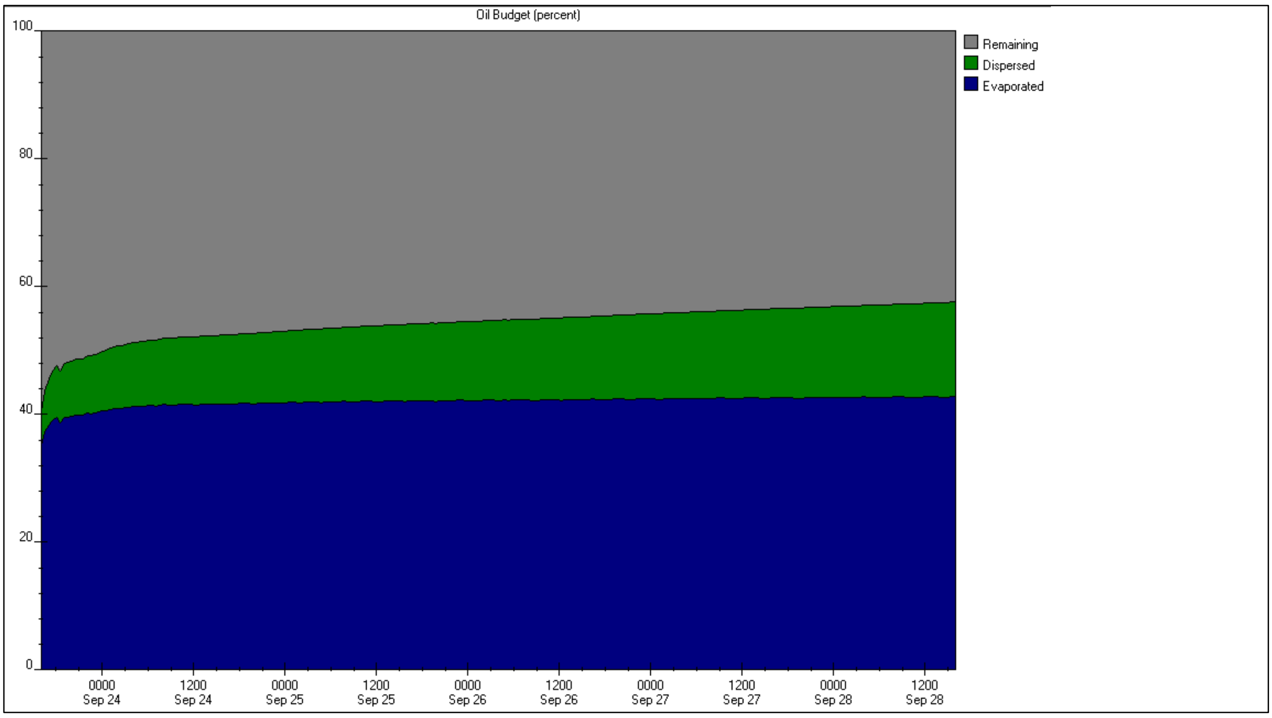


Figure 6-5 Predicted Fate and Weathering for a continuous release of 1.6 m^3/d

6.8.2.4 Vessel collision

Quantitative Hydrocarbon Spill Modelling

BMG Closure Project Phase 1 diesel spill scenario was used to inform the risk assessment. While outside the Operational Area for this EP, is considered an appropriate approach to inform the risk assessment given that the modelled release location is in close proximity (~34 km southwest of the Operational Area) and release volume identified is the same.

- LOC Vessel Collision Scenario: 500 m^3 instantaneous surface release of Marine Diesel Oil – This scenario examined a 500 m^3 surface release of MDO over 5 hours, tracked for 30 days, representing a fuel tank rupture after a vessel collision at the Manta-2A well location (~34 km southwest of the Operational Area). A total of 200 spill trajectories were simulated across two seasons, summer and winter (100 spills per season) (RPS 2021).

The spill modelling was performed using an advanced three-dimensional trajectory and fates model, SIMAP (Spill Impact Mapping Analysis Program). The SIMAP model calculates the transport, spreading, entrainment, and evaporation of spilled hydrocarbons over time, based on the prevailing wind, and current conditions, and physical and chemical properties of the spilled oil (RPS 2021).

The SIMAP system, includes algorithms to account for both physical transport and weathering processes (RPS 2021). Further, RPS confirms that this work meets and exceeds the American Society for Testing and Materials Standard F2067-13 “Standard Practice for Development and Use of Oil Spill Models”. Reporting thresholds have been specified to account for “exposure” on the sea surface and “contact” to shorelines at meaningful levels.

6.8.2.5 Thresholds

Table 6-26 describes the concentration thresholds for use in the impact assessment that 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. These thresholds align with the NOPSEMA environmental bulletin 'Oil Spill modelling' (NOPSEMA 2019).

Table 6-26 Justification for Hydrocarbon Impact Thresholds

Exposure Level	Impact Threshold	Justification
Surface Oil		
Low	1 g/m^2	The low threshold to assess the potential for surface oil exposure was 1 g/m^2, equivalent to an average thickness of 1 µm, referred to as visible oil. Oil of this thickness is described as rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (AMSA 2014). This threshold is below the level which could cause environmental harm, however at this concentration, oil on water is expected to be noticeable, and thus has the potential to impact nature-based activities (such as tourism) given the potential reduction in aesthetics.
Moderate	10 g/m^2	Ecological impact has been estimated to occur at 10 g/m^2 (a film thickness of ~10 µm or 0.01 mm) according to French et al. (1996) and French-McCay (2009) as this level of fresh oiling has been observed to mortally impact some birds through adhesion of oil to their feathers, exposing them to secondary effects such as hypothermia. The appearance of oil at this average thickness has been described as a metallic sheen (AMSA 2014). Scholten et al. (1996) and Koops et al. (2004) indicated that oil concentrations on the sea surface of 25 g/m^2 (or greater), would be harmful for all birds that have landed in an oil film due to potential contamination of their feathers, with secondary effects such as loss of temperature regulation and ingestion of oil through preening. The appearance of oil at this thickness is also described as metallic sheen (AMSA 2014). A sea surface oil exposure of 10 g/m^2 represents the practical limit for surface response options; below this thickness, oil containment, recovery and chemical treatment (dispersant) become ineffective (AMSA 2015).
High	50 g/m^2	Concentrations above 50 g/m^2 are considered the lower actionable threshold, where oil may be thick enough for containment and recovery, therefore the high exposure threshold is considered for response planning. The appearance of oil at this average thickness has been described as a discontinuous true oil colour (AMSA 2014).
Shoreline		
Low	10 g/m^2	The low threshold (10 g/m^2) was applied as the reporting limit for oil on shore. This threshold may trigger socio-economic impact, such as temporary closures of beaches to recreation or fishing, or closure of commercial fisheries and might trigger attempts for shore clean-up on beaches or man-made features / amenities (breakwaters, jetties, marinas, etc.). French-McCay et al. (2005a, 2005b) also use a threshold of 10 g/m^2, equivalent to two teaspoons of oil per square meter of shoreline, as a low impact threshold when assessing the potential for shoreline accumulation.
Moderate	100 g/m^2	French et al. (1996) and French-McCay (2009) define a shoreline oil accumulation threshold of 100 g/m^2, or above, would potentially harm shorebirds and wildlife (furbearing aquatic mammals and marine reptiles on or along the shore) based on studies for sub-lethal and lethal impacts. This threshold has been used in previous environmental risk assessment studies (see (D. French-McCay 2003, French-McCay, Reich and Rowe, et al. 2011, French-McCay, Reich and Michel, et al. 2012, NOAA 2013)). Additionally, a shoreline concentration of 100 g/m^2, or above, is the minimum limit that the oil can be effectively cleaned according to the AMSA (2015) guideline. This threshold is equivalent to half cup of oil per square meter of shoreline accumulation.
High	1,000 g/m^2	The higher threshold of 1,000 g/m^2, and above, was adopted to inform locations that might receive oil accumulation levels that could have a higher potential for ecological effect. Observations by Lin & Mendelssohn (1996) demonstrated that loadings of more than 1,000 g/m^2 of oil during the growing season would be required to impact marsh plants significantly. Similar thresholds have been found in studies assessing oil impacts on mangroves (Grant, Clarke and Allaway 1993, Suprayogi and Murray 1999). This threshold is equivalent to 1 L (or 4 ¼ cups) of oil per square meter of shoreline accumulation.
In-water - Dissolved		
Low	10 ppb	Laboratory studies have shown that dissolved hydrocarbons exert most of the toxic effects of oil on aquatic biota (Carls, et al. 2008, Nordtug, et al. 2011, Redman 2015). The mode of action is a narcotic effect, which is positively related to the concentration of soluble hydrocarbons in the body tissues of organisms (D. French-McCay 2002). Dissolved hydrocarbons are taken up by organisms directly from the water column by absorption through external surfaces and gills, as well as through the digestive tract. Thus, soluble hydrocarbons are termed "bioavailable". Hydrocarbon compounds vary in water-solubility and the toxicity exerted by individual compounds is inversely related to solubility; however, bioavailability will be modified by the volatility of individual compounds (Nirmalakhandan and Speece 1998, Blum and Speece 1990, L. McCarty 1986, McCarty,
Moderate	50 ppb	
High	400 ppb	

Exposure Level	Impact Threshold	Justification
		Dixon, et al. 1992a, 1992b, Mackay, Puig and McCarty 1992, McCarty and Mackay 1993); (Verhaar, de Jongh and Hermens 1999, Swartz, et al. 1995, D. French-McCay 2002, McGrath and Di Toro 2009). Of the soluble compounds, the greatest contributor to toxicity for water-column and benthic organisms are the lower-molecular-weight aromatic compounds, which are both volatile and soluble in water. Although they are not the most water-soluble hydrocarbons within most oil types, the polynuclear aromatic hydrocarbons (PAHs) containing 2-3 aromatic ring structures typically exert the largest narcotic effects because they are semi-soluble and not highly volatile, so they persist in the environment long enough for significant accumulation to occur ((Anderson, Neff, et al. 1974, Anderson, Riley, et al. 1987, Neff and Anderson 1981, Malins and Hodgins 1981, McAuliffe 1987, NRC 2003). The monoaromatic hydrocarbons, including the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes), and the soluble alkanes (straight chain hydrocarbons) also contribute to toxicity, but these compounds are highly volatile, so that their contribution will be low when oil is exposed to evaporation and higher when oil is discharged at depth where volatilisation does not occur (D. French-McCay 2002). French-McCay (2002) reviewed available toxicity data, where marine biota was exposed to dissolved hydrocarbons prepared from oil mixtures, finding that 95% of species and life stages exhibited 50% population mortality (LC_{50}) between 6 and 400 ppb total PAH concentration after 96 hours exposure, with an average of 50 ppb. Hence, concentrations lower than 6 ppb total PAH value should be protective of 97.5% of species and life stages even with exposure periods of days (at least 96 hours). Early life-history stages of fish appear to be more sensitive than older fish stages and invertebrates. Thresholds of 10, 50 or 400 ppb over a 1-hour timestep to indicate increasing potential for sub-lethal to lethal toxic effects (low to high).
In-water - Entrained		
Low	10 ppb	Entrained hydrocarbons consist of oil droplets that are suspended in the water column and insoluble. As such, insoluble compounds in oil cannot be absorbed from the water column by aquatic organisms, hence are not bioavailable through absorption of compounds from the water. Exposure to these compounds would require routes of uptake other than absorption of soluble compounds. The route of exposure of organisms to whole oil alone include direct contact with tissues of organisms and uptake of oil by direct consumption, with potential for biomagnification through the food chain (NRC 2003). The 10-ppb threshold represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in the ANZECC (2000) water quality guidelines. Due to the requirement for relatively long exposure times (> 24 hours) for these concentrations to be significant, they are likely to be more meaningful for juvenile fish, larvae and planktonic organisms that might be entrained (or otherwise moving) within the entrained plumes, or when entrained hydrocarbons adhere to organisms or trapped against a shoreline for periods of several days or more. The entrained hydrocarbon 10 ppb exposure value has been used to inform the EMBA.
High	100 ppb	The 100-ppb exposure value is considered to be representative of sub-lethal impacts to most species and lethal impacts to sensitive species based on toxicity testing. This is considered conservative as toxicity to marine organisms from oil is likely to be driven by the more bioavailable dissolved aromatic fraction, which is typically not differentiated from entrained hydrocarbon in toxicity tests using water accommodated fractions. Given entrained hydrocarbon is expected to have lower toxicity than dissolved aromatics, especially over time periods where these soluble fractions have dissoluted from entrained hydrocarbon, the high exposure value is considered appropriate for risk evaluation.

6.8.2.6 Weathering and Fate

A MDO was used for the containment loss from a vessel scenario. The MDO is a light persistent fuel oil used in the maritime industry. It has a density of 829.1 kg/m^3 (API of 37.6) and a low pour point (-14^{o}C) (RPS 2021). The low viscosity (4 cP at 25^{o}C) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation. Approximately, 5% (by mass) of the oil is categorised as a group II oil (light-persistent) based on categorisation and classification derived from AMSA (2015) guidelines. The classification is based on the specific gravity of hydrocarbons in combination with relevant boiling point ranges.

Figure 6-6 shows weathering graphs for a 500 m^3 release of MDO over 5 hours (tracked for 30 days) during three static wind conditions. The prevailing weather conditions will influence the weathering and fate of the MDO. Under lower windspeeds (5 knots), the MDO will remain on the surface longer, spread quicker, and in turn increase the evaporative process. On the contrary, sustained stronger winds (>15 knots) will generate breaking waves at the surface, causing a higher amount of MDO to be entrained into the water column and reducing the amount available to evaporate.

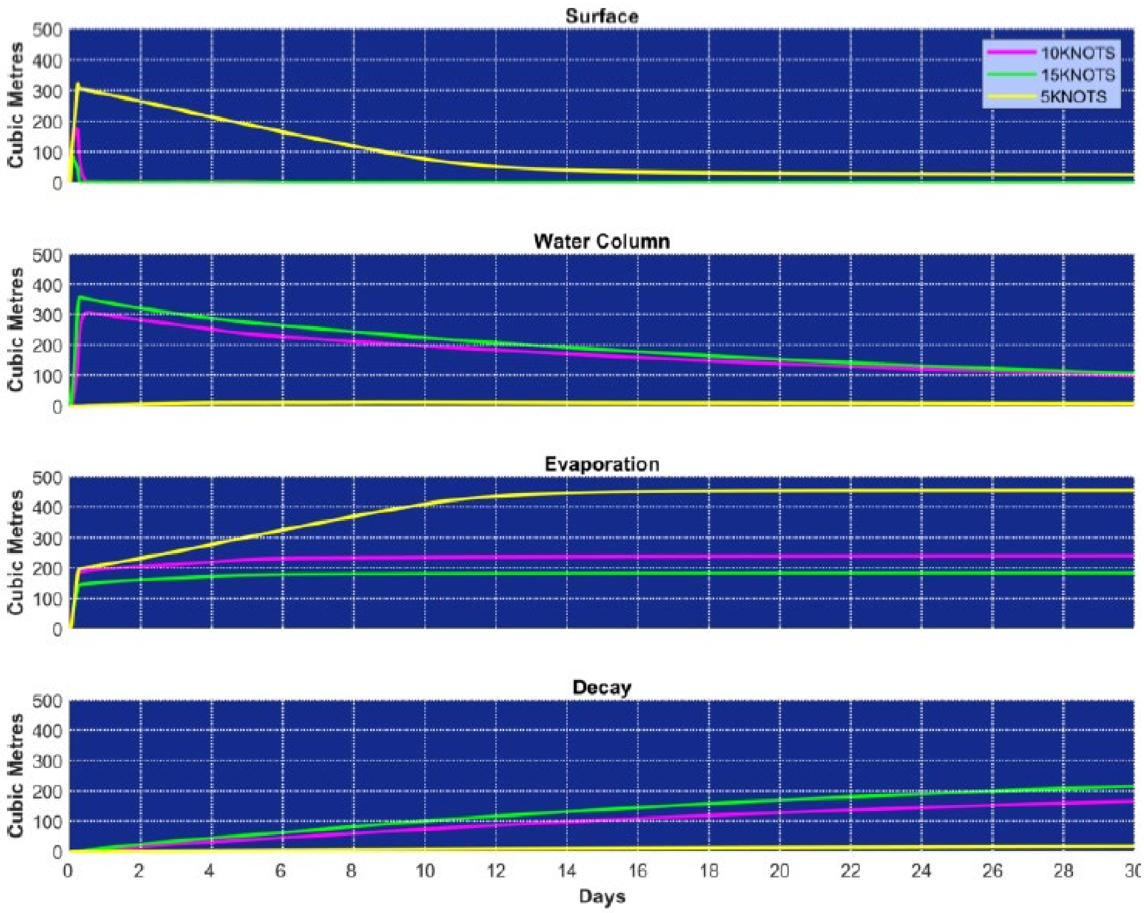


Figure 6-6 Weathering of MDO under three static wind conditions (5, 10 and 15 knots)

6.8.2.7 Modelling Outputs

Below is a summary of the results from the stochastic modelling undertaken for a loss of containment caused by vessel collision and outline the area potentially exposed to hydrocarbons. The modelling report is provided in Appendix 6 of the BMG Closure Project (Phase 1) Environment Plan[17]. Figure 6-7 to Figure 6-10 show the surface, shoreline and in-water areas with the potential to be exposed, according to the modelling results (RPS 2021). The ecological and social receptors with the potential to be exposed to surface, shoreline accumulation and in-water hydrocarbons from a loss of containment caused by vessel collision event are evaluated in Section 6.8.4.3.

Surface Exposure (Figure 6-7)

- for summer conditions, the predicted maximum distance of surface exposure from the release location at moderate exposure threshold (≥10 g/m2) was 32 km West southwest and at high exposure threshold (≥50 g/m2) was 11 km North Northwest
- for winter conditions, the predicted maximum distance of surface exposure from the release location at moderate exposure threshold (≥10 g/m^2) was 132 km East Northeast and at high exposure threshold (≥50 g/m^2) was 7 km Northeast.

Shoreline Exposure (Figure 6-8)

- probability of shoreline contact from moderate exposure threshold (≥100 g/m^2) ranged from 3% (summer) to 6% (winter)
- the minimum time before shoreline contact at 10 g/m^2 was ~1.9 days (~46 hours) and at 100 g/m^2 was ~2.04 days (~48 hours) both predicted during winter conditions

17 ^ Available publicly at: https://docs.nopsema.gov.au/A832863

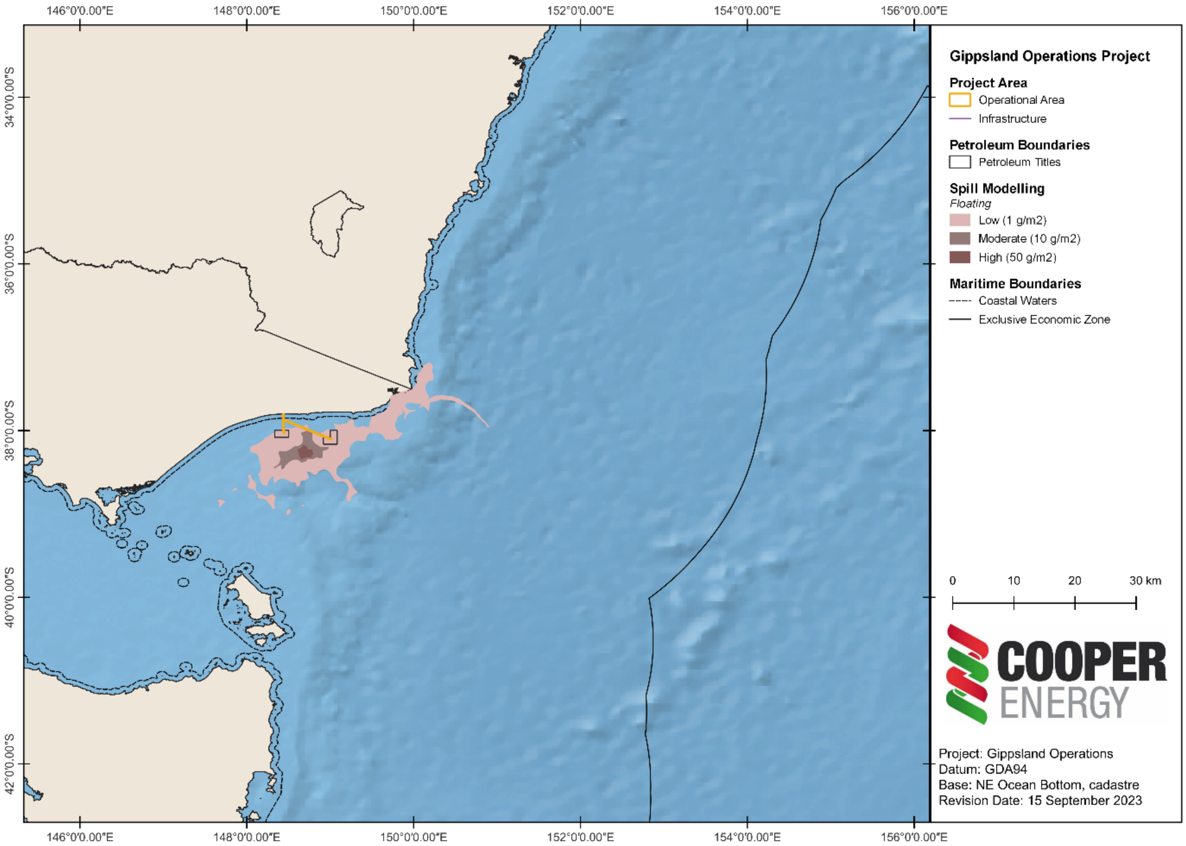
- the maximum volume of oil ashore was 64.8 m^3 (winter)
- only two sites, East Gippsland and Cape Howe / Mallacoota recorded exposure values at or above the high threshold and only during the winter season
- no sites were exposed at the high threshold during the summer season.
- Gabo Island recorded the highest probability of shoreline accumulation at the low threshold during summer conditions with 3%, while East Gippsland and Cape Howe / Mallacoota recorded the highest probability at the low accumulation threshold during winter conditions with 7%
- the minimum time recorded before low shoreline accumulation was 1.92 days at Cape Howe Mallacoota and East Gippsland under winter conditions while the maximum volume to reach the shoreline was 64.6 m^3, recorded at East Gippsland and Cape Howe / Mallacoota.

In water – Dissolved (Figure 6-9)

- in the surface (0-10 m) depth layer, a total of 12 BIAs (i.e. the BIAs which intersect the Operational Area) were predicted to be exposed to dissolved hydrocarbons at or above the low and moderate thresholds during summer and winter conditions, and the greatest probabilities of 72% and 36% and 69% and 50% respectively
- aside from the 12 BIAs that the release location resides within, all the other BIAs recorded probabilities of less than 10% except the White-faced Storm-petrel – Foraging BIA which recorded a 17%
- no locations were exposed at or above the high exposure threshold for either season.
- two AMPs (East Gippsland and Flinders) were predicted to be exposed to dissolved hydrocarbons at the low threshold during summer conditions and one AMP (East Gippsland) during winter conditions, with all recording a 1% probability of exposure
- dissolved hydrocarbons at, or above the low threshold were predicted to cross into both New South Wales and Victoria state waters.

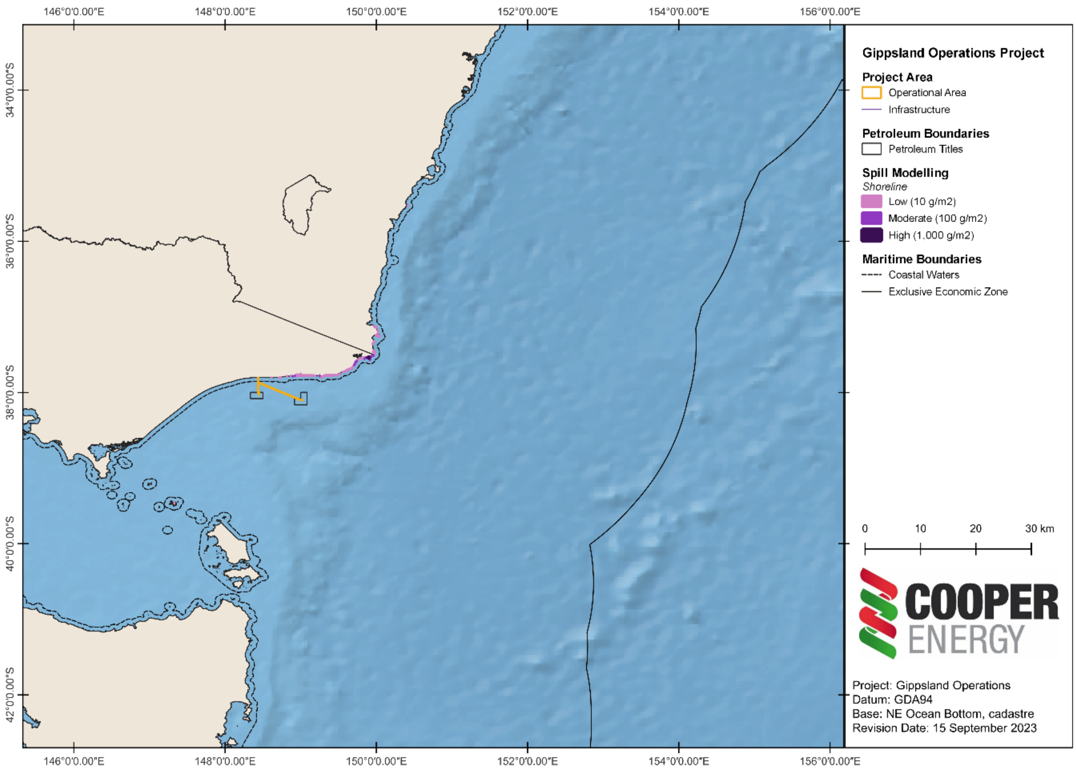
In water – Entrained (Figure 6-9)

- in the surface (0-10 m) depth layer, a total of 12 BIAs (i.e. the BIAs which intersect the Operational Area) were predicted to be exposed to entrained oil at or above the low and high thresholds during summer and winter conditions, and the highest probabilities were 94% and 89% and 98% and 89% respectively
- aside from the 12 BIAs that the release location resides within, 13 and 12 additional BIAs recorded probabilities of exposure to entrained hydrocarbons at the high threshold during summer and winters conditions, respectively. The greatest probabilities of high exposure during summer and winter conditions were predicted at the White-faced Storm-petrel – Foraging BIA with 36% and 37%, respectively
- a total of four and three AMPs were predicted to be exposed to entrained hydrocarbons at, or above the low threshold during summer and winter conditions, respectively, with the highest probability predicted at East Gippsland (15%) during summer conditions
- entrained hydrocarbons at, or above the low threshold were predicted to cross into NSW, Tasmania and Victoria state waters during summer conditions with probabilities of 26%, 5% and 37%, respectively. During winter conditions, entrained hydrocarbons at or above the low threshold were predicted to cross into NSW and Victoria state waters with probabilities of 28% and 33%, respectively.



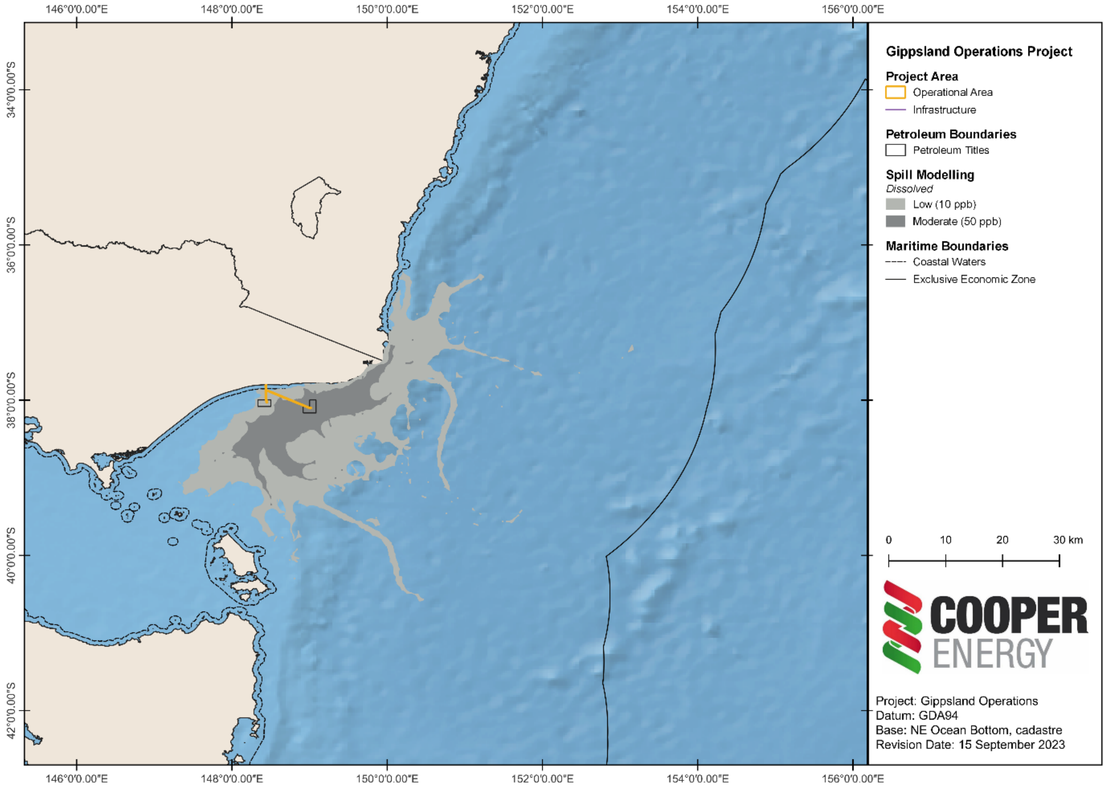
Note: Spill modelling shapefiles provided by RPS (2021)

Figure 6-7 Zones of potential floating oil exposure, in the event of a 500 m^3 surface release of MDO (results shown are of 200 modelling simulations through summer and winter combined)



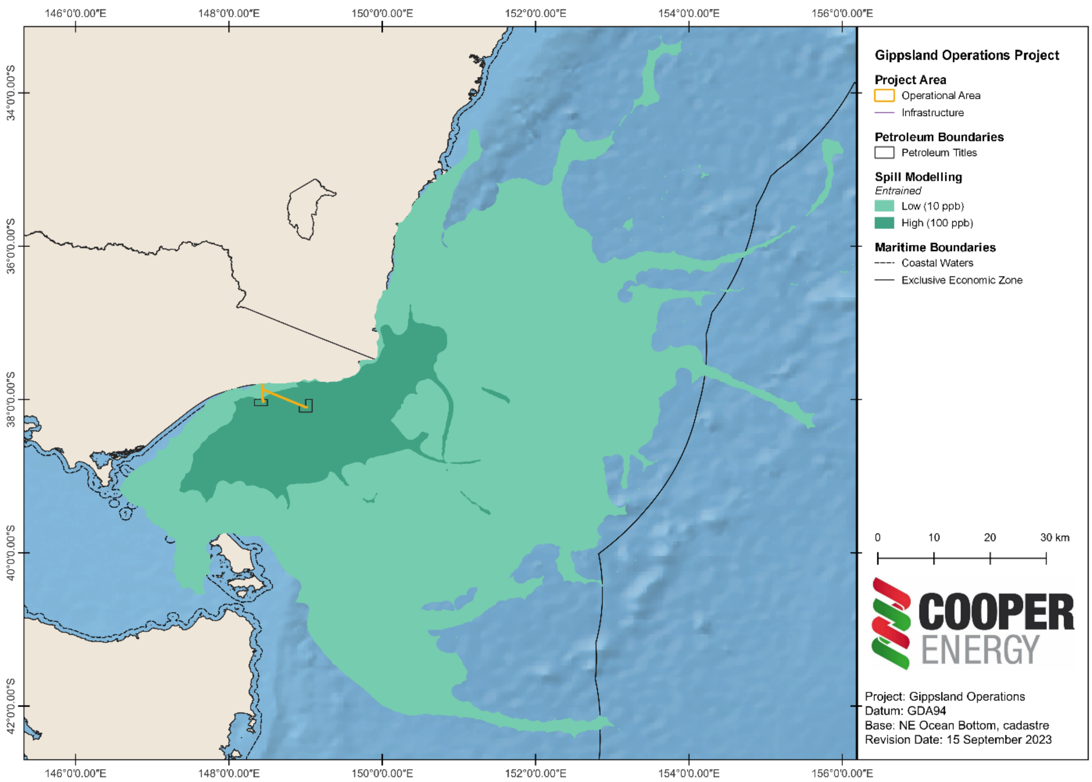
Note: Spill modelling shapefiles provided by RPS (2021)

Figure 6-8 Zones of potential shoreline oil exposure, in the event of a 500 m^3 surface release of MDO (results shown are of 200 modelling simulations through summer and winter combined).



Note: Spill modelling shapefiles provided by RPS (2021)

Figure 6-9 Zones of potential instantaneous dissolved hydrocarbon exposure at 0-10 m below the sea surface in the event of a 500 m^3 surface release of MDO at the M2A well location (results shown are of 200 modelling simulations through summer and winter combined)



Note: Spill modelling shapefiles provided by RPS (2021)

Figure 6-10 Zones of potential instantaneous entrained hydrocarbon exposure at 0-10 m below the sea surface in the event of a 500 m^3 surface release of MDO at the M2A well location (results shown are of 200 modelling simulations through summer and winter combined)

6.8.3 Predicted Environmental Impacts and Risk Events

Spills to the marine environment have the potential to expose ecological and social receptors to different hydrocarbon exposures and concentrations. Hydrocarbon exposures include:

- surface
- shoreline
- in water.

Hydrocarbon spill events have the potential to result in:

- toxicity effects/physical oiling
- reduction in intrinsic values/visual aesthetics.
- impacts to commercial businesses.

6.8.4 Impact and Risk Evaluation

6.8.4.1 Risk Event: Change in water quality due to chemical release

Water quality is expected to be typical of the offshore marine environment. Gippsland Basin is well mixed given it is a higher-energy environment exposed to frequent storms (Section 4.3).

As described in Section 6.8.2.1 and Section 6.8.2.2, if a LoC occur, chemicals that could be released are typically low concentrations or low volumes. Given the nature of the potential releases (instantaneous and non-continuous) that could be discharged, and high energy marine environment, the consequence of this impact has been evaluated as **Level 1**, as minor spills within the Operational Area would minor and limited to a temporary change in water quality in the vicinity of the release.

6.8.4.2 Risk Event: Gas release at PB and Sole

Table 6-27 Consequence evaluation for gas exposure – In water

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
Ecological Receptors			
Habitat	Coral Macroalgae Sponge Seagrass	As identified in Section 6.8.2.3, when Sole gas is released into the environment, 50% is expected to quickly dissipate due to evaporation and dispersion weathering process. The remaining condensate is expected to be persist in the marine environment for longer periods and be subject to relatively slow degradation. Due to the low release rate and dispersion process, a small portion may remain in the waters occupied by and surrounding the gas plume. Only sponge habitats were identified within the Operational Area.	Little is known about how sponges and their microbial symbionts respond to petroleum products (Heidi, et al. 2019). A study undertaken to the larval sponge holobiont (Heidi, et al. 2019) and its response to hydrocarbon exposure identified that sponges can survive high concentrations of petroleum hydrocarbons, but their ability to undergo successful settlement, crucial for recruitment, is affected at moderate concentrations of PAHs. Thus, the potential consequence to sponge habitats from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to habitats of recognised conservation value or to local ecosystem function.
Marine Fauna	Plankton Invertebrates Fish and Sharks Mammals Seabirds Reptiles	As identified in Section 6.8.2.3, when Sole gas is released into the environment, 50% is expected to quickly dissipate due to evaporation and dispersion weathering process. The remaining condensate is expected to be persist in the marine environment for longer periods and be subject to relatively slow degradation. The rapid rise of gas to surface in a loss of well control event will release gas to the atmosphere rather than being trapped at depth in the water column. Due to the low release rate and dispersion process, a small portion may remain in the waters occupied by and surrounding the gas plume. This would not be expected to result in significant oxygen depletion given surrounding waters are generally well mixed.	Low-oxygen conditions caused by methane-consuming microbes, could threaten small marine organisms (e.g. plankton, fish larvae, and other fauna that are not actively mobile) that provide a vital link in the marine food chain. However, given the low release rate and well mixed surrounding waters, this is not considered likely to occur. Toxicity impacts are not predicted, therefore, the potential consequence to social and ecological receptors is considered to be **Level 1**, as impacts are expected to be temporary and localised and thus will not impact on plankton, marine fauna and commercial fish species that maybe transient within the Operational Area or affect local ecosystem functioning.
Social Receptors			
Human System	Commercial Fisheries and Recreational Fishing	In-water exposure to gas release may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (NOAA 2002) which can have economic impacts to the industry. Five Commonwealth managed fisheries with recorded fishing effort and Two Victorian state managed fisheries areas were identified within the Operational Area. Note several fisheries active fishing areas are unknown due to limited data available and/or fisher confidentiality.	As previously identified, toxicity impacts are not predicted. However, impacts associated with tainting may occur. Based on the worse case potential consequence to fish species, the potential consequence is assessed to be **Level 1**. Refer also to: marine fauna.
Natural System	Marine Protected Areas	There are no known Marine Protected Areas or heritage properties or places in the Operational Area. Therefore, in water exposure to these areas is not expected and not evaluated further	N/A

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
	Heritage		
	Key Ecological Features	The Operational intersects the Upwelling East of Eden KEF. Values associated with this area are high productivity and aggregations of whales, seals, sharks and seabirds.	Based on the worse case potential consequence to key receptors within these KEFs, the potential consequence is assessed to be **Level 1**. Refer also to: marine fauna.

6.8.4.3 Risk Event: LoC – Vessel Collision

Table 6-28 Consequence evaluation for MDO hydrocarbon exposure – Surface

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
Ecological Receptors			
Marine Fauna	Seabirds	Several threatened, migratory and/or listed marine species have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by >10 g/m^2 surface hydrocarbons (Appendix 3.5). There are several foraging BIAs that are present within the area potentially exposed to >10 g/m^2 surface hydrocarbons for albatross, petrel, and shearwater species. Foraging BIAs are typically large broad areas (e.g. antipodean albatross) (Section 3.10 -Appendix 2). The birds can feed via surface skimming or diving – both exposing the bird to any oil on the water surface. No breeding activity occurs in oceanic waters.	When first released, MDO has higher toxicity due to the presence of volatile components. Individual birds making contact close to the spill source at the time of the spill may be impacted, however, it is unlikely that a large number of birds will be affected as the majority (95%) of the MDO volume will have evaporated within a few days of release. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with areas where hydrocarbons concentrations are greater than 10 µm and due to physical oiling may experience lethal surface thresholds. As such, acute or chronic toxicity impacts (death or long-term poor health) to birds is possible but unlikely for an MDO spill as the number of birds would be limited due to the small area and brief period of exposure above 10 µm (95% evaporation expected within a few days). Therefore, potential impact, if occurs, would be limited to individuals, with population impacts not anticipated. Marine pollution is listed as a threat for several migratory shorebirds and seabird conservation advice / recovery plans (refer to Table 2-3), however management actions mostly relate to nesting locations. The potential consequence to seabirds from a vessel collision (MDO) event is assessed as **Level 2** based on the potential for localised and short-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
	Marine Turtles	There may be marine turtles in the area predicted to be exposed to >10 g/m^2 surface oil. However, there are no BIAs or habitat critical to the survival of the species within this area (Appendix 3.5).	Marine turtles are vulnerable to the effects of oil at all life stages. Marine turtles can be exposed to surface oil externally (i.e. swimming through oil slicks) or internally (i.e. swallowing the oil). Ingested oil can harm internal organs and digestive function. Oil on their bodies can cause skin irritation and affect breathing. The number of marine turtles that may be exposed to MDO is expected to be low as there are no BIAs or habitat critical to the survival of the species present, hence, turtles may be transient within the EMBA. Surface oiling area is expected to reduce quickly, with the majority (95%) of the MDO volume predicted to have evaporated within a few days of release. Therefore, potential impact would be limited to individuals, with population impacts not anticipated. Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a), particularly in relation to shoreline oiling of nesting beaches. There are no nesting beaches within the EMBA, and the activity will be conducted in a manner which is not inconsistent with the relevant management actions. The potential consequence to turtles from a vessel collision (MDO) event is assessed as **Level 2** based on the potential for localised and short-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.
	Marine Mammals (Pinnipeds)	There may be pinnipeds in the area predicted to be affected by hydrocarbons >10 g/m^2. However, there are no BIAs or habitat critical to the survival of the species within this area (Appendix 3.5).	Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Oiling of pinnipeds can lead to hypothermia if the fur is affected, or poisoning if oil is ingested, resulting in reduced foraging and reproductive fitness or death (DSEWPC 2013b). Fur seals are particularly vulnerable to hypothermia from oiling of their fur, as well as irritation to lungs if breathing in fumes (e.g. if feeding occurs in the area). Fur seals are known to forage throughout the Gippsland and have been sighted foraging at BMG. The number of pinnipeds that may be exposed to MDO is expected to be low as there are no BIAs or habitat critical to the survival of the species present, hence, pinnipeds may be transient within the EMBA. Surface oiling area is expected to reduce quickly, with the majority (95%) of the MDO volume predicted to have evaporated within a few days of release. Therefore, potential impact would be limited to individuals, with population impacts not anticipated. Conservation Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC 2020b) identifies oil spills as a potential threat to habitat. Activities within this EP will be consistent with the conservation and management priorities outlined in this advice. Given that fur seals are vulnerable to hypothermia from oiling and poisoning from ingestion, the potential consequence to pinnipeds from a vessel collision (MDO) event is assessed as **Level 3** based on the potential for medium term impacts to species of recognised conservation value but not affecting local ecosystem functioning.
	Marine Mammals (Whales)	Several threatened, migratory and/or listed marine cetacean species have the potential to be migrating, resting or foraging within an area predicted to be above the surface thresholds of >10 g/m^2 (Appendix 3.5). The following BIAs are within the area predicted to be above the surface thresholds of >10 g/m^2:	Cetaceans can be exposed to oil through direct contact with the skin, eyes, mouth, and blowhole(s), and they can also inhale volatile petroleum fractions at the water's surface, ingest oil directly, and consume oil components in food (Amstrup, et al. 1989, O'Hara and T.J. 2001). Physical contact by individual whales with MDO is unlikely to lead to any long-term impacts, due to the insulative properties of their thick layers of blubber and skin (Geraci and D.J. 1990). Given the mobility of whales, only a small proportion of the

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
		• pygmy blue whale known foraging BIA • southern right whale	migrating population might surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effects. If whales are foraging at the time of the spill, a greater number of individuals may be present in the area where sea surface oil is >10 g/m^2 (10 µm). Surface oiling area is expected to reduce quickly, with the majority (95%) of the MDO volume predicted to have evaporated within a few days of release. Although oil spill has been identified as a potential threat for cetaceans or its habitat (refer to Table 2-3), no management advice were defined. Activities within this EP will be conducted in a consistent manner with the relevant management actions outline in the Plans. The potential consequence to cetaceans from a vessel collision (MDO) event is assessed as **Level 2** based on the potential for localised and short-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.
	Fish and Sharks	Several threatened, migratory and/or listed fish and sharks may occur within the area. Sharks have the potential to be foraging, migrating and breeding within the area predicted to be contacted by >10 g/m^2 surface hydrocarbons (Appendix 3.5). A distribution BIA for white sharks has been identified within the area predicted to be above the surface thresholds of >10 g/m^2.	Fish and sharks may be vulnerable to hydrocarbon exposure from an oil spill. Fish that have been exposed to dissolved aromatic hydrocarbons are capable of eliminating the toxicants once placed in clean water; hence, individuals exposed to a spill are likely to recover (King, et al. 1996). In addition, since fish do not generally break the sea surface, the risk from surface oil spills is low. Whale sharks were identified as species that may be present within the area. Whale Sharks have the tendency to feed close to surface waters (Compagno 1984), increasing the likelihood of exposure to surface slicks. Surface spills may also affect Whale Shark migration if attempting to travel through an area impacted by a spill. However, Whale Sharks do not spend all their time in surface waters—they routinely move between surface, can dive to great depths (~700 m) and they can remain away from the surface for long periods (DAWE 2021b). In the unlikely event, whale sharks are within the exposure area at the time of the spill, where sea surface oil is >10 g/m^2 (10 µm), surface oiling area is expected to reduce quickly with the majority (95%) of the MDO volume predicted to have evaporated within a few days of release. Therefore, the potential consequence to fish and sharks from a vessel collision (MDO) event is assessed as **Level 2** based on the potential for localised and short-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.
	Syngnathids and dolphins	Syngnathids and dolphins have the potential to be exposed to >10 g/m^2 surface oil. However, there are no threatened species, BIAs or habitat critical to the survival of the species within the surface that could be potentially affected (Appendix 3.5). Therefore, surface exposure to syngnathids and dolphins is not expected and not evaluated further.	N/A
Social Receptors			
Natural Systems	Key Ecological Features	Upwelling East of Eden is within the area predicted to be above the surface thresholds of >10 g/m^2 (Appendix 3.5). Values associated with these areas are high productivity and aggregations of whales, seals, sharks and seabirds.	Based on the worse case potential consequence to key receptors within the Upwelling East of Eden KEF (i.e. plankton), the potential consequence to this KEF is assessed to be **Level 2** as per the assessment for plankton (Table 6-30).

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
	State Marine Protected Areas	No Marine National Parks are within the area predicted to be exposed to the surface thresholds of >10 g/m^2 (Appendix 3.5). Therefore, surface exposure to MPA is not expected and not evaluated further.	N/A
Human Systems	Recreation and Tourism (including recreational fisheries)	Marine pollution can result in impacts to marine-based tourism from reduced visual aesthetic. MDO is known to rapidly spread and thin out on release. Consequently, a large area may be exposed to hydrocarbon concentrations greater than 1 g/m^2. Low exposure thresholds (1 g/m^2) are predicted up to 194 km E (summer) or 177 km NE (winter) of the release location. Local government areas and sub-areas where low threshold surface oil is predicted include East Gippsland, Cape Howe & Mallacoota.	Visible surface hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Given the nature of the oil, it is expected to rapidly weather offshore and once onshore is expected to continue weathering until it is flushed via natural processes from the coastline, or until it is physically cleaned-up. Regardless any exposure is expected to be limited in duration and consequently, the potential consequence to recreation and tourism from a vessel collision (MDO) event is considered to be **Level 2** as it could be expected to result in localised short-term impacts. Refer also to marine mammals (pinnipeds, cetaceans).
	Shipping	Shipping occurs within the area predicted to be above the surface thresholds of >10 g/m^2.	Impacts to shipping may occur due to temporary deviation to their shipping fairways. Vessels may be present in the area where sea surface oil is >10 g/m^2 (10 µm), however, due to the short duration of surface exposure (95% evaporated within a few days) impacts would be localised and short term. Consequently, the potential consequence is considered to be **Level 1**.
	Oil and gas	Oil and gas platforms are located within the area predicted to be above the surface thresholds of >10 g/m^2.	Oil and gas infrastructure present in the area where sea surface oil is >10 g/m^2 (10 µm) could be potentially oiled. However, due to the short duration of surface exposure (95% evaporated within a few days) impacts would be localised and short term, consequently, the potential consequence is considered to be **Level 1**.

Table 6-29 Consequence evaluation for MDO hydrocarbon exposure – Shoreline

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
Ecological Receptors			
Habitat	Rocky Shoreline	Rocky shores are within the area potentially exposed to hydrocarbon ashore; however, within the stretch of coast where shoreline contact could be expected, there is no sheltered rocky coasts (i.e. those rocky coasts more sensitive to shoreline oiling). As MDO is not sticky or viscous, if it contacts rocky shorelines, it is not expected to stick with tidal washing expected to influence the longevity of exposure.	The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents etc. Exposed rocky shorelines are less sensitive than sheltered rocky shorelines. One of the main identified values of rocky shores / scarps is as habitat for invertebrates (e.g. sea anemones, sponges, sea-squirts, molluscs). Rocky areas are also utilised by some pinniped and bird species; noting that foraging and breeding / nesting typically occurs above high tide line. The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where the immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA 1995).

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
			The potential consequence to rocky sites from a vessel collision (MDO) event is assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function. Refer also to: • marine invertebrates • seabirds and shorebirds • pinnipeds.
	Sandy Shoreline	Sandy beaches are within the area potentially exposed to hydrocarbons ashore. Sandy beaches are the predominant habitat type within the stretch of coast where shoreline contact could be expected from a vessel collision (MDO) event. MDO would be expected to penetrate porous sediments of sandy shorelines quickly but may also be washed off shorelines just as quick via waves and tidal flushing. NOAA (2014) note that as MDO is readily and completely degraded by naturally occurring microbes, it could be expected to disappear from shorelines within one to two months. MDO has the potential to be buried due to the continual washing in the intertidal zone.	Sandy beaches are considered to have a low sensitivity to hydrocarbon exposure. Sandy beaches provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans). Due to proximity to shore, a release of MDO may reach the shoreline prior to it completely weathering and consequently impacts due to toxicity and/or smothering of infauna may occur. The potential consequence to sandy shorelines from a vessel collision (MDO) event is assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function. Refer also to: • marine invertebrates • seabirds and shorebirds • pinnipeds • recreation.
	Mangroves	Mangroves are known to be located in close proximity to the area potentially exposed to hydrocarbons ashore, however, mangroves are not expected to be exposed within the stretch of coast from vessel collision (MDO) event, there is no coastal habitat mapped specifically as this vegetation type either. Oil can enter mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes (IPIECA 1993). This process commonly leads to a patchy distribution of the oil and its effects because different places within the forests are at different tidal heights (IPIECA 1993, NOAA 2014). The physical smothering of aerial roots by standard hydrocarbons can block the trees' breathing pores used for oxygen intake and result in the asphyxiation of sub-surface roots (IPIECA 1993).	Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Mangroves can take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al. 1987). Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may take months to years to detect (NOAA 2014). Snedaker et al. (1997) suggest that at least some mangroves species can tolerate or accommodate exposure to moderate amounts of oil on breathing roots. Given the non-viscous nature of MDO impacts are expected to be limited to the volatile component of the hydrocarbon, however given their sensitivity to hydrocarbons (as a conservative assessment), the potential consequence to mangroves is assessed to be **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function.
	Saltmarsh	Communities of saltmarsh are known to be located in close proximity to the area potentially exposed to hydrocarbons ashore and is present within some estuaries and inlet / riverine systems. Some of the saltmarsh habitat along this coast will be representative of the Subtropical and Temperate Saltmarsh TEC.	Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. In comparison with mangroves, saltmarsh is generally less vulnerable to oil spills (US EPA 2004). Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are very variable (IPIECA 1994). In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
		Oil can enter saltmarsh systems during the tidal cycles if the estuary / inlet is open to the ocean. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights. Oil (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. Heavy oil coating will be restricted to the outer fringe of thick vegetation, although lighter oils can penetrate deeper, to the limit of tidal influence (IPIECA 1994).	shoots of the plants may be killed but recovery can take place from the underground systems. NOAA & API (2013b) indicate that marshes that are oiled at the start of or during dormancy have a much greater potential for recovery. Good recovery commonly occurs within one to two years (IPIECA 1994). Given the sensitivity to hydrocarbons (as a conservative assessment), the potential consequence to saltmarsh is assessed to be **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function.
Marine Fauna	Invertebrates	Invertebrates that live in intertidal zones include crustaceans, molluscs and infauna, and can be present in wide range of habitats including sandy beaches and rocky shores (refer also to the exposure evaluation for these habitats). Exposure to hydrocarbons for invertebrates is typically via direct contact and smothering but can also occur via ingestion.	The impact of oil on any marine organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Acute or chronic exposure, through surface contact, and/or ingestion can result in toxicological impacts, reproductive impacts, smothering and potentially cause death. However, the presence of an exoskeleton (e.g. crustaceans) will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no exoskeleton and larval forms may be more sensitive to impacts from hydrocarbons. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, but can eventually be lost. As MDO is expected to rapidly spread out, a portion of the coast that comprises suitable habitats for intertidal invertebrates could be potentially exposed. Thus, the potential consequences are assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function.
	Seabirds and Shorebirds	Listed marine, threatened and/or migratory bird species have the potential to be resting, feeding or nesting within the area potentially exposed to hydrocarbons ashore. This fauna can be present in wide range of habitats including sandy beaches and rocky shores (refer also to the exposure evaluation for these habitats). There are several foraging BIAs throughout the area potentially exposed to hydrocarbon ashore, however these species are oceanic foragers, not shoreline foragers. Shorebirds will still utilise intertidal and onshore zones for feeding though no BIAs or habitat critical to the survival of the species have been identified. Given hydrocarbons may wash ashore prior to weathering, there is the potential for both physical oiling and toxicity (e.g. surface contact or ingestion), particularly for shorebirds utilizing the intertidal area. Noting that these events will be temporary, so length of exposure is limited.	Direct contact with hydrocarbons can foul feathers, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impair waterproofing. Oiling of birds can also suffer from damage to external tissues, including skin and eyes, as well as internal tissue irritation in their lungs and stomachs (ITOPF 2011). Toxic effects may result where the oil is ingested as the bird attempts to preen its feathers, or via consumption of oil-affected prey (Peakall, Wells and Mackay 1987). It is unlikely that a large number of birds will be affected by hydrocarbons ashore as the probability of shoreline contact is less than 8%. Therefore, should potential impacts occur, these would be limited to individuals; impacts to populations are not anticipated. Marine pollution is listed as a threat for several migratory shorebirds and seabird conservation advice / recovery plans (refer to Table 2-3), however management actions mostly relate to nesting locations. The potential consequence to seabirds and shorebirds from a vessel collision (MDO) event is assessed as **Level 2** based on the potential for localised short-term impacts to species or habitats of recognised conservation value not affecting ecosystem function.
	Marine Reptiles	Turtles nesting on exposed shores would be exposed by direct contact with skin / body. However, there are no BIAs or habitat critical to the survival of the species within the shorelines that could be potentially affected (Appendix 3.6). Therefore, shoreline exposure to marine turtles is not expected and not evaluated further.	NA

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
	Marine Mammals (Pinnipeds)	Pinniped species have the potential to present within the area predicted to be exposed to hydrocarbons ashore. There are no BIAs or habitat critical to the survival of the species within the area that maybe exposed to hydrocarbons ashore (Appendix 3.6). Pinnipeds hauling out on exposed shores could be exposed by direct contact of oil with skin / body. Direct oiling is possible but expected to have a limited window for occurring due to rapid weathering and flushing of MDO.	Pinnipeds have high site fidelity and can be less likely to exhibit avoidance behaviours, thus staying near established colonies and haul-out areas. Fur seals are particularly vulnerable to hypothermia from oiling of their fur (Helm, et al. 2015) and consequently, once onshore hydrocarbons pose a significant hazard to pinnipeds with biological impacts caused from ingestion possibly resulting in reduced reproduction levels. Conservation Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC 2020b) identifies oil spills as a potential threat to habitat. Activities within this EP will be consistent with the conservation and management priorities outlined in this advice. The number of pinnipeds that may be exposed to MDO is expected to be low as there are no BIAs or habitat critical to the survival of the species present, Therefore, potential impacts would be limited to individuals, impacts to populations are not anticipated. Given that fur seals are vulnerable to hypothermia from oiling, the potential consequence to pinnipeds from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function.
Social Receptors			
Natural System	Wetlands	Wetlands are predicted to be within the area potentially exposed to hydrocarbons ashore. One nationally important wetland is present in the area potentially exposed to hydrocarbon ashore, Mallacoota Inlet Wetlands. No wetlands of international importance (Ramsar) are present within the area.	The impacts of hydrocarbons on wetlands are generally similar to those described for mangroves and saltmarshes. The degree of impact of oil on wetland vegetation are variable and complex, and can be both acute and chronic, ranging from short-term disruption of plant functioning to mortality. Spills reaching wetlands during the growing season will have a more severe impact than if oil reaches wetlands during the times when many plant species are dormant. Wetland habitat can be of particular importance for some species of birds and invertebrates. As such, in addition to direct impacts on plants, oil that reaches wetlands also may affect these fauna utilising wetlands during their life cycle, especially benthic organisms that reside in the sediments and are a foundation of the food chain. Thus, the potential consequence to wetlands from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function. Refer also to: • marine invertebrates • seabirds and shorebirds.
Human System	Coastal Settlements	Coastal settlements are within the area potentially exposed to hydrocarbons ashore; however, the stretch of coast expected to be exposed is not densely populated. Noting that these events will be temporary, so duration of exposure is also limited. Most of the hydrocarbons will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.	Visible hydrocarbons have the potential to reduce the visual amenity of the area for coastal settlements. Given its rapid weathering and potential for tidal flushing and rapid degradation, the potential consequence to coastal settlements is assessed as **Level 2** based on the potential for localised short-term impacts. Refer also to: • rocky shores • sandy beaches.
	Recreation and Tourism	Recreational and tourism activities occur within the area potentially exposed hydrocarbons ashore; however, the stretch of	Visible hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities.

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
		coast expected to be exposed, as such the volume of recreation / tourism is not as high as other places. Noting that these events will be temporary, so duration of exposure is also limited. Most of the oil will be concentrated along the high tide mark while the lower / upper parts are often untouched (IPIECA 1995) and expected to be visible.	The potential consequence to recreation and tourism is assessed as **Level 2** based on the potential for localised short-term impacts. Refer also to: • rocky shores • sandy beaches • coastal settlements.
	Heritage	No World Heritage Properties, Commonwealth Heritage Places or National Heritage Places were identified within the area predicted to be contacted (Appendix 3.6). Specific locations of spiritual and ceremonial places of significance, or cultural artefacts, are often unknown, but are expected to be present along the mainland coast. Therefore, there is the potential that some of these sites may be within the area potentially exposed to hydrocarbons ashore. Noting that these events will be temporary, so duration of exposure is also limited. Most of the oil will be concentrated along the high tide mark while the lower / upper parts are often untouched (IPIECA 1995) and expected to be visible.	Visible hydrocarbons have the potential to reduce the visual amenity of heritage sites. However, it is expected that these sites would be above the high tide mark. Thus, the potential consequence to heritage is assessed as **Level 2** as they could be expected to result in localised short-term impacts. Refer to: • rocky shoreline • sandy beaches • coastal settlements.

Table 6-30 Consequence evaluation for MDO hydrocarbon exposure – In water

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
Ecological Receptors			
Habitat	Coral	Soft corals may be present within reef and hard substrate areas within the area predicted to be exposed above thresholds (>50 ppb). Note that the greater wave action and water column mixing within the nearshore environment will also result in rapid weathering of the MDO residue.	Exposure of entrained and dissolved hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka 2001). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA 2010). However, given the lack of hard coral reef formations, and the sporadic cover of soft corals in mixed reef communities, such impacts are considered to be limited to isolated corals. Thus, the potential consequence to corals is assessed as **Level 2** based on the potential for localised short-term impacts to species / habitats of recognised conservation value, but not affecting local ecosystem functioning.
	Sponge	Sponge habitats are known to be present within the Operational Area and therefore, they may be exposed above thresholds (>50 ppb). The modelling indicates that temporary patches of entrained MDO (>100 ppb) and dissolved (>50 ppb) may be present at 0-10 m water depth. As such, expose to sponge habitats are limited to shallow waters (<10 m).	Little is known about how sponges and their microbial symbionts respond to petroleum products (Heidi, et al. 2019). A study undertaken to the larval sponge holobiont (Heidi, et al. 2019) and its response to hydrocarbon exposure identified that sponges can survive high concentrations of petroleum hydrocarbons, but their ability to undergo successful settlement, crucial for recruitment, is affected at moderate concentrations of PAHs. Thus, the potential consequence to sponge habitats from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to habitats of recognised conservation value or to local ecosystem function

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
	Macroalgae	Macroalgae may be present within reef and hard substrate areas within the area predicted to be exposed above thresholds (>50 ppb). However, it is not a dominant habitat feature within this area. Note that the greater wave action and water column mixing within the nearshore environment will also result in rapid weathering of the MDO residue.	Reported toxic responses to oils have included a variety of physiological changes to enzyme systems, photosynthesis, respiration, and nucleic acid synthesis (Lewis and Pryor 2013). A review of field studies conducted after spill events by Connell et. Al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly from even very heavy oiling. In the event that a TEC: Giant kelp marine forests of SE Australia is present within the area potentially affected following a credible but unlikely spill scenario, there is the potential to expose this important habitat to in-water hydrocarbons. However, as described above, given hydrocarbons are expected to have limited impacts to macroalgae and as MDO is not sticky and expected to rapidly degrade upon release, the potential consequence to macroalgae is assessed as **Level 2** based on the potential for localised short-term impacts to species / habitats of recognised conservation value, but not affecting local ecosystem functioning.
	Seagrass	Seagrasses may be present within the area predicted to be exposed above thresholds (>50 ppb). Seagrass in this region isn't considered a significant food source for marine fauna.	There is the potential that exposure could result in sub-lethal impacts, rather than lethal impacts, possibly because much of seagrasses' biomass is underground in their rhizomes (Zieman, Iverson and Ogden 1984). Thus, the potential consequence to seagrass is assessed as **Level 2** based on the potential for localised short-term impacts to species / habitats of recognised conservation value, but not affecting local ecosystem functioning.
Marine Fauna	Plankton	Plankton are likely to be exposed within the area above threshold (>50 ppb). Exposure above thresholds is predicted in the 0-10 m water depth, which is also where plankton are generally more abundant. In-water phase MDO may intersect the Upwelling East of Eden KEF. While a spill would not affect the upwelling itself, if the spill occurs at the time of an upwelling event, it may result in krill being exposed to low (effects) level entrained phase MDO (99% species protection). Pygmy blue whales feeding on this krill may suffer from reduced prey, however, these impacts are expected to be extremely localised and temporary.	Relatively low concentrations of hydrocarbon are toxic to both plankton [including zooplankton and ichthyoplankton (fish eggs and larvae)]. Plankton risk exposure through ingestion, inhalation and dermal contact. Plankton are numerous and widespread but do act as the basis for the marine food web, meaning that an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover (ITOPF 2011), allowing for seasonal influences on the assemblage characteristics. Thus, the potential consequence to plankton is assessed as **Level 2** based on the potential for short-term and localised impacts, but not affecting local ecosystem functioning.
	Invertebrates	The modelling indicates that temporary patches of entrained MDO (>100 ppb) and dissolved (>50 ppb) may be present at 0-10 m water depth. Impact by direct contact of benthic species with hydrocarbon in the deeper areas of the release area is not expected given the surface nature of the spill and the water depths throughout the area predicted to be exposed. Species closer to shore may be affected although these effects will be localised, low level and temporary, noting that in-water thresholds selected for interpretation are effects levels for 95-99% species protection. Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed to sub-lethal impacts, however, population level impacts are considered unlikely. Tissue taint may occur and remain for several months in some species	Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Localised impacts to larval stages may occur which could impact on population recruitment that year. Thus, the potential consequence to invertebrates including commercially fished invertebrates is assessed as **Level 2** based on the potential for localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
		(e.g. lobster, abalone) however, this will be localised and low level with recovery expected. In-water invertebrates of value have been identified to include squid, crustaceans (rock lobster, crabs) and molluscs (scallops, abalone). Several commercial fisheries for marine invertebrates are within the area predicted to be exposed above the impact threshold: • Commonwealth Southern Squid Jig Fishery • Victorian Abalone Fishery. • Victorian Rock Lobster Fishery. • Victorian Giant Crab Fishery.	
	Fish and Sharks	In-water hydrocarbon droplets can physically affect fish exposed for an extended duration (weeks to months). Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest. Several fish communities in these areas are demersal and therefore more prevalent towards the seabed, which modelling does not predict is exposed >10 m water depth. Therefore, any impacts are expected to be highly localised. There is a known distribution, foraging and breeding BIA for the great white shark and a migration and foraging BIA for the Grey Nurse Shark in the area predicted to be over the impact threshold (Appendix 3.7), however, it is not expected that this species spends a large amount of time close to the surface where thresholds are predicted to be exceeded.	Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved / entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF 2011). The potential for environmental risks associated with in-water exposure would be limited to a relatively short period following the release. Although subsurface hydrocarbons could potentially result in acute exposure to marine biota such as juvenile fish, larvae, and planktonic organisms, impacts are not expected cause population-level impacts. Impacts on fish eggs and larvae entrained in the upper water column are not expected to be significant given the temporary period of water quality impairment, and the limited areal extent of the spill. As egg/larvae dispersal is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any oil affected populations. Thus, the potential consequence to fish and sharks including commercially fished species is assessed as **Level 2** based on the potential for localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.
	Mammals (Pinnipeds)	Localised parts of the foraging range for New Zealand fur-seals and Australian fur-seals may be temporarily exposed to above threshold concentrations of entrained and dissolved MDO in the water column (Appendix 3.7).	Exposure to low / moderate effects level hydrocarbons in the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds, however given the temporary and localised nature of the spill, their widespread nature, the low-level exposure zones and rapid loss of the volatile components of MDO in choppy and windy seas (such as that of the EMBA), the potential consequence is assessed as **Level 2** based on the potential for localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.
	Mammals (Whales)	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 threshold (> 50 ppb) (Appendix 3.7). The following known BIAs are present: • foraging (pygmy blue whale and humpback whale) • migration and resting on migration (southern right whale). Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and D.J. 1990). Such	The potential for impacts to cetaceans would be limited to a relatively short period following the release and would need to coincide with 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 for a single migration event, thus potential consequence is assessed as **Level 2** based on the potential for localised short-term impacts to species / habitats of recognised conservation value, but not affecting local ecosystem functioning.

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
		impacts are associated with 'fresh' hydrocarbon; however, the risk of impact declines rapidly as the MDO weathers.	
	Mammals (Dolphins)	Dolphin species have the potential to occur within the area predicted to be above the surface threshold (> 50 ppb) (Appendix 3.7). One breeding BIA for the Indo-pacific bottlenose was identified. Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and D.J. 1990). Such impacts are associated with 'fresh' hydrocarbon; however, the risk of impact declines rapidly as the MDO weathers.	Inshore dolphins may be vulnerable to oil spills because of their highly localised populations along the east coast (DSEWPC 2012). The Indo-Pacific bottlenose dolphin occurs in riverine and coastal waters, shallow waters on the continental shelf and around oceanic islands. However, dolphins have been known to detect oil and avoid it (DSEWPC 2012). The potential for environmental risks associated with in-water exposure would be limited to a relatively short period and not expected to result in population-level impacts. Thus, the potential consequence to dolphins is assessed as **Level 2** based on the potential for short-term and localised impacts, but not affecting local ecosystem functioning.
	Seabirds	Several threatened, migratory and/or listed marine species have the potential to be foraging and breeding within the area predicted to be above threshold (> 50 ppb) (Appendix 3.7). There are several foraging BIAs that are present within the area potentially exposed. Foraging BIAs are typically large broad areas (e.g. Antipodean Albatross) (Section 3.10 - Appendix 2). The birds can feed via surface skimming or diving – both exposing the bird to any oil on the water surface. No breeding activity occurs in oceanic waters.	Seabirds at sea and onshore have the potential to interact with oil spills. Foraging birds will be at potential risk of both direct impacts through contamination of individual birds (e.g. fouling of feathers) and indirect impacts (e.g. fouling and/or a reduction in prey items) (Clarke 2010). Acute and chronic toxic effects may result where the product is ingested as the bird attempts to preen its feathers (Peakall, Wells and Mackay 1987). However, the risk of impact declines rapidly as MDO weathers. Marine pollution is listed as a threat for several migratory shorebirds and seabird conservation advice / recovery plans (refer to Table 2-3), however management actions mostly relate to nesting locations. Thus, the potential consequence to seabirds is assessed as **Level 2** based on the potential for short-term and localised impacts, but not affecting local ecosystem functioning.
	Reptiles	Turtles have the potential to be within the area predicted to be exposed to >50 ppb. However, there are no BIAs or habitat critical to the survival of the species within the area that could be potentially affected (Appendix 3.7). Therefore, in water exposure to turtles is not expected and not evaluated further.	NA
Social Receptors			
Human System	Commercial Fisheries and Recreational Fishing	In-water exposure to entrained MDO may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (NOAA 2002) which can have economic impacts to the industry. Several commercial fisheries are known to operate in the EMBA and overlap the spatial extent of the water column hydrocarbon predictions.	Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF 2011). The potential for environmental risks associated with in-water exposure would be limited to a relatively short period following the release. Any acute impacts are expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. Exclusion zone established would be limited to the immediate vicinity of the release point, and due to the rapid weathering of MDO, would only be in place for a short period after release, therefore physical displacement to vessels is unlikely to be a significant impact. Indirect impacts associated with tainting may occur. Tainting is a change in the characteristic smell or flavour, and renders the catch unfit for human consumption or sale. Tainting may not be a permanent condition but will persist if the organisms are continuously exposed; but when exposure is terminated, depuration will quickly occur (McIntyre, et al. 1982).

Receptor Group	Receptor Type	Exposure Evaluation	Consequence Evaluation
			Thus, the potential consequence to commercial and recreational fisheries is assessed as **Level 2** based on the potential for localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning. Refer also to: • fish and sharks • invertebrates.
Natural System	State Marine Protected Areas	Marine protected areas predicted to be exposed to entrained hydrocarbons above thresholds are Cape Howe Marine National Park and the Point Hicks Marine National Park. Conservation values for these areas include high marine fauna and flora diversity, including fish and invertebrate assemblages and benthic coverage (sponges, soft corals, macroalgae).	Based on the worse case potential consequence to key receptors the consequence to protected marine areas is assessed **Level 2**. Refer to: • invertebrates • macroalgae • pinnipeds.
	Key Ecological Features	Big Horseshoe Canyon and Upwelling East of Eden are predicted to be exposed to entrained hydrocarbons above thresholds (>50 ppb). Values associated with these areas are: • Big Horseshoe Canyon – hard substrate for benthic flora and fauna. • Upwelling East of Eden – high productivity and aggregations of whales, seals, sharks and seabirds.	Based on the worse case potential consequence to key receptors within these KEFs, the potential consequence is assessed to be **Level 2**. Refer also to: • coral • macroalgae • seagrass • plankton • invertebrates • seabirds • fish and sharks • marine mammals • seabirds.
	Heritage	Underwater cultural heritage associated with seabed environments such as shipwrecks or archaeological significance artefacts would not be exposed to in-water hydrocarbons as modelling predicts a surface release will result in hydrocarbons entrained in water up to 30 m. Seabed interaction has the potential to occur in nearshore environments and consequently, exposure to cultural heritage receptors may occur in these areas if they exist (refer to heritage section in Table 6-29).	In-water hydrocarbons have the potential to impact the physical environment where in-water hydrocarbons occur nearshore waters in less than 30 m depth. However, as any hydrocarbon presence would be expected to evaporate over time, the potential consequence to heritage is assessed as **Level 2** as they could be expected to result in localised short-term impacts. Refer to: • Coral • Macroalgae • Seagrass

6.8.5 Control Measures, ALARP and Acceptability Assessment

Table 6-31 provides a summary of the control measures and ALARP and Acceptability Assessment relevant to Accidental Hydrocarbon Release.

Table 6-31 Accidental Hydrocarbon Release ALARP, Control Measures and Acceptability Assessment

Accidental Hydrocarbon Release	
ALARP Decision Context and Justification	**ALARP Decision Context: B** Cooper Energy operates offshore both in the Otway and the Gippsland. The activities proposed within this EP are not novel and similar vessel-based activities are undertaken by Cooper Energy and other operators in the region regularly. The activities of other marine users are also well understood, and there are well established protocols in place to manage potential interactions that could lead to a hydrocarbon release. The risks associated with vessel collision are well understood, however a worst-case release of marine diesel has the potential to result in **Level 3** consequences. Consequently, Cooper Energy believes that ALARP Decision **Context B** should be applied.
Control Measure	**Source of good practice control measures**
CM1: Marine exclusion and caution zones	• petroleum wells are within gazettal PSZs • subsea infrastructure is marked on navigational charts • temporary exclusion or caution zones around vessels undertaking petroleum activities to be requested via Notice to Mariners.
CM2: Pre-start notifications CM4: Ongoing consultation	Under the *Navigation Act 2014 (Cth)*, the AHS are responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications including: • notices to Mariners • AUSCOAST warnings Relevant details will be provided to the Joint Rescue Coordination Centre (JRCC) to enable AUSCOAST warnings to be disseminated.
CM3: Marine Order 27 Safety of navigation and radio equipment	AMSA Marine Order 27: Safety of navigation and radio equipment gives effect to SOLAS regulations regarding radiocommunication and safety of navigation and provides for navigation safety measures and equipment and radio equipment requirements
CM5: Fisheries Damage Protocol	Fisheries Damage Protocol was developed with South-east Fishing Trawl Industry Association (SETFIA) and Southern Shark Industry Alliance (SSIA) to provide a compensation mechanism to fishers who damage equipment on infrastructure on the seabed outside of the PSZ or during emergency scenarios.
CM6: Marine Order 30: Prevention of collision	AMSA Marine Order 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets industry standards.
CM7: Marine Order 21: Safety and emergency arrangements	AMSA Marine Order 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety.
CM9: Planned Maintenance System	Critical equipment on vessels will be maintained in accordance with preventative maintenance system including: • combustion equipment (vessels) • thrusters (vessels)
CM17: Vessel compliant with MARPOL Annex I, as appropriate to class (i.e. SMPEP or equivalent).	In accordance with MARPOL Annex I and AMSA Marine Order 91 - Marine Pollution Prevention – (oil), a SMPEP or equivalent (according to class) is required to be developed based upon the Guidelines for the Development of Shipboard Oil Pollution Emergency Plans, adopted by IMO as Resolution Marine Environment Protection Committee.54(32) and approved by AMSA. To prepare for a spill event, the SMPEP or equivalent details: • response equipment available to control a spill event • review cycle to ensure that the SMPEP or equivalent is kept up to date • testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP or equivalent details: • reporting requirements and a list of authorities to be contacted • activities to be undertaken to control the discharge of hydrocarbon • procedures for coordinating with local officials. Specifically, the SMPEP or equivalent contains procedures to stop or reduce the flow of hydrocarbons to be considered in the event of tank rupture.
CM25: Marine Order 31: Vessel surveys and certification	AMSA Marine Order 31: All vessels contracted to Cooper Energy will have in date Vessel surveys and certification.

Accidental Hydrocarbon Release	
CM27: NOPSEMA accepted WOMP	Under Part 5 of the OPGGS (Resource Management and Administration) Regulations 2011 (Cth), an accepted WOMP is required before well activities can be undertaken. The WOMP details well barriers and the integrity testing that will be in place for the activity. The accepted WOMP (and its implementation) is therefore considered a key component of the environmental risk management for the campaign.
CM28: Accepted Safety Case	Under OPGGS (Safety) Regulations 2009 (Cth) the following safety cases will be required for the campaign: • campaign Safety Case Revision • Gippsland Offshore Operations Field Safety Case. Each safety case will identify all hazards having the potential to result in major accident events (MAEs) associated with the respective facility. Safety cases, therefore, address major source control events associated with the wells including surface and subsea well releases, and vessel collision. As part of MAEs prevention and control, formal safety assessments are details and systematic assessment of the risk associated with each of those hazards, including the likelihood and consequences of each potential major accident event; and identifies the technical and other control measures that are necessary to reduce that risk to ALARP. The accepted safety cases (and their implementation) are considered key components of the environmental risk management for the campaign.
CM29: Asset IMP	Each asset has an Asset IMP that details the frequency, management, monitoring, mitigation and inspection activities determined necessary to ensure integrity is maintained for the infrastructure.
CM30 Simultaneous operations (SIMOPS) procedure.	A SIMOPS will be implemented if multiple vessels are required during emergency response.
CM43: SCERP	Source control is part of the first actions taken to minimise the volume of hydrocarbon released and therefore reduce potential impacts and risks to the environment. Key source control options for this LOWC event include well intervention, drilling a relief well and with subsequent dynamic kill, covered in the respective SCERP.
CM44: OPEP	Under the OPGGS(E)R (Cth), NOPSEMA require that the petroleum activity have an accepted OPEP in place before the activity commences. In the event of a significant LoC, the OPEP will be implemented. The Offshore Victoria OPEP has been developed and includes activities described under this EP. By committing to implement this EP, Cooper Energy acknowledges that any response will be implemented in accordance with the requirements described within the OPEP.
CM45: Operational and Scientific Monitoring Plan (OSMP)	Cooper Energy's OSMP details the arrangements and capability in place for: • operational monitoring of a hydrocarbon spill to inform response activities • scientific monitoring of environmental impacts of the spill and response activities. Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required and potential breaches of protected places management objectives, specifically those of Australian Marine Parks.
Impact and Risk Summary	
Residual Impact consequence	N/A
Residual Risk Consequence	Level 3 - Localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function; remedial, recovery work to land/water systems over months/year.
Residual Risk Likelihood	The identified control measures to prevent a subsea loss of well control event include clear design and assurance standards, and consequently, it is considered **Unlikely (D)** that a LOWC would occur that as a rare combination of factors would be required for an occurrence; the event is conceivable and could occur at some time; and could occur during the activity. In most vessel collisions where a loss of containment occurs, the release is from a forward tank. The tanks are generally double-lined and smaller than other tanks, the loss of the 500 m^3 diesel as used in this evaluation not expected. Considering the inherent low likelihood of a collision occurring, the safeguards in place, enactment of the OPEP, the LoC-vessel collision scenario resulting in a level-3 consequence is considered to be **Remote (E).** LoC is not expected to occur during the activity.
Residual Risk Severity	Moderate
Demonstration of Acceptability	

Accidental Hydrocarbon Release	
Principles of ESD	The potential impact associated with this aspect is limited to a localised medium-term impact to species or habitats of recognized conservation value or to local ecosystem function; remedial, recovery work to land / water systems over months / year. The activities were evaluated as having the potential to result in a **Level 3** consequence. Consequently, no further evaluation against the principles of ESD is required.
Legislative and conventions	Legislation and other requirements considered relevant control measures include: • NOPSEMA accepted Safety case • OPGGS (Resource Management and Administration) Regulations 2011 (Cth) • OPGGS(E)R (Cth) – Offshore Victoria OPEP and Offshore Victoria Operations OSMP
Internal context	The environmental controls proposed reflects the Cooper Energy HSEC Policy goals of utilising best practice and standards to eliminate or minimise impacts and risks to the environment and community to a level which is ALARP. Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05)
External context	No objections or claims have been raised during Relevant Persons consultation. Suggestions from State emergency agencies have been adopted unless otherwise discussed and agreed. A Yuin Nation clan connection to killer whales (Section 4.4.2) was identified. As described in Section 6.8.4, potential impacts to cetaceans were identified between level 1 (temporary) and level 2 (localised short-term). Identified cultural values connection to killer whales (Section 4.4.2) are not expected to be at risk of disruption.
Acceptability Outcome	**Acceptable**

7 Oil Spill Response Overview

7.1 Oil Spill Response Strategies

This section represents the risk assessment for oil spill response options as required by the OPGGS(E)R (Cth) and OPGGSR (Vic) and is used to inform the Offshore Victoria Oil Pollution Emergency Plan (OPEP).

7.1.1 Hydrocarbon Spill Risks associated with the Activity

Table 7-1 summarises the spill scenarios identified in Section 6.8 during the activities associated with this EP, and the relevant level. Spill levels are described in the Offshore Victoria OPEP.

Table 7-1 Hydrocarbon spill risks associated with the activity of this EP

Spill Risk	Spill Level	Fluid Type
Minor spill LoC	Level 1	MDO, hydraulic oil, chemical
Vessel Collision LoC	Level 1 or 2	MDO (Group II)
Subsea LoC (pipeline and well release)	Level 1 or 2	Gas, condensate

7.1.2 Response Option Selection

Not all response options and tactics are appropriate for every oil spill. Different oil types, spill locations, and volumes require different response options and tactics, or a combination of response options and tactics, to form an effective response strategy.

Net Environmental Benefit Analysis (NEBA) is the process of considering advantages and disadvantages of different spill response options (including no response) to arrive at a spill response decision resulting in the lowest overall environmental and social impacts. NEBA is undertaken at a strategic level to identify pre-determined recommended response strategies, and an operational NEBA is undertaken throughout the emergency response. The process requires the identification of sensitive environmental receptors and the prioritisation of those receptors for protection so that the strategic objectives of the response can be established. Table 7-2 provides an assessment of the available oil spill response options, their suitability to the potential spill scenarios and their recommended adoption for the identified events.

Table 7-2 Oil Spill Response Options

Response Option	Description	LoC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	Subsea LoC	Viable Response?	Strategic Net Benefit?
Source control	Limit flow of hydrocarbons to environment.	Achieved by vessel SMPEP or equivalent.	✓	✓	Implement Source Control Plan to assess and determine remedial option.	✓	✓
Monitor and evaluate	Direct observation-aerial or marine, vector calculations, oil spill trajectory modelling, satellite tracking buoys. To maintain situational awareness, all monitor and evaluate options suitable.	MDO spreads rapidly to thin layers. Aerial surveillance is considered more effective than vessel to inform spill response and identify if oil has contacted shoreline or wildlife. Vessel surveillance is limited in effectiveness in determining spread of oil. Manual calculation based upon weather conditions will be used at the time to provide guidance to aerial observations. Oil Spill Trajectory Modelling may also be used to forecast impact areas. Deployment of oil spill monitoring buoys at the time of vessel incident will assist in understanding the local current regime during the spill event.	✓	✓	For a continuous significant spill event (LOWC) hydrocarbons will be present at the surface for the duration of the release. To maintain situational awareness, all monitor and evaluate techniques will be considered during gas spill incidents to validate predicted impacts and assess the application of further response strategies if required.	✓	✓
Dispersant application	Breakdown surface spill & draw droplets into upper layers of water column. Increases biodegradation and weathering and provides benefit to sea-surface air breathing animals.	MDO, while having a small persistent fraction, spreads rapidly to thin layers. Insufficient time to respond while suitable surface thicknesses are present. Dispersant application can result in punch-through where dispersant passes into the water column without breaking oil layer down if surface layers are too thin. Application can contribute to water quality degradation through chemical application without removing surface oil. Considered not to add sufficient benefits.	X	X	The area affected by a subsea gas release is likely to be localised around the release point, with plumes predicted to surface anywhere this point. Furthermore, PB condensate is low volume and are primarily non-persistent hydrocarbon, therefore, will weather rapidly. Given the low viscosity of this liquid any surface oils will spread rapidly to thin layers. Sole condensate is low volume and have a persistent hydrocarbon component. Application can contribute to water quality degradation through chemical application without removing surface oil due to the low volumes. Considered not to add sufficient benefits.	X	X
Contain and recover	Booms and skimmers to contain surface oil where there is a potential threat to environmental sensitivities.	MDO spreads rapidly to less than 10 µm and suitable thicknesses for recovery are only present for the first 36 hours for a large offshore spill, and there is insufficient mobilisation time to capture residues. In general, this method only recovers ~10-15% of total spilled oil (ITOPF 2022) , creates significant	X	X	Given plumes are predicted to surface anywhere close to the release point of the hydrocarbons, surface oils will not be present in suitable thicknesses to make contain and recover a viable response option.	X	X

Response Option	Description	LoC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	Subsea LoC	Viable Response?	Strategic Net Benefit?
		levels of waste, requires significant manpower and suitable weather conditions (calm) to be deployed.					
Protect and deflect	Booms and skimmers deployed to protect environmental sensitivities.	Corralling of surface hydrocarbons close to shore may not be effective for MDO depending on sea surface conditions. However, if operational monitoring indicates sensitive receptors are exposed, and are accessible to response personnel and equipment, protection and deflection may be an effective technique for reducing oil within inland water ways, in low energy environments.	✓	✓	Given PB condensate have non-persistent hydrocarbon fractions, or low volumes, and its rapid dispersion in the environment, protect and deflection may not be effective. Low volumes of Sole condensate release were identified; however, Sole condensate have light persistent levels of persistent hydrocarbon. Due to the low volumes protection and deflection may not be effective. However, if operational monitoring indicates sensitive receptors are exposed, and are accessible to response personnel and equipment, protection and deflection may be an effective technique for reducing oil within inland water ways, in low energy environments.	✓	✓
Shoreline clean-up	Shoreline clean-up is a last response strategy due to the potential environmental impact	As shoreline exposure is possible, and as there are various shoreline techniques that are appropriate for this type of hydrocarbon, a shoreline clean-up may be an effective technique for reducing shoreline loadings where access to shorelines is possible.	✓	✓	Due to the low volume of the product released and its dispersion in the environment prior to reaching shorelines it is possible that there would be insufficient quantities for manual clean-up. However, as shoreline exposure is possible, and as there are various shoreline techniques that are appropriate for this type of hydrocarbon, a shoreline clean-up may be an effective technique for reducing shoreline loadings where access to shorelines is possible.	✓	✓
Oiled wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-spill captive management. In Victoria, this is managed by DEECA.	Given limited size and rapid spreading of the MDO spill, large scale wildlife response is not expected. However, individual birds could become oiled in the vicinity of the spill. OWR is both a viable and prudent response option for this spill type.	✓	✓	Given the nature of the PB condensate (i.e. its rapid spreading to thin layers) and Sole condensate (i.e. light persistent levels of hydrocarbon) and limited volumes of residue washed ashore, it is predicted there will be limited impacts to species sensitive to oil residues such as birds. However, individual birds could become oiled in the vicinity of the spill. OWR is both a viable and prudent response option for this spill type.	✓	✓

7.2 Response Priority Areas

To support the identification of priority response areas, shoreline sensitivity analysis and mapping was undertaken guided by IPIECA principles and informed by the regional description of the environment and understanding of receptor presence in the region (Appendix 2). The Response Priority Areas process is detailed in the Offshore Victoria OPEP. The Offshore Victoria OPEP covers the priority response planning areas associated with the spill events detailed in this EP.

7.3 Pre-spill Net Environmental Benefits Assessment (NEBA)

Location specific information was used for each of the priority response planning areas to further refine receptor presence, with these receptors ranked based upon the sensitivity criteria detailed in the OPEP (Section 4.4 Priority Protection Areas). An assessment of the effective spill response strategies and the net benefit they offer, specific to the sensitivities located within each of the priority response planning areas is provided in the OPEP Section 4.4. Priority Protection Areas.

All primary response options detailed in the pre-spill NEBA are consistent with this EP and thus the pre-spill NEBA is considered suitable for this activity.

7.4 Spill Response: Source Control

7.4.1 MDO – source control

Source control arrangements for significant vessel spills resulting from fuel tank perforation includes:

- closing watertight doors
- checking bulkheads
- determining whether vessel separation will increase spillage
- isolating penetrated tanks
- tank lightering.

Source control relies heavily upon the activation of the vessels SMPEP (or equivalent). As all vessel-based source control activities relate to activities onboard the vessel, no additional environmental impacts or risks have been identified. As such, no additional evaluation is required.

7.4.2 Subsea condensate – source control

Well source control activities, including methodologies and resources to implement source control and limit the hydrocarbon released to the environment are detailed in the asset SCERP.

7.4.3 Resources Required and Availability - Subsea condensate

The feasibility/effectiveness of a source control response is provided in Table 7-3. As shown in this assessment, capping is unlikely to be selected for regaining control of the wells, as the relief well offers the more likely solution to the well control issue.

Table 7-3 Overview of Level 3 Source Control Options Applicable to Gippsland Offshore Operations

Parameter	Site Survey and debris clearance	Manual Intervention of Well Control Equipment	Subsea Dispersant Application	Well Capping	Relief Well
Operations	Yes – survey would be required to confirm the leak source.	Yes – manual intervention would be attempted if remote shut-in not possible	No – dispersant not considered suitable for operational spill scenarios.	No – capping would not be suitable for a leak via tortuous leak path through the subsea tree.	Yes – a relief well response could be activated to intercept the flowing well an contain the source.
Suitability/ Functionality How does the control perform to achieve its required risk reduction?	Site survey assists in identifying equipment status and hazards. Debris clearance equipment is used to enable access to the well if obstructed. This option enables data to be gathered and the site to be prepared to both select and enable subsequent source control options.	Capability to manually intervene the well control equipment will be maintained throughout the campaign when well control equipment is deployed.	Dispersant not expected to be of benefit for leaks of gas/condensate through tortuous leak path.	Well capping can curtail the hydrocarbon flow prior to permanent plugging of the well. A capping option requires clear vertical access with a crane or Heavy Well Intervention Vessel and establishing a seal over the subsea receptor – the subsea interfaces and load allowances change throughout a drilling, intervention or abandonment program and can require different capping solutions. The well capping solution is only an option if the tree body has integrity and suitable vertical access to the subsea connector.	This source control technique has been proven successful in Australia (e.g. Montara) and internationally (Macondo). Considered technically feasible and effective on subsea well release scenarios for the Otway wells, Stemming the flow of hydrocarbons from a well by injecting kill density fluid into the well bore is a proven method of regaining control of a well. This is often achieved by directionally drilling a relief well to intercept the wellbore and then pumping fluid to stem the flow. Once the well is stabilised, cement can be pumped into the well to form a permanent barrier to isolate the flow zone.
Dependencies Does the response strategy rely on other systems to perform its intended function?	Response is reliant on availability of equipment and trained/experienced resources to undertake activities: • possible salvage/debris equipment removal specialist • survey vessel, construction and/or support vessel • possible Safety Case and/or revision.	Response is reliant on the availability of trained and experienced resources to undertake activities: • subsea intervention equipment and operators • survey vessel, construction and/or support vessel. • Safety Case and/or revision	N/A	N/A	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • drill rig and trained staff • well engineering services and management contractor • well control specialists • well equipment availability • Safety Case and/or revision
Availability and Timely The response strategy is available to perform its function, in sufficient time?	Survey and debris clearance equipment is available within Australia as part of the AMOSC Subsea First Response Toolkit. Similar packages are also available internationally including from Wild Well Control.	Capability to mount an intervention response.	N/A	N/A	Relief well MODU, services and equipment can be sourced via existing contracts and APPEA Mutual Aid Memorandum of Understanding (MoU). Timeline breakdown is provided in below.

7.4.3.1 Site Survey, Debris Clearance and Intervention - Scope of Activity

Site survey and debris clearance are key preliminary tasks that assist in selecting subsequent source control options.

- survey allows the response team to understand any issues which may preclude installation of equipment or other constraints to safely enter and work in the area
- the need for debris removal activities will be dependent upon the scenario, damage to the subsea facilities such as subsea well components well control equipment. Debris clearance may involve the use of ROVs and cutting of equipment to ensure a clear path for manual intervention
- intervention and is likely the earliest opportunity to stem or stop the release of hydrocarbons. Intervention would include the use of ROVs and tooling which can interface with the PB and Sole wells
- a decision on which equipment is used will be made at the time based on availability and suitability of equipment for the event.

Table 7-4 describes various options available for supply. Response specialists and subsea specialists such as AMOSC, Oceaneering and Wild Well Control can provide equipment packages.

Table 7-4 Indicative survey and debris clearance equipment

Response Options	Equipment Applicable to Source Control Options
Survey Debris clearance Intervention	Cameras - inspection ROV operated ROVs Grinders / super grinders Impact wrenches Multipurpose cleaning tools Remote control units Hydraulic cutters Chopsaws Diamond wire cutters Hydraulic power units ROV dredges Torque tools Test jig Pressure control equipment intervention skid and operating equipment Linear valve override tools Manipulator knife Flying lead orientation tool Umbilicals

7.4.3.2 Site Survey, Debris Clearance and Intervention Response Time Model

Table 7-5 outlines the key activities and estimated response time model (RTM) associated with gaining access to inspection, debris clearance and intervention. The RTM considers response times for:

- sourcing applicable vessel will be through 3rd party vessel operator. There are generally vessels available within the south-east region which could complete tasks such as inspection, but vessels with the capability to undertake debris clearance and intervention may need to be sourced from further afield
- sourcing applicable inspection, intervention and/or debris removal equipment will be through a 3rd party provider such as AMOSC (Subsea First Response Toolkit [SFRT] based in Western Australia) or subsea specialists such as Oceaneering and/or TMT depending on the equipment needs at the time. Hardware may alternatively be mobilised via Wild Well Control (Houston) where it supports best case response times. Table 7-5 shows the RTM for the AMOSC SFRT.

Table 7-5 RTM Site Survey, Debris Clearance and Intervention

	3rd Party (e.g. AMOSC or Alternative Party Supplier)	Intl Case	Mid Case	Local Case
	Vessel Mobilisation Point	Asia - Singapore	Northwest Shelf	Offshore Vic Waters

	3rd Party (e.g. AMOSC or Alternative Party Supplier)	Intl Case	Mid Case	Local Case
	Mobilise vessel			
1	Contract and mobilise vessel to port facilities	13	8	5
	Source subsea equipment			
2	Initial notification to arrival of crews at warehouse to load trucks	0.25	Concurrent with Activity 1	
3	Prepare and load equipment on trucks (five in total)	0.65		
4	Transit time (road) to Portland	3.00		
5	Callout of SME crews to Portland	Concurrent #4		
6	Unload at Portland	0.31		
7	Charge SAM (not applicable for operations)	2.00		
8	Load SFRT to vessel and sea fasten	1	Following vessel arrival at port	
9	Transit from Port of Melbourne to wellsite location and deploy	0.5		
	Total Time (days)	**14.5**	**9.5**	**6.5**

7.4.3.3 Relief Well - Scope of Activity

The scope of drilling a relief well is the same as drilling a standard well although it will be a deviated well due to the need to drill at distance from the original flowing well. A relief well is typically drilled as a straight hole down to a planned kick-off point, where it is turned towards the target using directional drilling technology and tools to get within 30 – 60 m of the original well. The drilling assembly is then pulled from hole and a magnetic proximity ranging tool is run on wireline to determine the relative distance and bearing from the target well. Directional drilling continues with routine magnetic ranging checks to allow for the original well to be intersected. Once the target well is intersected dynamic kill commences by pumping kill weight mud and cement downhole to seal the original well bore.

Planning for the relief well will begin simultaneously with other well intervention options. Outline relief well plans, and methodology are contained in the SCERP. This plan details the process for relief well design with key activities prioritised as part of the immediate response operations.

- mobilisation of well control and relief well specialists
- confirmation of the relief well strategy with well specialist to define mobile offshore drilling unit (MODU) / vessel requirements:
  - confirm relief well location using geophysical site survey data. This will consider the prevailing weather at the time of the incident, seabed infrastructure in the area and directional drilling requirements for well intersection
  - validate relief well casing design.
- screen available MODUs in the region with current Australian Safety Case and select MODU with appropriate technical specifications to execute the strategy. A memorandum of understanding has been established between Australian operators (including Cooper Energy) to expedite access to suitable MODUs, equipment and services for relief well drilling. If required, Cooper Energy is able to request the use of a MODU, equipment and services, that may be under contract to another operator. Minimum technical specifications for the well kill are assessed in the asset SCERP based upon inputs from well control modelling reports and relief well complexity; the selected MODU will meet these requirements and be capable of operating in the Metocean conditions at the relief well location
- prepare and submit regulatory documentation required for relief well activities
- mobilise necessary equipment and services such as directional drilling equipment and appropriate ranging tools for relief well strategy.

Relief well design

The SCERP and relief well plan includes technical details as to the design and equipment requirements to drill a relief well in the PB and Sole fields. The Australian Petroleum Production and Exploration Association (now Australian Energy Producers) relief well complexity assessment provides an overview of some of the key planning considerations which are addressed within these documents. PB and Sole relief wells score 22 and 32 which is low and medium complexity, respectively (Table 7-6, Table 7-7).

Detailed well kill modelling has demonstrated that the PB and Sole wells can be killed via a single relief well. Relief wells are expected to have similar formation strength as existing wells in these fields, hence modelling and planning has provided for formation fracture gradients recorded during historical drilling in the PB and Sole fields. The reservoir conditions and flow rate modelling for PB and Sole were utilised to provide a conservative worst-case scenario outlined below with respect to the Relief Well Complexity Assessment.

The basic design is for a directional relief well targeting the targeting the wellbore at base of the 244 mm (9-5/8") casing (top reservoir intersection scenario). The relief well architecture would comprise:

- 660 x 1067 mm (26" x 42") conductor hole drilled to ~ 45-60 m below seabed - sufficient depth as required for conductor loading and fatigue mitigation. 914 mm (36") conductor will be installed and cemented to seabed
- 445 mm (17-1/2") surface hole directionally drilled riserless before running 340 mm (13-3/8") surface casing, the well will be kicked off to achieve initial build up to the target sail angle
- 311 mm (12-1/4") hole directionally drilled with Blowout preventer installed to before running 244 mm (9-5/8") intermediate casing. The sail angle from the surface casing shoe is to be maintained until reaching proximity of the target offset of the existing wellbore, sufficient tolerance to intersect the wellbore
- 216 mm (8-1/2") hole drilled up to total depth, allowing for sufficient depth to intersection with adjustments possible in any direction. This section of the well is designed to intercept the target wellbore, which may be iterative until success.

Table 7-6 Relief Well Complexity Assessment for PB

Design Parameter	Complexity Category								
	Low			Medium			High		
Flow potential	Low pressure well (maximum anticipated surface pressure [MASP] <5 kpsi) and/or tight reservoir.			Low - moderate pressure well (MASP <10 kpsi), conventional reservoir.			High pressure well (MASP >10 kpsi) and/or high permeability reservoir.		
Score	1	**2**	3	4	5	6	7	8	9
Reservoir Fluids	Dry Gas.			Wet Gas / Condensate.			Crude Oil.		
Score	1	**2**	3	4	5	6	7	8	9
Trajectory (Relief Well)	• max. inclination <30˚ • max. dogleg severity <2.5˚/30 m • nearest offset >5 km.			• max. inclination >60˚ • directional plan achievable with standard tools • offset wells <5 km that required A/C screening.			• max. inclination >60˚ • short radius or high build rate through shallow formations • multi-well location e.g. subsea drill-centre or platform.		
Score	1	2	3	**4**	5	6	7	8	9
Surface location	No constraints on surface location.			Seabed features, subsea or surface infrastructure limit choice of surface location.			Detailed risk assessment or mooring design required to choose suitable relief well location due to existing infrastructure.		
Score	1	2	3	**4**	5	6	7	8	9
Temperature	Max. bottomhole static temperatures <150˚C.			150˚C <Max. BHST <180˚C - and/or Synthetic-based drilling muds required.			BHST >180˚C.		
Score	**1**	2	3	4	5	6	7	8	9
Long-lead equipment (casing & wellheads)	Standard casing and wellheads specs – same as source well.			Standard casing and wellheads specs –different from source well.			Unusual casing and/or wellhead specs. May require additional effort to assure timely supply.		
Score	1	**2**	3	4	5	6	7	8	9

Design Parameter	Complexity Category								
	Low			Medium			High		
Availability of technically suitable relief well rigs	Multiple suitable rigs likely to be operating offshore Australia.			At least one suitable MODU likely to be operating offshore Australia, with alternative rigs available in the region.			Limited availability of suitable rigs.		
Score	1	2	3	4	5	6	7	8	9
Hazardous formation fluids (H_2S or CO_2)	None expected.			Expected, but not likely to affect material selection or relief well location.			Expected and may require special safety precautions, well materials, or affect the location of a relief well.		
Score	1	2	3	4	5	6	7	8	9

Source: Australian Offshore Titleholders Source Control Guideline (APPEA 2021)

Table 7-7 Relief Well Complexity Assessment for Sole

Design Parameter	Complexity Category								
	Low			Medium			High		
Flow potential	Low pressure well (maximum anticipated surface pressure [MASP] <5 kpsi) and/or tight reservoir.			Low - moderate pressure well (MASP <10 kpsi), conventional reservoir.			High pressure well (MASP >10 kpsi) and/or high permeability reservoir.		
Score	1	2	3	4	5	6	7	8	9
Reservoir Fluids	Dry Gas.			Wet Gas / Condensate.			Crude Oil.		
Score	1	2	3	4	5	6	7	8	9
Trajectory (Relief Well)	• max. inclination <30˚ • max. dogleg severity <2.5˚/30 m • nearest offset >5 km.			• max. inclination >60˚ • directional plan achievable with standard tools • offset wells <5 km that required A/C screening.			• max. inclination >60˚ • short radius or high build rate through shallow formations • multi-well location e.g. subsea drill-centre or platform.		
Score	1	2	3	4	5	6	7	8	9
Surface location	No constraints on surface location.			Seabed features, subsea or surface infrastructure limit choice of surface location.			Detailed risk assessment or mooring design required to choose suitable relief well location due to existing infrastructure.		
Score	1	2	3	4	5	6	7	8	9
Temperature	Max. bottomhole static temperatures <150˚C.			150˚C <Max. BHST <180˚C - and/or Synthetic-based drilling muds required.			BHST >180˚C.		
Score	1	2	3	4	5	6	7	8	9
Long-lead equipment (casing & wellheads)	Standard casing and wellheads specs – same as source well.			Standard casing and wellheads specs –different from source well.			Unusual casing and/or wellhead specs. May require additional effort to assure timely supply.		
Score	1	2	3	4	5	6	7	8	9
Availability of technically suitable relief well rigs	Multiple suitable rigs likely to be operating offshore Australia.			At least one suitable MODU likely to be operating offshore Australia, with alternative rigs available in the region.			Limited availability of suitable rigs.		
Score	1	2	3	4	5	6	7	8	9
Hazardous formation fluids (H_2S or CO_2)	None expected.			Expected, but not likely to affect material selection or relief well location.			Expected and may require special safety precautions, well materials, or affect the location of a relief well.		
Score	1	2	3	4	5	6	7	8	9

Source: Australian Offshore Titleholders Source Control Guideline (APPEA 2021)

MODU considerations

The default surface location offset distance of the relief well is 0.5 - 1 km from a flowing well. The Metocean conditions (prevailing wind and currents) are considered when finalising the surface location. The location of the relief well is positioned to ensure the relief well MODU is upwind for as much time as possible to limit potential exposure to hydrocarbons from the subsea LoC.

The relief well can be executed using a semi-submersible MODU (moored) similar to that used for drilling the wells.

Moorings are expected to extend approximately 2 km from the MODU and may therefore extend beyond the distance of the EP Activity Operational Area, which may expand by approximately 1-2 km radius under emergency conditions.

MODU mooring and anchor suitability analysis have been completed previously for the PB and Sole petroleum title areas and has concluded that MODU anchors or commonly available rental anchors would be appropriate. At least two anchor handling and tow support (AHTS) vessels would be required to tow the MODU (if not self-propelled) and install the moorings. An active MODU would already be supported by AHTS vessels and hence would likely be accompanied by those vessels during relief well drilling. AHTS vessels could also be sourced from hubs such as Northwest Shelf and Singapore.

There are typically multiple semi-submersible MODUs capable of drilling such wells within Australian waters. Higher activity is typical in the Northwest Shelf, though drilling MODU's have also been active in the Southeastern region through much of the period 2017-2022.

For planning purposes Cooper Energy assesses four mobilisation scenarios for sourcing a relief well MODU:

- regional semi-submersible MODU in Victorian waters
- Northwest Shelf semi-submersible MODU in West Australian waters
- International (Asia) semi-submersible MODU in Singapore waters.

International time case – MODU is mobilised from Singapore

The international case model has been developed to assess mobilising a suitable MODU from outside of Australian waters. This may be due to a number of reasons for example:

- no active working MODU in Australian waters
- deficient MODU capabilities to drill and kill the well
- MODU unable to be released due to restrictions (such as biosecurity, well control event, equipment failure, weather, regulator enforcement etc.)
- complex scopes to suspend well and demobilise from location (i.e. deep-water mooring recovery).

While other suitable MODU options are likely available closer to the relief well site there should not be a requirement to look further than the area of Singapore which continually services the oil and gas and maritime industries.

The base case transit time is the longest of all cases presented. Additionally, the selected MODU should have a current Australian Vessel Safety Case and no restrictions to enter the county.

Mid time case – MODU is mobilised from Northwest Shelf

The mid case model has been developed to assess bringing in a suitable MODU from the Northwest Self (Exmouth). This may be due to a number of reasons for example:

- no active suitable working MODU in local Victorian waters
- deficient MODU capabilities to drill and kill the well
- MODU unable to be released due to restrictions (such as biosecurity, well control event, equipment failure, weather, regulator enforcement etc.)
- complex scopes to suspend well and demobilise from location (i.e. deep-water mooring recovery)

The Exmouth point of departure for the mobilisation is a nominal position in the Northwest Shelf; a MODU further north in the area would require additional transit time. However, this would not be excessive or warrant a separate RTM estimate.

The Northwest Shelf is presently the main activity hub for oil and gas operations in Australia, multiple companies have continuous MODU operations on the Northwest Shelf. Hence, the area is likely to hold multiple options for securing relief well semi-submersible MODU. Additionally, transit time is improved when compared to the base case transit time.

Local time case – MODU is mobilised from Victorian waters

The local case model has been developed to assess a technically capable and locally available semi-submersible MODU in the offshore Victoria area. Transit time is improved for the local case when compared to the base and mid case. A suitable local rig would be the preferred option during a relief well operation but may not be selected for several reasons for example:

- lack of appropriate MODU capabilities to drill and kill the well
- RTM favours selection of alternate MODU (complex scope to suspend well and demobilise from local location, stacked or requirement for hull inspection prior to mobilisation)
- MODU unable to be released due to restrictions (such as well control event, equipment failure, weather, regulator enforcement etc.)
- no MODU available locally during activities.

The Victorian offshore oil and gas sector is serviced sporadically by semi-submersible MODUs with Titleholders mobilising more frequently to Northwest Shelf (Mid case) from Asia. Therefore, should a relief well MODU be required it will likely be mobilised from either the Northwest Shelf or Asia. RTM estimates have been developed and will continue to be reviewed and updated to reflect the most favourable case mobilisation of relief well MODU to the relief well location.

7.4.3.4 Relief Well RTMs

Cooper Energy RTM models contain the same activities and time for well construction, dynamic kill and abandonment of the well. The time model only changes due to mobilisation point of the MODU.

Cooper Energy has estimated the following timeframes for the total relief well installation and well kill scope (Table 7-8). The series of cases is used to help understand critical activities to undertaking the relief well scope. Table 7-9 shows the indicative relief well installation timeline.

Table 7-8 Indicative MODU Mobilisation Timeline

Response Time Model – Relief Well Drilling & Well Kill		Intl Case	Mid Case	Local Case
MODU Mobilisation Point		Asia - Singapore	Northwest Shelf	Offshore Vic Waters
No.	Activity description	Estimated Days	Estimated Days	Estimated Days
	Source Control Relief Well Activation Phase			
1	Activated Well Control team, commence planning & notifications	2	2	2
2	Select MODU, inspect & complete contracting and work scope	3	6	6
3	Demobilise equipment from MODU	1	1	1
4	MODU move preparations (includes anchor handling)	2	2	2
	MODU Transit Phase			
5	MODU mobilisation to relief well location	51	29	3
	Total Time (days)	**59**	**40**	**14**

Table 7-9 Indicative Relief Well Installation Timeline

Response Time Model – Relief Well Drilling & Well Kill		PB Base Case	Sole Base Case
No.	**Well Construction, Ranging & Intercept, Well Kill Phase**	**Estimated Days**	**Estimated Days**
1	Run anchors and position MODU	2.0	2.0
2	Mobilise equipment to rig	1.0	1.0
3	Prepare to Spud	0.5	0.5
4	Drill 26" x 42” Conductor Hole Section	0.8	0.8
5	Run and cement 36” Conductor	1.5	1.5
6	Directionally drill 17-1/2” Surface Hole Section	1.8	2.3
7	Run and cement 13-3/8” Surface Casing	1.1	1.2
8	Run and test blowout preventer	2.2	2.2
9	Directionally drill 12-1/4” Intermediate Hole Section	4.4	15.5
10	Run and cement 9-5/8” Intermediate Casing	3.2	0.5
11	Directionally drill 8-1/2” Reservoir Hole Section, ranging runs #1-4	13.0	1.5
12	Pre-kill preparations	0.5	0.5
13	Well kill operations, attempt #1	1.5	1.5
14	Pre-kill preparation	0.5	2.0
15	Well kill operations, attempt #2, flow stopped	1.5	1.0
	Time to Complete Well Kill (days - Drilling Only)	35.4	34.0
	Relief Well Abandonment Phase	-	-
16	Plug and Abandon Well	4.5	3.5
17	Pull blowout preventers	1.2	1.2
18	Remove wellhead	0.8	0.8
19	Retrieve anchors and release MODU	2.0	2.0
	Total Relief Well duration (days - Drilling and Abandonment Only)	**43.9**	41.5

7.4.3.5 Regulatory Approval Timing Considerations

Planning for relief well drilling will occur in parallel to other tertiary well control responses. A key component of the relief well drilling will be the preparation, submission, and approval of the regulatory documents. Generally, for well operations the regulatory and risk management processes fall on critical path hence in an emergency these documents will require a high level of focus immediately to ensure they are in place prior to arrival of the MODU.

The following documents will require consideration:

- vessel safety case
  - the selected MODU is expected to have a valid safety case, and it is not expected to affect response times.
- scope of validation
  - any proposed significant change to an offshore facility (i.e. MODU or vessel) will require a scope of validation to be proposed to NOPSEMA and agreed prior to submission of a safety case revision. Depending on the level of changes the time to complete and gain approval could possibly affect the response time to have regulatory documentation in place prior to start of relief well operations.
- safety case revision
  - the safety case revision will require preparation, submission and approval prior to operations and is expected to be on critical path for relief well activities (Table 7-10).
- WOMP
  - the in-force WOMP is expected to be suitable for relief well drilling and not expected to require a revision and resubmitted.

- EP
  - the EP is designed to provide for source control response activities. Significant changes may require resubmission subject to initial change assessment, though is not expected to affect overall response time.
- well activity notice
  - well activity notice is not expected to affect response time.

As part of the preparation of the above documentation a number of formal safety assessments will be conducted as part of risk management these include:

- Hazard Identification (HAZID) workshop (identity's risks, assesses hazards and mitigations to control works site hazards with aim to remove major accident events).
- Hazard Operations (HAZOP) workshop (risk assesses the operational sequence and place controls to reduce hazards to ALARP).
- risk assessments for safety critical equipment (vessel equipment, BOP, mooring, fluids handling).

Table 7-10 Safety Case Revision Preparation and Approval Timeline

No.	Safety Case Revision Submission Key Steps (standard MODU)	Estimated Days
1	Planning, regulatory consultation, HAZID/HAZOP Workshops, document preparation	2 weeks
2	Internal review cycle and submit	1 week
3	Priority Regulatory Assessment Period	1 week
	Total Time	**4 weeks (28 days)**

Response Agreements

Cooper Energy maintains contracts/agreements with specialist resources to supply well control expertise and support for drilling a relief well. This includes:

- well engineering support services
- technical writing and risk engineering services to support regulatory documentation workflows and submissions is provided by experienced specialists such as ADD Energy
- well control specialists with experience in relief wells and the coordination of well control activities such as Wild Well Control
- wellhead and casing materials supplier
- Cooper Energy is party to the Industry MoU to share drilling rigs, equipment and resources (well site services) in the event of an emergency. The MoU provides for the timely transfer of third-party contractual arrangements involved in the release of a MODU and well site services to the titleholder for relief well drilling
- equipment and materials needed to construct a relief well will be able to be sourced either directly from suppliers or through the industry Australian Energy Producers Mutual Aid MoU. The availability of equipment and materials are tracked through the "relief well readiness form" process (refer to OPEP - Source Control Resource Availability). All equipment and materials are expected to be sourced and transported to site during the SCR approval RTM, MODU transit and anchoring phase for the base and mid case response time model estimates. For the local MODU mobilisation case, an operational MODU would also have equipment and services, with additional equipment and services available via Australian Energy Producers MoU.

MODU activity outlook and monitoring

Cooper Energy keeps a watching brief on vessel availability through industry forums and vessel broker updates and is also a participant of the Australian Drilling Industry Steering Committee. Through this Committee, Cooper Energy receives regular updates on the location and operational status of MODU's operating in Australian waters, which could be made available for a source control response.

7.4.4 Source Control ALARP Evaluation

Source Control ALARP considerations are included in the NOPSEMA accepted WOMP.

7.4.5 Source Control Impact and Risk Evaluation

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 are covered under the NOPSEMA accepted WOMP, and thus are not considered further.

The Environmental Performance Outcomes, Standards and measurement criteria for response preparedness and implementation of source control activities are detailed in the Offshore Victoria OPEP.

7.5 Spill Response: Monitor and Evaluate

7.5.1 Overview

Ongoing monitoring and evaluation of the oil spill is a key strategy and critical for maintaining situational awareness and to complement and support the success of other response activities. In some situations, monitoring and evaluation may be the primary response strategy where the spill volume / risk reduction through natural dispersion and weathering processes is considered the most appropriate response. Monitor and evaluate will apply to all marine spills. Higher levels of surveillance such as vessel/aerial surveillance, oil spill trajectory modelling and deployment of satellite tracking drifter buoys will be undertaken for Level 2/3 spills given the nature and scale of the spill risk.

It is the responsibility of the Control Agency to undertake operational monitoring during the spill event to inform the operational response. Operational monitoring may include the following:

- aerial observation
- vessel observation
- tools:
  - oil spill trajectory modelling
  - vector analysis (manual calculation)
  - ADIOS (a spill weathering model).
- utilisation of satellite tracking drifter buoys.

The responsibility for operational monitoring lies with the respective control agency (refer to Offshore Victoria OPEP).

7.5.2 Resources Required and Availability

To understand the response equipment and personnel associated with a monitor and evaluate response technique, Cooper identified the quantity and type of equipment and personnel required for the proposed optimum response.

One or more Satellite Tracking Buoys would be deployed to provide an understanding in real time of environmental conditions. The outcomes from this will feed into both Oil Spill Trajectory Modelling and Manual Trajectory Calculations to provide situational awareness and an understanding of the spill trajectory and sensitivities that have the potential to be exposed. Minimum requirements are:

- 1 x Satellite Tracking Buoy

Whilst this can be done rapidly, additional vessel and aerial surveillance may take more time to initiate dependant on the time of the spill and conditions offshore. Vessel surveillance can be conducted from any offshore vessel under Cooper Energy's control which may be engaged immediately in the event of a spill depending on the time of day. Vessel observations will assist in determining if additional response actions are required, however, vessel observation is generally considered to be less effective than aerial observation due to the limited distance in which observations can be conducted. Nonetheless, vessel surveillance activities also incorporate operational monitoring studies as outlined in the OSMP; which will involve various monitoring and sampling methodologies of water to determine the extent of surface, entrained and dissolved hydrocarbons in the water column and near sensitive receptors. Minimum requirements, in addition to vessel crew, are:

- 1 vessel surveillance team comprising:
  - 1 x visual observer
  - 1 x vessel.

Aerial surveillance may be undertaken from specially mobilised aircraft, available crew transfer helicopters, or similar. Trained observers must be present on the surveillance aircraft who can be sourced from the Australian Marine Oil Spill Centre (AMOSC) and/or AMSA. If aerial surveillance is required, an over-flight schedule is developed. The frequency of flights will be sufficient to ensure that the information collected during each flight (i.e. observer log and spill mapping) meets the information needs to validate dispersion of the spill.

Aerial surveillance would be used at the start of spill to gain situational awareness assess including trajectory of spill, size of slick and thickness to enable a baseline quantity to be established. Initial reconnaissance may be basic to enable a level of understanding of the spill within 24 hours without waiting for trained observers to arrive, whilst later observations may require more skill/calculations to estimate behaviour, therefore trained observers are critical.

Given the small distance offshore, the proximity to airfields, and the surveillance time requirement, minimum requirements are:

- 1 aerial surveillance team:
  - 1 x visual observer
  - 1 x aircraft (helicopter or fixed wing).

The feasibility/effectiveness of a monitor and evaluate response is provided in Table 7-11.

Table 7-11 Feasibility / Effectiveness of Monitor and Evaluate Response

Parameter	Protect and deflect
Suitability/Functionality How does the response strategy perform to achieve its required risk reduction?	Implementation of monitoring is fundamental in informing all the remaining response strategies. The response activity validates trajectory and weathering models providing forecasts of spill trajectory, determines the behaviour of the oil in the marine environment, determines the location and state of the slick, determines the effectiveness of the response options and confirms the impact on receptors. Monitoring and evaluation activities will continue throughout the response until the termination criteria have been met.
Dependencies Does the response strategy rely on other systems to perform its intended function?	The successful execution of monitoring relies on of the pre-planning of monitoring assets being completed to enable the shortest mobilization time of personnel, and equipment required for gaining situational awareness. To ensure the IMT can maintain the most accurate operating picture the monitoring data collected in the field will be delivered to the IMT as soon as possible.
Availability and limitations Time the response strategy is available to perform its function?	Time to be operational - Monitoring from aerial platforms will only operate in daylight hours; all other options are capable of 24-hour operations. Access to ADIOS is available within 1 hour of the establishment of the IMT with initial results available within 1 hour of accessing the system. Initial external modelling results are available 2 hours after initial request. Personnel downtime will be planned and managed to ensure appropriate levels of response personnel are maintained and rotated as required or until the response is terminated.

The Offshore Victoria OPEP details the resource capability to undertake monitor and evaluate activities in accordance with the identified required resources above, their availability and hence Cooper Energy's capability to support a 'monitor and evaluate' response.

Cooper Energy maintains operational monitoring capability and implements operational monitoring for Level 2 or 3 facility-based incidents and this response capability would be available to assist the Control Agencies in the event of a MDO vessel spill if requested. Cooper Energy would initiate Type II (scientific) monitoring in the event of any Level 2 or 3 spill. Through this resourcing Cooper Energy is capable of:

- acquiring knowledge of the spill conditions from any vessel based MDO spill via deployed tracking buoys and undertaking manual trajectory calculations within 1 hour of Emergency Management Team mobilisation
- activating and obtaining modelling forecast within 4 hours of spill
- deploying aircraft within 24 hours to verify modelling/vector calculation forecast and provide real-time feedback of impacts / predicted impacts.

Cooper Energy considers that during a 'worst-case' spill event, there are sufficient monitoring resources to respond in sufficient time to allow Cooper Energy to understand if any sensitivities have the potential to be threatened by a spill (i.e. via satellite tracking buoy deployment; manual and computerised trajectory calculation and finally via aerial observation). The operational constraints and termination criteria for a 'Monitor and Evaluate' response is provided in the Offshore Victoria OPEP.

7.5.3 Monitor and Evaluate ALARP Evaluation

Monitor and evaluate ALARP considerations are included in Table 7-12.

Table 7-12 Monitor and evaluate ALARP Evaluation

Additional control measures	Benefit	Cost	Outcome
Utilise additional vessels and aircraft for spill observations during initial response stages	Although additional surveillance activities will provide additional information, continuous monitoring of the spill has limited benefit given significant changes in trajectory are influenced by oceanic currents and wind direction that is being continuously monitored via both tracking buoys and Meteye services. Consequently, a single aerial and vessel Monitoring, Evaluation and Surveillance (MES) Team is expected to be sufficient for the initial stages of the response planning and using additional platforms is not considered to provide a considerable environmental benefit.	Cooper Energy have arrangements in place to enable additional platforms to be deployed for MES activities if required and thus the cost of deploying additional platforms is not expected to be significant. However, during the initial stages of the response, deploying additional platforms increases simultaneous operations risk whilst the emergency management structure and communication protocols are being initiated. Consequently, as there is no considerable benefit of scaling up MES during the initial stages of the response implementation of this control measures have not been considered further. As the response progresses, scaling up or down of the response effort will be considered in accordance with the OPEP which reviews the effectiveness of each strategy. Cooper Energy has demonstrated in Table 7-11 that existing arrangements are in place (such as with both vessel and aircraft providers) to access additional resources (not just that required for the initial stages of the response) if required by this process.	Not Selected
Use unmanned aerial vehicles to provide a more rapid monitoring response with reduced safety risks	This control measure is not expected to provide significant environmental benefit as Gippsland assets are close to shore, whereas civilian drone ranges are limited, more sensitive to weather, and may not provide any additional information when compared to vessels and aerial survey via fixed wing aircraft or helicopter.	The cost associated with purchasing this a drone and maintaining a contract with drone operator may not be significant. However, is not expected to provide any additional benefit when compared to aerial survey via fixed wing or helicopter.	Not Selected
Night-time monitoring - infrared	Infrared may be used to provide aerial monitoring at night-time; however, the benefit is minimal given trajectory monitoring (and infield monitoring during daylight hours) will give good operational awareness. In addition to this, satellite imagery may be used (is already provided for) at night to provide additional operational awareness.	The cost associated with utilising infra-red monitoring is not considered to be significant. As infra-red monitoring needs to be deployed from an aerial platform, this activity creates significant health and safety risks.	Not Selected

7.5.4 Monitor and Evaluate Impact and Risk Evaluation

Monitoring and evaluation activities have the potential to result in:

- Marine fauna interactions.

7.5.4.1 Cause of the aspect

The following activities associated with operational monitoring have the potential to interfere with fauna:

- aircraft use for aerial surveillance (fixed wing or helicopter)
- vessels use for surveillance.

7.5.4.2 Aspect characterisation

The cause of these aspects is not considered to be any different to those planned under this EP (i.e. aircraft and vessel use). Consequently, no further aspect characterisation has occurred.

7.5.4.3 Predicted Environmental Impacts and Risk

The potential risks associated with a monitor and evaluate response are:

- localised and temporary fauna behavioural disturbance
- injury or mortality due to an unplanned interaction
- change in water quality.

7.5.5 Impact and Risk Evaluation

The potential impacts associated with vessel and aircraft activities have been evaluated throughout the risk assessment of this EP (Section 6). Based upon the nature and scale of the activities, the evaluation is considered appropriate for any aerial or marine surveillance undertaken and thus has not been considered further.

7.5.6 Control Measures, ALARP and Acceptability Assessment

Table 7-13 provides a summary of the EIA/ERA for monitoring and evaluation activities.

Table 7-13 Monitor and Evaluate EIA/ERA

ALARP Decision Context and Justification	**ALARP Decision Context A** The use of vessels and aircraft in offshore areas is well practiced with the potential impacts and risks from these activities well understood. There is a good understanding of control measures used to manage these risks from aircraft. There is little uncertainty associated with the potential environmental impacts and risks, which have been evaluated as **Level 1**. No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. As such, Cooper Energy believes ALARP Decision Context A should apply.
Control Measure	**Source of good practice control measures**
Consultation	Consultation in the event of a spill will ensure that relevant government agencies support the monitor and evaluate strategy thus minimising potential impacts and risks to sensitivities.
Maintain monitoring and evaluation capability	Cooper Energy will maintain the required level of response capability to implement a monitoring and evaluation strategy commensurate with the spill events detailed in this EP.
Impact and Risk Summary	
Likelihood	The likelihood of a worst-case scenario spill was determined to be Unlikely (D). As such, the likelihood of impacts from marine fauna interaction in the event of a response have been determined to be **Remote (E).**
Residual Impact Consequence	N/A
Residual Risk Consequence	N/A (Refer to relevant aspects in Section 6)

Residual Risk Likelihood	N/A (Refer to relevant aspects in Section 6)
Residual Risk Severity	N/A (Refer to relevant aspects in Section 6)
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect are limited to standard aerial and vessel activities, which is not considered as having the potential to affect biological diversity and ecological integrity. The activities do not have the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and other requirements	Legislation and other requirements considered as relevant control measures include: • OPGGS Act 2006 (Cth) • OPGGS Act 2010 (Vic) • EPBC Regulations 2000 (Part 8 – Interacting with cetaceans and whale watching) • Wildlife (Marine Mammals) Regulations 2019 (Vic) • Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022) • Conservation Management Plan for the Southern Right Whale (DSEWPC 2012) • Conservation Management Plan for the Blue Whale 2015–2025 (Commonwealth of Australia 2015a) • Listing Advice for Megaptera novaeangliae humpback whale (TSSC 2022) • Conservation Advice for Balaenoptera borealis (Sei whale) (TSSC 2015a) • Conservation Advice for Balaenoptera physalus (Fin whale) (TSSC 2015b) • Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a) • Recovery Plan for the White Shark (Carcharodon carcharias) (Commonwealth Australia 2013) • Conservation Advice for Rhincodon typus whale shark (TSSC 2015c)
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05)
External context	No concerns from Relevant Persons have been raised to date regarding impacts and risks from monitor and evaluate strategies. As such, Cooper Energy considers that there is broad acceptance of the impacts and risks associated with the activity.
Environmental Performance	
The environmental performance outcomes, standards and measurement criteria for response preparedness and implementation of monitoring and evaluation activities are shown in the Offshore Victoria OPEP.	

7.6 Spill Response: Protect and Deflect

7.6.1 Overview

Booms and skimmers can be deployed to protect or deflect oil from environmental sensitivities. Noting that the effectiveness of boom operation is dependent on current, wave and wind conditions.

7.6.2 Resources Required and Availability

Response resources will be activated via AMOSC in the first instance, with equipment and resources selected on the basis of the Tactical Response Plan (TRP) activation and subsequent Incident Action Plan (IAP), as defined in the Offshore Victoria OPEP.

The feasibility / effectiveness of a protect and deflect response is provided in Table 7-14.

Table 7-14 Feasibility / Effectiveness of Protect and Deflect Response

Parameter	Protect and deflect
Suitability/Functionality How does the response strategy perform to achieve its required risk reduction?	Successful implementation of the protection and deflection response strategy will reduce the oil reaching the shoreline. Protection strategies can be used for targeted protection of sensitive receptors. The use of zoom and beach guardian boom is the most technically suitable and feasible application of the response strategy. Alternative offshore boom types cannot be deployed successfully in shallow water due to depth of draft. Chevron, cascade and exclusion booming formations will be deployed based on the location.
Dependencies Does the response strategy rely on other systems to perform its intended function?	Operational effectiveness of this response is dependent on monitoring and surveillance (including deterministic modelling predictions and visual surveillance) of the floating oil before stranding which enables the prioritization and targeted protection of environmental sensitivities. This will ensure boom is deployed at the sensitivities reducing the oil reaching the shorelines.
Availability and limitations Time the response strategy is available to perform its function?	Time to be operational - Based on the availability of personnel, equipment and vessels, the deployment of the response strategy will take place within 48 hours of response activation. Protection and deflection operations will take place during daylight hours only and in appropriate weather and tide conditions. Deployed boom formations will require regular monitoring to ensure continued effectiveness. Personnel downtime will be planned and managed to ensure appropriate levels of response personnel are maintained and rotated as required or until the response is terminated.

7.6.3 Protect and Deflect ALARP Evaluation

Protect and deflect ALARP considerations are included in Table 7-15.

Table 7-15 Protect and Deflect ALARP Evaluation

Additional control measures	Benefit	Cost	Outcome
Implement optimum protect and deflect sooner by storing equipment at strategic locations	The environmental benefits associated with this option are negligible; existing logistics pathways have demonstrated that this equipment can be mobilised to potentially impacted shorelines before shoreline contact occurs.	Any equipment mobilised to site would need to be purchased by Cooper. Most equipment proposed to be used (available via the various agreements) can only be mobilised in an emergency as it needs to be stored and available in strategic locations nationwide for the whole industry. Purchasing such equipment would result in significant costs that are considered grossly disproportionate to the level of risk reduction achieved.	Not Selected

7.6.4 Protect and Deflect Impact and Risk Evaluation

Protect and deflect activities have the potential to result in:

- interactions with shoreline and nearshore habitats.

7.6.4.1 Cause of the aspect

The following activities associated with protection and deflection have been identified as having the potential to interact near-shore/shoreline habitats:

- boom deployment and management (especially anchored boom).

7.6.4.2 Aspect characterisation

Stochastic modelling indicates that the largest volume of hydrocarbons ashore was 64.8 m^3 with the maximum length of shoreline exposed to hydrocarbons above impact thresholds 6.0 km. Any protection and deflection response would be expected to be focused to these areas, and as such disturbance associated with protect and deflect tactics would be limited.

Cultural heritage, such as shell middens, may be found in many areas along the Victorian coast; coastal shell middens, charcoal and hearth stones from fires, and items such as bone and stone artefacts are typically located within sheltered positions in the dunes, coastal scrub and woodlands, within rock shelters or on exposed cliff top (Appendix 2). Some site locations may be relatively well known to the general public, others may not be. In the event of a spill threatening shorelines, known sites within the impact area can be identified with the assistance of the State government and through consultation with the appropriate traditional owner groups.

7.6.4.3 Predicted Environmental Impacts and Risks

The potential impacts of protection and deflection activities are:

- loss of seabed vegetation / disturbance to estuarine habitats from boom anchors
- impacts to cultural heritage values
- restricting access to the area for recreational activities.

7.6.5 Impact and Risk Evaluation

7.6.5.1 Risk Event: Loss of seabed vegetation / disturbance to estuarine habitats from boom anchors

Inherent Consequence Evaluation

Potential impacts of protect and deflect response vary, depending on the method used and the nearshore/shoreline habitat. Particular values and sensitivities in the area that may be affected by the spill include nearshore and estuarine habitats (such as seagrass) and shoreline habitats (sandy beach habitats).

Loss of vegetation may occur where equipment cannot be mobilise using existing tracks or where protection booms may be placed. Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact/response thresholds, any impacts are likely to be highly localised the response infrastructure. These impacts would likely result in localised medium-term impacts to species or habitats with recover over months to a year.

As such the consequence has been ranked as a **Level 3.**

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.6.5.2 Risk Event: impacts to cultural heritage values

Inherent Consequence Evaluation

Cultural heritage sites or artefacts along the shoreline or where equipment is mobilised may be affected by protect and deflect response.

Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact/response thresholds, any impacts are likely to be highly localised the response area. As described in Section 7.6.4.2, consultation with state government and traditional owner groups will be undertaken to identify known cultural heritage sites or artefacts. Therefore, potential impacts to cultural heritage sites or artefacts from protect and deflect response are expected (if any) to be localised and short-term. However, if new sites are discovered, potential impact are expected to be localised medium term to conservation values and therefore, the consequence has been ranked as a **Level 3.**

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.6.5.3 Risk Event: Restricting access to the area for recreational activities.

Inherent Consequence Evaluation

Potential impacts of protect and deflect response vary, depending on the method used and the nearshore/shoreline habitat. Particular values and sensitivities in the area that may be affected by the spill include local recreational activities along the coastline.

Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact / response thresholds, any impacts are likely to be highly localised the response infrastructure. Areas maybe temporary restricted to the public while protection and deflection activities occur. As the diesel will weather rapidly this would only occur for days. As such, these impacts would likely result in localised short term impacts social receptors.

As such the consequence has been ranked as a **Level 2.**

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.6.6 Control Measures, ALARP and Acceptability Assessment

Table 7-16 provides a summary of the EIA/ERA for protect and deflect activities.

Table 7-16 Protect and Deflect EIA/ERA

ALARP Decision Context and Justification	**ALARP Decision Context A** Implementing protect and deflect response techniques is standard practice for marine oil spills. There is a good understanding of potential impacts and risks from these techniques, and the control measures required to manage these. There is little uncertainty associated with the potential environmental impacts and risks, evaluated as **Level 3** due to the small disturbance footprint expected with these techniques. No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. As such, Cooper Energy considers ALARP Decision Context A should apply.
Control Measure	**Source of good practice control measures**
Maintain protect and deflect capability	Cooper Energy will maintain the required level of response capability to implement a protection and deflection strategy commensurate with the spill events detailed in this EP.
Develop TRPs for priority protection sites	Identify priority protection sites and apply tactical response planning measures
Consultation	• consultation in the event of a spill will ensure that relevant government agencies support the protect and deflect strategy thus minimising potential impacts and risks to sensitivities • engagement with relevant State Agencies and Traditional Owner groups in the event of a spill, with information provided on an as-needed basis, to identify and protect cultural heritage sites from disturbance associated with spill response activities. Discussions with GLaWAC indicated the Gunaikurnai people would like to be contacted in the event of a spill which could impact shorelines to provide cultural heritage advice/support.
OSMP (Monitor response effectiveness)	Monitoring the response effectiveness will ensure response is terminated where the response is no longer effective or where a net environmental benefit is no longer present.
Use of Existing Tracks and Pathways	Utilising existing tracks and paths where possible will ensure the disturbance footprint associated with the implementation of this response technique is reduced to ALARP.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 3 - Localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function; remedial, recovery over months/year.

Residual Risk Likelihood	The likelihood of a significant event was determined to be Hypothetical (F) (Section 6.8.5). As such, the likelihood of impacts from protection and deflection response activities in the event of vessel collision have been determined to be **Hypothetical (F)**.
Residual Risk Severity	**Low**
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect is limited to a localised medium-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 **Level 3** consequence thus 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.
Legislative and other requirements	Legislation and other requirements considered as relevant control measures include: • OPGGS Act 2006 (Cth) • OPGGS Act 2010 (Vic)
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05)
External context	No concerns have been raised to date by Relevant Persons during activity consultation regarding impacts and risks from protect and deflect strategies. As such, Cooper Energy considers that there is broad acceptance of the impacts associated with the activity.
Environmental Performance	
The environmental performance outcomes, standards and measurement criteria for response preparedness and implementation of Protect and Deflect activities are shown in the Offshore Victoria OPEP.	

7.7 Spill Response: Shoreline Assessment and Clean-up

7.7.1 Overview

Any shoreline operations will be undertaken in consultation with, and under the control of the Control Agency, and the appropriate land managers of the shoreline affected.

Shoreline clean-up consists of different manual and mechanical recovery techniques to remove oil and contaminated debris from the shoreline to reduce ongoing environmental contamination and impact. It may include the following techniques:

- manual collection of oil and debris – people collect oil from the shoreline
- mechanical collection – use of machinery to collect and remove stranded oil and contaminated material
- mechanical alterations to shoreline – use of machinery to temporarily move sand to close estuaries/waterways
- sorbents – use of sorbent padding to absorb oil
- vacuum recovery, flushing and washing – the use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating oil accumulated at the shoreline
- sediment reworking – move sediment to the surf to allow oil to be removed from the sediment and move sand by heavy machinery
- vegetation cutting – removing oiled vegetation
- cleaning agents – application of chemicals such as dispersants to remove oil.

Shorelines within the EMBA are predominantly sandy beaches with numerous estuaries present along the Victorian Coastline.

By the time the spill reaches shore it has weathered significantly, with only the persistent residual remaining. Under low energy conditions, the residual components may form a thin liquid sheer on the coast and may persist in the environment; this may allow them to be physically removed until physically removed. The following clean-up methods may have environmental benefit:

- manual clean-up
- mechanical collection

7.7.2 Resources Required and Availability

The number and tasks of personnel will vary according to the quantity of spill debris, its rate of delivery to the site and the disposal method chosen.

Response resources will be activated via AMOSC in the first instance, with equipment and resources selected based on the TRP activation and subsequent IAPs as defined in the Offshore Victoria OPEP.

The feasibility / effectiveness of a shoreline assessment and clean-up response is provided in Table 7-17.

Table 7-17 Feasibility / Effectiveness of Shoreline Assessment and Clean-up Response

Parameter	Shoreline Assessment and Clean-up
Suitability/Functionality How does the response strategy perform to achieve its required risk reduction?	Successful implementation of the shoreline assessment and clean up response strategy will result in a reduction of oil on the shoreline, assist in preventing the remobilization of oil and act to reduce the lasting impact of the oil spill on shoreline receptors. The method of clean up chosen will be selected based on shoreline type, local knowledge of the conditions and the availability of equipment and personnel. Oil clean up quantities are estimated to recover 1 m^3 per person/per day (manual recovery) and 24 m^3 per team/per day (mechanical collection)
Dependencies Does the response strategy rely on other systems to perform its intended function?	Operational effectiveness of this response is dependent on the continuous use of monitoring and surveillance to help direct clean-up efforts towards the areas most affected by stranded oil which enables the prioritization and targeted clean-up of environmental sensitivities.
Availability and limitations Time the response strategy is available to perform its function?	Time to be operational - Shoreline Clean-up and Assessment Technique personnel will be available on site within 12 hours to commence terrestrial assessment. Based on the availability of personnel and equipment the clean-up activities will commence within 12 hours of response Activation. Personnel downtime will be planned and managed to ensure appropriate levels of response, personnel are maintained and rotated as required or until the response is terminated.

7.7.3 Shoreline Assessment and Clean-up ALARP Evaluation

Shoreline Assessment and Clean-up ALARP considerations are included in Table 7-18.

Table 7-18 Shoreline Assessment and Clean-up ALARP Evaluation

Additional control measures	Benefit	Cost	Outcome
Implement shoreline assessment and clean-up sooner	Modelling indicates that shortest time to shore at levels where a shoreline response can be implemented (>100 g/m^2) is within 2 days. Existing pathways allow for mobilising relevant shoreline assessment and clean-up resources within minimum shoreline contact times; therefore, implementing clean-up operations earlier is not expected to result in any additional environmental benefit.	Cooper Energy has demonstrated that optimum shoreline response can be implemented before shoreline contact, and there is no environmental benefit with implementing this control measure; therefore, this control measure is not considered further.	Not Selected
Implement larger initial shoreline assessment and clean-up response	Modelling indicates that shortest time to shore at levels where a shoreline response can be implemented (>100 g/m^2) is within 2 days. Cooper Energy has demonstrated capability to rapidly implement the planned shoreline assessment and clean-up response within the required timeframes. Deploying more resources than are required to clean-up a shoreline can incur additional risks and reduced environmental benefits; therefore, an optimum level of response has been identified, based on modelling outcomes.	As Cooper Energy has access to the required resources, the cost of implementing a larger response will not result in a significant cost. However, because there is no environmental benefit identified with this control measure, it is not considered further.	Not Selected

Additional control measures	Benefit	Cost	Outcome
	If shorelines are cleaned-up too soon and hydrocarbons continue to wash ashore, there is the potential that continued cleaning will sensitise habitats. Therefore, in accordance with International Petroleum Industry Environmental Conservation Association guidance, it is recommended that shoreline clean-up activities are slowly increased to ensure that techniques are effective, and impacts are minimised. Consequently, there is no environmental benefit associated with implementing this control measure.		

7.7.4 Shoreline Assessment and Clean-up Impact and Risk Evaluation

Shoreline assessment and clean-up activities have the potential to result in:

- interactions with shoreline habitats.

7.7.4.1 Cause of the aspect

The following activities associated with shoreline clean-up tactics may interact with shoreline habitats:

- personnel and equipment access to beaches
- shoreline clean-up
- waste collection and disposal.

7.7.4.2 Aspect characterisation

Stochastic modelling indicates that the largest volume of hydrocarbons ashore was 64.8 m^3 with the maximum length of shoreline exposed to hydrocarbons above impact thresholds 6.0 km. Any shoreline clean-up response would be expected to be focused to these areas, and as such disturbance associated with shoreline clean-up tactics would be limited.

Cultural heritage, such as shell middens, may be found in many areas along the Victorian coast; coastal shell middens, charcoal and hearth stones from fires, and items such as bone and stone artefacts are typically located within sheltered positions in the dunes, coastal scrub and woodlands, within rock shelters or on exposed cliff top (Appendix 2). Some site locations may be relatively well known to the general public, others may not be. In the event of a spill threatening shorelines, known sites within the impact area can be identified with the assistance of the State government and through consultation with the appropriate traditional owner groups.

7.7.4.3 Predicted Environmental Impacts and Risks

The potential impacts of these activities are:

- damage to or loss of shoreline habitats
- disturbance to fauna habitat and fauna behaviours
- impacts to cultural heritage values
- temporary exclusion of the public from amenity beaches.

7.7.5 Impact and Risk Evaluation

7.7.5.1 Risk Event: Damage to or loss of shoreline habitats

Inherent Consequence Evaluation

Sandy beaches have been used for the consequence evaluation as they are considered to provide a comprehensive indication of possible worst-case consequences as a result of implementing shoreline response activities (due to presence of potential sensitivities and the invasive nature of techniques such as mechanical collection). This is not to say that sandy beaches themselves are considered more sensitive than other habitats.

Based upon the low viscosity, it is possible that MDO will infiltrate porous shorelines (such as sandy beaches) where it washes onshore rapidly and has not significantly weathered. Consequently, mechanical recovery could be required (resulting in excavation of shorelines). If not done correctly, any excavation of hydrocarbon contaminated materials along the coast could exacerbate beach erosion to a point where its recovery longer term recovery.

Based upon the potential for localised medium-term impacts to shoreline habitats, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7.5.2 Risk Event: Disturbance to fauna habitat and fauna behaviours

Inherent Consequence Evaluation

The noise and general disturbance created by shoreline clean-up activities could potentially disturb the feeding, breeding, nesting or resting activities of resident and migratory fauna species that may be present (such as shorebirds and seabirds). Any erosion caused by responder access to sandy beaches, or the removal of sand, may also bury nests.

On the basis that these disturbances could cause medium term impacts to local populations of shorebirds and seabirds, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7.5.3 Risk Event: impacts to cultural heritage values

Inherent Consequence Evaluation

Cultural heritage sites or artefacts along the shoreline or where equipment is mobilised may be affected by shoreline clean-up response.

Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact/response thresholds, any impacts are likely to be highly localised the response area. As described in Section 7.7.4.2, consultation with state government and traditional owner groups will be undertaken to identify known cultural heritage sites or artefacts. Therefore, potential impacts to cultural heritage sites or artefacts from protect and deflect response are expected (if any) to be localised and short-term. However, if new sites are discovered, potential impact are expected to be localised medium term to conservation values and therefore, the consequence has been ranked as a **Level 3.**

Inherent Likelihood

Given the low likelihood of a significant spill event occurring, and modelling scenarios which indicate shoreline exposure >100 g/m^2 (which is likely to require clean-up effort) has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7.5.4 Risk Event: Temporary exclusion of the public from amenity beaches.

Inherent Consequence Evaluation

The presence of stranded oil and clean-up operations will necessitate temporary beach closures (likely to be weeks but depends on the degree of oiling and nature of the shoreline). This means recreational activities (such as swimming, walking, fishing, boating) in affected areas will be excluded until access is again granted by local authorities. Based upon stochastic modelling that indicates a maximum shoreline impact for concentrations above 100g/m2 is 6.0 km, and as diesel will weather rapidly, clean-up operations are expected to take days-weeks. As such, these impacts would likely result in localised short term impacts social receptors. As such the consequence has been ranked as a **Level 2.**

Inherent Likelihood

Given the low likelihood of the vessel collision event occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a Hypothetical likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7.6 Control Measures, ALARP and Acceptability Assessment

Table 7-19 provides the EIA/ERA for shoreline assessment and clean-up.

Table 7-19 Shoreline Assessment and Clean-up EIA/ERA

ALARP Decision Context and Justification	**ALARP Decision Context A** The implementation of shoreline assessment and clean-up response techniques are standard practice for marine oil spills where there is the potential for shoreline exposures. There is a good understanding of potential impacts and risks from these techniques, and the control measures required to manage these. There is slight uncertainty associated with the potential environmental impacts and risks, which have been evaluated as **Level 3** due to the localised area of disturbance and (conservatively assessed) medium-term impacts associated with these response techniques. No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. As such, Cooper Energy believes **ALARP Decision Context A** should apply.
Control Measure	**Source of good practice control measures**
Maintain shoreline assessment and clean-up capability	Cooper Energy will maintain the required level of response capability to implement a shoreline assessment and clean-up strategy commensurate with the spill events detailed in this EP.
Consultation	• consultation in the event of a spill will ensure that relevant government agencies support the protect and deflect strategy thus minimising potential impacts and risks to sensitivities • engagement with relevant State Agencies and Traditional Owner groups in the event of a spill, with information provided on an as-needed basis, to identify and protect cultural heritage sites from disturbance associated with spill response activities. The Gunaikurnai people were consulted. They would like to be contacted in the event of a spill which could impact shorelines to provide cultural heritage advice/support.
Use of existing tracks and Pathways	Utilising existing tracks and paths where possible will ensure the disturbance footprint associated with the implementation of this response technique is reduced to ALARP.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 3 - Localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function; remedial, recovery over months/year.
Residual Risk Likelihood	The likelihood of a significant event was determined to be Hypothetical (F) (Section 6.8.5). In addition, the small volumes hydrocarbons ashore and associated limited residual fractions indicate implementing this type of technique is low. Thus, the likelihood associated with causing a Level 3 consequence from this technique is considered to **Hypothetical (F)**.
Residual Risk Severity	**Low**
Demonstration of Acceptability	

Principles of ESD	The potential impact associated with this aspect is limited to a localised medium-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 **Level 3** consequence thus 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.
Legislative and other requirements	Legislation and other requirements considered as relevant control measures include: • OPGGS Act 2006 (Cth) • OPGGS Act 2010 (Vic)
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05)
External context	No concerns have been raised to date by Relevant Persons during activity consultation regarding impacts and risks from shoreline assessment and clean-up strategies. As such, Cooper Energy considers that there is broad acceptance of the impacts associated with the activity.
Environmental Performance	
The environmental performance outcomes, standards and measurement criteria for response preparedness and implementation of shoreline clean-up activities are shown in the Offshore Victoria OPEP.	

7.8 Spill Response: Oiled Wildlife Response

7.8.1 Overview

In the event of a hydrocarbon spill, the impacts on wildlife are determined by the types of fauna present, the type of oil spilled and the extent of exposure. A review of the species likely to be present within the EMBA identifies seabirds, shorebirds, marine mammals and reptiles could be affected, and which may necessitate an oiled wildlife response.

Oiled wildlife response consists of a three-tiered approach involving:

- primary: situational understanding of the species / populations potentially affected (ground-truth species presence and distribution by foot, boat or aerial observations)
- secondary: deterrence or displacement strategies (e.g. hazing by auditory bird scarers, visual flags or balloons, barricade fences; or pre-emptive capture)
- tertiary: recovery, field stabilisation, transport, veterinary examination, triage, stabilisation, cleaning, rehabilitation, release.

7.8.2 Resources Required and Availability

Response resources would be activated via AMOSC in the first instance, with equipment and resources selected on the basis of the TRP activation and subsequent IAPs as defined in the Offshore Victoria OPEP.

Cooper Energy will not deploy any resources without first receiving a formal deployment request from relevant Control Agency.

Cooper Energy identified the estimated waste types associated with an Oily Wildlife response technique to understand the response equipment and personnel required to support waste management activities. Table 7-20 provides a conservative indication of the level of waste that may be required to be managed by this activity.

Table 7-20 Estimated Waste Types and Volumes from a BMG Vessel Collision Event

Response Technique	Waste Type	Waste Volume (m3)
Shoreline Clean-up – decontamination stations	Wastewater	1 m^3 per unit (1 bird = 1 unit)
	Personal Protective Equipment	5 kg per unit

The feasibility / effectiveness of an oiled wildlife response is provided in Table 7-21.

Table 7-21 Feasibility/Effectiveness of Shoreline Assessment and Clean-up Response

Parameter	Oiled Wildlife Response
Suitability/Functionality How does the response strategy perform to achieve its required risk reduction?	The oiled wildlife response may lead to the survival of vulnerable wildlife populations. The level of oiled wildlife response required can be scaled based on the predicted number of animals oiled. It is not expected a large-scale wildlife response, given the limited size and nature of the MDO spill.
Dependencies Does the response strategy rely on other systems to perform its intended function?	Operational effectiveness of the oiled wildlife response relies on supporting monitoring information from aerial, vessel and ground surveys. This supporting information can be gathered during daylight hours only.
Availability and limitations Time the response strategy is available to perform its function?	Time to be operational - Once the oiled wildlife facility has been established 24-hour continuous operations are feasible where it is confirmed safe to do so. Under the direction of DEECA personnel, downtime will be planned and managed to ensure appropriate levels of response personnel are maintained and rotated as required or until the response is terminated.

7.8.3 Oiled Wildlife Response ALARP Evaluation

OWR ALARP considerations are included in Table 7-22.

Table 7-22 OWR ALARP Evaluation

Additional control measures	Benefit	Cost	Outcome
Training and competencies	Personnel handling oiled wildlife are trained as fauna handlers or are guided by OWR-trained personnel. During an oil spill there is the potential for fauna to come into contact with floating or stranded oil. If this occurs, State response agencies would lead oiled wildlife response, with Cooper energy providing labour and resources as requested by the controlling agency.	State agencies lead the oiled wildlife response, providing trained personnel, technical expertise and instruction to Cooper energy for support as required, Training additional personnel before an event occurs is not expected to provide any benefit; responders will be given direction from the appropriate agency during an OWR. This option has therefore not been implemented.	Not Selected

7.8.4 Oiled Wildlife Impact and Risk Evaluation

7.8.4.1 Cause of aspect

The activities associated with OWR that have the potential to impact on fauna are:

- hazing of target fauna that may deter non-target species from their normal activities (resting, feeding, breeding, etc.)
- inappropriate handling and treatment that may cause distress, injury or death of target fauna

7.8.4.2 Aspect Characterisation

Stochastic modelling indicates that the largest volume of hydrocarbons ashore was 64.8 m^3 with the maximum length of shoreline exposed to hydrocarbons above impact thresholds 6.0 km. Any oiled wildlife response would be expected to be focused to these areas.

7.8.4.3 Predicted Environmental Impacts and Risks

The potential impacts of this activity are disturbance, injury or death of fauna.

7.8.5 Impact and Risk Evaluation

7.8.5.1 Risk Event: Disturbance, injury or death of fauna.

Inherent Consequence Evaluation

Untrained resources capturing and handling native fauna may cause distress, injury and death of the fauna. To prevent these impacts, only appropriately trained oiled wildlife responders will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species.

It is preferable to have oil-affected animals that have no prospect of surviving or being successfully rehabilitated and released to the environment humanely euthanized than to allow prolonged suffering. The removal of these individuals from the environment has additional benefits in so far as they are not consumed by predators / scavengers, avoiding secondary contamination of the food-web.

Hazing and exclusion of wildlife from known congregation, resting, feeding, breeding or nesting areas may have a short or long-term impact on the survival of that group if cannot access preferred resources. These effects may be experienced by target and non-target species. For example, shoreline booming, or ditches dug to contain oil may prevent penguins from reaching their burrows after they've excited the water and low helicopter passes flown regularly over a beach to deter coastal birds from feeding in an oil-affected area may also deter penguins from leaving their burrows to feed at sea, which may impact on their health.

Due to the potential for localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning, the potential impacts form this activity have been identified as **Level 2**.

Inherent Likelihood

Given the low likelihood of the vessel collision event occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.8.6 Control Measures, ALARP and Acceptability Assessment

Table 7-23 provides the EIA/ERA for OWR activities.

Table 7-23 Shoreline Assessment and Clean-up EIA/ERA

ALARP Decision Context and Justification	**ALARP Decision Context A** The implementation of OWR activities is standard practice for marine oil spills where there is the potential for hydrocarbon exposure to wildlife. There is a good understanding of potential impacts and risks from these techniques, and the control measures required to manage these. There is little uncertainty associated with the potential environmental impacts and risks, which have been evaluated as **Level 2** due to the incidental expected impacts from this response. No objections or concerns were raised during Relevant Persons consultation regarding this activity or its potential impacts and risks. As such, Cooper Energy believes ALARP Decision Context A should apply.
Control Measure	**Source of good practice control measures**
Maintain Oiled Wildlife Response capability	Offshore Victoria OPEP. Cooper Energy will maintain the required level of response capability to implement an OWR strategy commensurate with the spill events detailed in this EP.
Consultation	• consultation in the event of a spill will ensure that relevant government agencies support the protect and deflect strategy thus minimising potential impacts and risks to sensitivities

	• engagement with relevant State Agencies and Traditional Owner groups in the event of a spill, with information provided on an as-needed basis, to identify and protect cultural heritage sites from disturbance associated with spill response activities. The Gunaikurnai people were consulted. They would like to be contacted in the event of a spill to provide cultural advice/support.
Use of existing tracks and Pathways	Utilising existing tracks and paths where possible will ensure the disturbance footprint associated with the implementation of this response technique is reduced to ALARP.
Trained fauna handlers will handle wildlife (unless different direction is received from State agency)	Wildlife is only approached or handled by State agency trained oiled wildlife responders unless formal direction is received from the Government IMT. Cooper Energy response personnel are advised of wildlife interaction restrictions through site safety inductions.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 2 - Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days/weeks.
Residual Risk Likelihood	The likelihood of vessel collision event was determined to be Hypothetical (F) (Section 6.8.5). In addition, the small volumes hydrocarbons ashore indicate implementing this type of technique is low. Thus, the likelihood associated with causing a Minor Impact from this technique is considered to be **Hypothetical (F).**
Residual Risk Severity	**Low**
Demonstration of Acceptability	
Principles of ESD	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 **Level 2** consequence thus 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.
Legislative and other requirements	Legislation and other requirements considered as relevant control measures include: • OPGGS Act 2006 (Cth) • OPGGS Act 2010 (Vic) • EPBC Act 1999 and EPBC Regulations 2000 • *Emergency Management Act 2013* (Vic) • *Wildlife Act 1975* (Vic) Oil Spill Response Technical Guidelines: The adopted controls have been guided by the following technical guides: • Wildlife Response Preparedness (IPIECA 2014). • State Maritime Emergencies (non-search and rescue) Subplan (State of Victoria (Department of Transport) 2021).
Internal context	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05)
External context	No concerns have been raised to date by Relevant Persons during activity consultation regarding impacts and risks from OWR strategies. As such, Cooper Energy considers that there is broad acceptance of the impacts associated with the activity.
Environmental Performance	
The environmental performance outcomes, standards and measurement criteria for response preparedness and implementation of OWR activities are shown in the Offshore Victoria OPEP.	

8 Environmental Performance Outcomes, Standards and Measurement Criteria

This section summarises the EPOs, EPSs, and CMs that have been developed as part of a systematic approach to the management of environmental risks as identified in Section 6. The EPOs, EPSs and measurement criteria related to the Gippsland Offshore Operations are shown in Table 8-1. Key responsible and accountable personnel who will ensure the EP is implemented and records of implementation retained is also shown.

The following legislative and guideline definitions are used in this section:

- EPOs: a measurable level of performance required for the management of the environmental aspects of the activity to ensure the environmental impacts or risks will be of an acceptable level
- EPSs: a statement of performance required of an adopted control measure
- measurement criteria: defines the measure by which environmental performance will be measured to determine whether the EPO has been met.

Table 8-1 Environmental Performance Outcomes, Standards and Measurement Criteria

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	CM1: Marine exclusion and caution zones	Permanent PSZs shall be gazetted.	PSZ gazetted notice	Operations Manager	Operations
		Subsea infrastructure is marked on navigational charts.	Navigational charts	Operations Manager	Operations
		500 m safety exclusion or caution zone around vessels undertaking petroleum activities to be requested via Notice to Mariners.	Completed Notice to Marines request	Project Manager	IMR
	CM2: Pre-start notifications	The AHS and/or Transport Safety Victoria will be notified no less than four working weeks before operations commence to enable Notices to Mariners to be published.	Email records	Project Manager	IMR
		AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning.	Email records / Daily report	Vessel Master	IMR
	CM3: Marine Order 27 Safety of navigation and radio equipment	Vessels shall meet the safety of navigation and radio equipment requirements of AMSA Marine Order 27.	Vessel inspection records	Vessel Master	IMR
	CM4: Ongoing consultation	Notifications for any on-water activities and ongoing consultations undertaken as per Section 10 (Consultation).	Notification records	Project Manager	Operations IMR
	CM5: Fisheries Damage Protocol	Fisheries Damage Protocol in place to provide a compensation mechanism to fishers who damage fishing equipment on PB and Sole assets infrastructure outside of the PSZ.	Fisheries Damages Protocol	Chief Operating Officer	Operations IMR
	CM6: Marine Order 30: Prevention of collision	Navigation, radar equipment, and lighting meets the Marine Order 30 requirements	Vessel inspection records	Vessel Master	IMR
	CM7: Marine Order 21: Safety and emergency arrangements	Vessels shall meet the requirements for safety and emergency arrangements of the Marine Order 21.	Vessel inspection records	Vessel Master	IMR
	CM8: Decommissioning protocol	Decommissioning planning and scheduling shall be progressed in accordance with the Cooper Energy Decommissioning Protocol and decommissioning and end states accepted by the relevant regulator.	Decommissioning Plans	Operations Manager	Operations
EPO2: No serious or irreversible harm to a threatened or migratory listed species. **EPO3:** Biologically important behaviours can continue while the	CM6: Marine Order 30: Prevention of collision	Navigation, radar equipment, and lighting meets the Marine Order 30 requirements	Vessel inspection records	Vessel Master	IMR
	CM9: Planned Maintenance System	Critical equipment on vessels will be maintained in accordance with preventative maintenance system to ensure efficient operation including: • combustion equipment (vessels) • thrusters (vessels)	Planned Maintenance System records	Vessel Master	IMR

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
activity is being undertaken. EPO5: No substantial and unrecoverable change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. **EPO6:** No substantial and unrecoverable changes to seabed or shorebird which may adversely impact on biodiversity, ecological integrity, social amenity or human health. **EPO7:** Reduce anthropogenic threats to allow for blue whale and southern right whale conservation status to improve so that they can be removed from the EPBC Act threatened species list, consistent with the objectives and specific actions of the species' recovery plans.		• equipment used to treat discharges to AMSA standards (vessel)			
	CM10: Emissions and Discharge Standards	Prior to commencing the offshore activity, the following will be verified, as relevant to vessel class: • Low-sulphur (<0.5% m/m) marine-grade diesel used • Valid International Air Pollution Prevention certification and International Energy Efficiency Certificate • Active Ship Energy Efficiency Management Plan • Vessel NOx emissions levels meet Regulation 13 MARPOL 73/78 Annex VI.	International energy efficiency certificate Bunker receipts Ship Energy Efficiency Management Plan records Certification	Vessel Master	IMR
		Bilge water treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	Oil record book	Vessel Master	IMR
		• Sewage discharged at sea is treated via a MARPOL (or equivalent) approved sewage treatment system. • Food waste only discharged when: - vessel is en-route and >12 nm from land or - food waste is communited or ground to <25 mm and vessel is en route and >3 nm from land.	Certification documentation	Vessel Master	IMR
	CM11: Cooper Energy Offshore Chemical Assessment Procedure	Project chemicals will meet the requirements of the Cooper Energy Offshore Chemical Assessment Procedure.	Completed and approved chemical assessment	Project Manager	Operations IMR
	CM12: Monitoring of hydraulic fluid use	Hydraulic fluid reservoirs alarm systems will notify in the event of excessive fluid use. This is supplemented by periodic checks of fluid tank levels.	Hydraulic fluid monitoring records	Operations Manager	Sole operations
	CM13: EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans and Victorian (Marine Mammals) Regulations 2019	• Vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations within respective jurisdictions, as a minimum, and shall report vessel interactions with dolphins and whales. An extended 500 m Caution Zone shall apply to whales. • Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on • Marine mammal sightings will be recorded and submitted to DCCEEW. Sightings will be reported as per Section 9.13.4.	Daily operations report details when whales and dolphins sighted, and the interaction management actions were implemented, if required	Vessel Master	IMR
	CM14: Whale Disturbance Risk	The Whale Disturbance Risk Management Procedure will be implemented . Provisions include:	Noise modelling report Daily reports and / or observation sheets	Project Manager	IMR

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
	Management Procedure	• establishment of a communications protocol between observers, IMR vessel master and project team • induction of observers to observation, communication and response requirements When vessel activity noise exceeds behavioural disturbance thresholds within southern right whale habitat critical to survival or blue whale foraging area, at times when the species are expected to be in the area: - Dedicated MMO for the hours of daylight (defined as sunset to sunrise). A 2nd MMO where necessary if daylight extends beyond 12 hours period. - Dedicated MMOs shall have demonstrated prior experience in the identification of large baleen whales, distance estimation and systems of recording and reporting - Inducted crew observers to support dedicated MMO during rest breaks - Application of whale observation and noise shutdown zones with radius equivalent to the behavioural disturbance thresholds of the vessel - Pre-DP start observation for the 30 minutes prior to commencing DP for the planned activity. DP will not commence until southern right or blue whales are not observed within the shutdown zone or are observed departing the shutdown zone. Where a southern right or blue whale is sighted within the shutdown zone, the vessel will: - Suspend DP operations when safe to do so (as determined by vessel master or delegate in command) - Adopt favourable heading to reduce thruster load (and associated noise) and slowly increase separation from whale if safe to do so (as determined by vessel master or delegate in command) - Apply 30-minute pre-start observations before recommencing DP for the planned activity - Operations using DP at night will be avoided where three or more separate sightings of southern right whales or blue whales have occurred within the vessel shutdown zone in the 3 hours prior to sunset, if safe to do so (as determined by vessel master or delegate in command).	Campaign induction records MMO experience records		

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
	CM15: Deployment and recovery procedures	Dropped objects will be recovered following the deployment and recovery procedures.	Records show that deployment and recovery procedures were implemented	Vessel Master	IMR
	CM16: Waste Management Practices	• Vessels are required to implement a Garbage Management Plan that complies with Annex V of MARPOL • Waste hierarchy is applied to project wastes • Waste with potential to be windblown shall be stored in covered containers • Waste lost overboard is recorded and recovered if possible • Waste transfers are recorded.	Garbage management plan Waste transfer records	Vessel Master	IMR
	CM17: Vessel compliant with MARPOL Annex I, as appropriate to class (i.e. SMPEP or equivalent).	• Vessel has a SMPEP (or equivalent appropriate to class) which is: - implemented in the event of a spill to deck or ocean - exercised according to the vessels exercise schedule. • Spill response kits are located in high spill risk areas and routinely checked to ensure adequate.	Vessel SMPEP Vessel exercise schedule Vessel inspection	Vessel Master	IMR
	CM18: Containment	Materials and equipment that have the potential to spill onto the deck or ocean are within a contained area.	Vessel inspection	Vessel Master	IMR
	CM19: Pre-campaign risk review (light)	A pre-campaign risk review will include an assessment against the National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) and additional controls will be implemented where required according to the relevant species conservation management plans.	Completed Risk Review Records	Project Manager	IMR
	CM20: Offshore Scope of Work	No equipment laydown or anchoring within the known sponge and bryozoan habitat on the seabed at water depth >40 m along the PB pipeline.	Offshore Scope of Work	Project Manager	IMR
	CM21: Installation Procedure	Installation procedures shall be developed which take into account seabed relief, sensitive seabed features and underwater cultural heritage. Equipment will be placed according to procedures.	Installation procedure	Project Manager	IMR
	CM22: pre-IMR Campaign Risk Review (noise)	A campaign risk review, as detailed in Section 9.10, will be undertaken prior to the activity commencing, to identify an environmental window where risks to endangered whales from underwater sound disturbance are avoided where practicable, and to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. The resulting activity schedule will, during peak and shoulder seasons for respective species:	Campaign Risk Review report Campaign Operations Report / Schedule	Project Manager	IMR

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
		• avoid intrusion of activity vessel noise (above behavioural disturbance threshold) into preferred calving and nursing areas (<10 m water depth) within 1 km of the coastline when occupied by pregnant or nursing southern right whales. • Operate vessels at speeds <10 knots within operational areas overlapping with southern right whale preferred calving and nursing areas (<10m water depth) within 1km of the coastline.			
	CM23: Cooper Energy IMS Risk Management Protocol	Prior to and during operations the Cooper Energy IMS Risk Management Protocol will be implemented for all vessels and submersible equipment and will consider all regions visited (international and domestic). Further information on the Cooper Energy IMS Risk Management Protocol is provided in Section 9.9.	Completed IMS Risk Assessments	Project Manager	IMR
	CM24: Australian biofouling management requirements	Prior to operations all international vessels must demonstrate compliance of the Australian Biofouling Management Requirements.	Biofouling management plan or equivalent	Vessel Master	IMR
	CM25: Marine Order 31: Vessel surveys and certification	Vessels will meet survey, maintenance and certification of regulated Australian vessels as per AMSA Marine Order 31.	Vessel certification	Vessel Master	IMR
	CM26: ROV pre-dive Inspections	ROV pre-dive inspection confirms if PB and Sole assets are in good condition.	ROV checklist	ROV Operator	IMR
	CM27: NOPSEMA accepted WOMP	A NOPSEMA-accepted WOMP will be in place for the activity. The WOMP includes, as applicable to the activity: • Cooper Energy well management standards • a description of well barriers • performance and testing criteria.	Records confirm a NOPSEMA-accepted WOMP Implementation records	Well Engineering Manager	Operations
	CM28: Accepted safety case	Activities will be managed in accordance with the accepted safety case.	Accepted Safety Case in place. Implementation records	Project Manager	Operations IMR
	CM29: Asset IMP	Each asset has an Asset IMP that details the frequency, management, monitoring, mitigation and inspection activities determined necessary to ensure integrity is maintained for the infrastructure.	Asset IMP in place. Implementation records	Chief Operating Officer	Operations
	CM30: SIMOPS	A SIMOPS will be implemented if multiple vessels are required during emergency response.	SIMOPS implementation records	Project Manager	Operations

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
	CM31: CEMS MS11 Supply Chain and Procurement management. Supplier Assessments.	Vessel selection process includes consideration of: • vessels with silent notation where tendered • relative nature/scale of potential subsea noise impacts from vessels tendered.	Vessel specifications and evaluations.	Project Manager	IMR
	CM46: Vessel speed	When travelling through the southern right whale reproduction BIA vessel speed will be limited to <10 knots.	Vessel inspection records	Vessel Master	IMR
	CM47: Concurrent operations	A concurrent operations plan will be implemented if other petroleum activities are scheduled in close proximity of Gippsland Operations activities.	Concurrent operations plan implementation records	Project Manager	Operations
EPO8: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity.	CM10: Emissions and Discharge Standards	Prior to commencing the offshore activity, the following will be verified, as relevant to vessel class: • low-sulphur (<0.5% m/m) marine-grade diesel used • valid International Air Pollution Prevention certification and International Energy Efficiency Certificate • active Ship Energy Efficiency Management Plan • vessel NOx emissions levels meet Regulation 13 MARPOL 73/78 Annex VI.	International energy efficiency certificate Bunker receipts Ship Energy Efficiency Management Plan records Certification	Vessel Master	IMR
EPO9: Manage direct and indirect GHG emissions from the Gippsland Offshore Operations consistent with Australia's international GHG emissions commitments, as outlined in the *Climate Change Act 2022 (Cth)* and the *Climate Change Act 2017 (Vic)*	CM10: Emissions and Discharge Standards	Prior to commencing the offshore activity, the following will be verified, as relevant to vessel class: • low-sulphur (<0.5% m/m) marine-grade diesel used • valid International Air Pollution Prevention certification and International Energy Efficiency Certificate • active Ship Energy Efficiency Management Plan • vessel NOx emissions levels meet Regulation 13 MARPOL 73/78 Annex VI.	International energy efficiency certificate Bunker receipts Ship Energy Efficiency Management Plan records Certification	Vessel Master	IMR
	CM31: CEMS MS11 Supply Chain and Procurement management. Supplier Assessments	GHG emission reduction initiatives are considered in the contractor evaluation process for IMR and support vessels.	Tender scope of work Tender evaluation forms	Project Manager	IMR
	CM32: OGP Leak Detection and Repair Program	Gas Leak Detection and Repair Program is implemented at OGP.	OGP Maintenance Management System Fugitive Gas Emissions Testing Record	Operations Manager	Operations
	CM33: Emissions Forecasting	Emissions forecasts are integrated with production within Cooper Energy's Portfolio process.	Annual emissions forecast	Chief Corporate Services Officer	Operations

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
	CM34: OGP production metering	Fuel gas use, production and sales volumes are metered at the OGP, informing emissions accounts.	Monthly emissions report	Operations Manager	Operations
	CM35: Monitoring and reporting of emissions	Routine reporting of actual emissions vs budget emissions to Executive.	Weekly Board update report	Chief Corporate Services Officer	Operations
	CM36: Emissions Reduction Protocol	Emissions Reduction Protocol is implemented for Gippsland Offshore Operations, with focus on onshore gas processing, to: • identify and assess emissions reduction opportunities • establish business case metrics • inform capital allocation.	Marginal Abatement Cost Curve Emissions Reduction Workshop records	Chief Operating Officer	Operations
	CM37: Cooper Energy carbon neutrality	Offset Cooper Energy's controllable emissions associated with the Gippsland Offshore activity.	Annual carbon account Carbon offset retirement records	Chief Corporate Services Officer	IMR Operations
	CM38: pre-IMR Campaign Risk Review (GHG emissions)	A campaign risk review will be undertaken prior to the activity commencing. It will include a review of the campaign emissions profile and management to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. The review will be undertaken prior to an IMR activity commencing to assess new or updated regulatory requirements.	Campaign Risk Review report	Project Manager	IMR
	CM39: NGER Scheme Reporting	GHG emissions are reported annually in accordance with NGER regulatory requirements.	NGER Reports	Environment & Sustainability Manager	IMR Operations
	CM40: Domestic customer base	All gas and condensate from Gippsland Offshore Operations is sold to domestic customers.	Gas sales agreements Annual Report	Chief Commercial Officer	Operations
	CM41: Customer engagement on emissions intensity	Lifecycle emissions intensity of Cooper Energy gas is communicated with customers to promote discussion around compensation for emissions associated with downstream distribution and combustion of gas by customers.	Sustainability Report Customer meeting records	Chief Commercial Officer	Operations
	CM42: Environment & Sustainability Risk Review	Cooper Energy's Functional Environment & Sustainability Risk Register considers the risk of customers becoming mis-aligned with National emissions reduction strategies. The Risk Register is on an annual review cycle and is reported to the Executive.	Environment & Sustainability Risk Register	Environment & Sustainability Manager	Operations
EPO10: Impacts to values and sensitivities are minimised in the event of a loss of hydrocarbons.	CM6: Marine Order 30: Prevention of collision	Navigation, radar equipment, and lighting meets the Marine Order 30 requirements	Vessel inspection records	Vessel Master	IMR
	CM43: SCERP	Source control is part of the first actions taken to minimise the volume of hydrocarbon released and therefore reduce potential impacts and risks to the environment.	Records confirm that source control response activities have been	Incident Controller (IC)	Operations

EPO	Control	EPS	Measurement Criteria	Responsible Person	Activity
			implemented in accordance with the SCERP.		
	CM44: OPEP	• emergency spill response capability is maintained in accordance with the OPEP. • emergency response activities will be implemented in accordance with the OPEP.	Records confirm that emergency response activities have been implemented in accordance with the OPEP.	IC	Operations IMR
	CM45: 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.	IC	Operations IMR

9 Implementation Strategy

Cooper Energy retains full and ultimate responsibility as the Titleholder of the activity and is responsible for ensuring that the Gippsland Offshore Operations and associated activities are implemented in accordance with the performance outcomes outlined in this EP.

The Regulations require that an implementation strategy must be included in an EP. The Implementation Strategy described in this section provides a summary of the CEMS.

9.1 Cooper Energy Management System

The CEMS is Cooper Energy's integrated system which consolidates all of Cooper's business processes into one system of management, to manage every aspect of Cooper Energy's business (such as HSEC, Operations, Well Construction, Engineering and Finance) in accordance with a set of core concepts (Table 9-1).

The CEMS document hierarchy is shown in Figure 9-1 and CEMS standards list in Table 9-2. The Cooper Energy's HSEC Policy is shown in Figure 9-2.

Table 9-1: Cooper Energy's Management System Core Concepts

Core concepts	
People	• how we organise (line and function) • which roles we need • which skills we need • how we build and sustain capability
Culture	• why we exist • what we value • how we work together • how we communicate
Process	• what we do • how we do it • how we learn • how we continuously improve
Technology	• which tools we use • how we use them • how we support people to perform their role
Governance	• how we manage risk • how we make decisions • how we ensure safety, quality and technical integrity

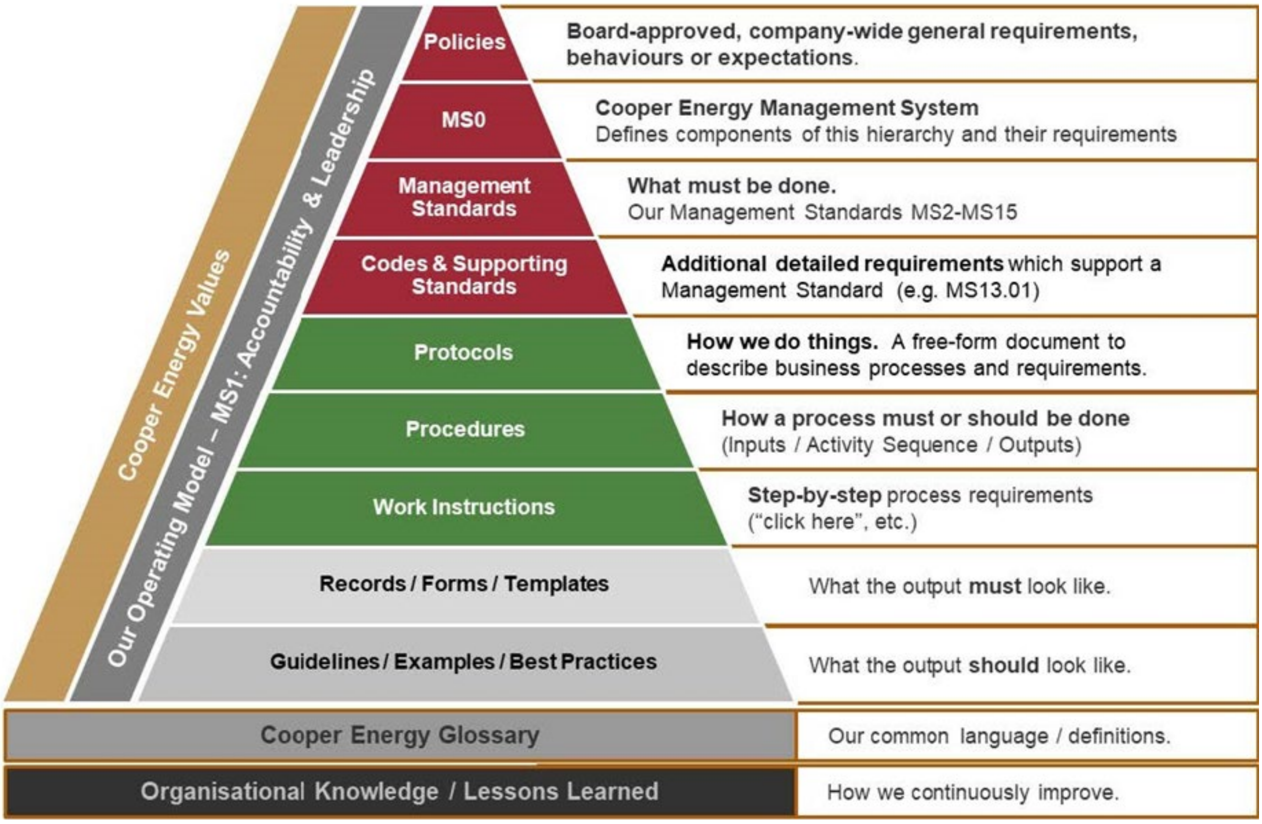


Figure 9-1: CEMS Document Hierarchy

Table 9-2: CEMS Standards

CEMS Standard	Focus Area
MS00	Statement of Intent and Expectations
MS01	Accountability and Leadership
MS02	People Management
MS03	Risk Management
MS04	Strategy and Planning Management
MS05	External Affairs, Investor Relations, Community and Stakeholder Management
MS06	Information Systems
MS07	Operations Management
MS08	Technical Management
MS09	Health, Safety and Environment Management
MS10	Incident and Crisis Management
MS11	Supply Chain and Procurement Management
MS12	Technical Assurance and Compliance Management
MS13	Financial Management
MS14	Commercial Marketing and Economics Management
MS15	Asset Lifecycle Management

Health, Safety and Environment Policy

Cooper Energy | HSEC | Policy

This policy describes our approach to managing Health, Safety and Environmental risks at Cooper Energy

Our Commitment

Cooper Energy is committed to taking all reasonably practicable steps to protect the health and safety of our workers, contractors, partners, and the communities in the areas where we operate.

In addition, we will ensure our business is conducted in an environmentally responsible manner.

Our Actions

We will:

- **Integrate** health, safety and environmental requirements into our daily work, our business planning and our decision making
- **Comply** with all relevant health, safety and environmental laws and regulations
- **Provide** resources and systems to enable delivery of our health, safety and environmental objectives
- **Identify, control and monitor** risks that have the potential to harm people and the environment to as low as reasonably practical
- **Empower** our people, regardless of position, to "Stop the Job" if they consider it necessary to prevent harm to themselves, others or the environment
- **Consult, communicate and promote participation** of our workforce to build and maintain a strong health, safety and environment culture
- **Ensure** all employees and contractors are trained, competent and suitably supervised so that works are undertaken in a safe and environmentally responsible manner
- **Collaborate** proactively with our stakeholders and the communities where we operate
- **Investigate and learn** from our incidents and from those in our industry
- **Set, measure and monitor** health, safety and environmental targets to drive continuous improvement in our performance
- **Report** publicly and transparently on our health, safety and environmental performance

Governance

The HSE Improvement Forum has oversight of this policy. The Managing Director is accountable for communicating this Policy and for ensuring compliance with its undertakings. All Executive Leadership Team members and Managers shall ensure the effective implementation, management and monitoring of our HSE Management System and its subsequent outcomes.

All Staff are responsible for compliance with our policy, standards, and procedures.

This policy will be reviewed at appropriate intervals and revised as necessary to keep it current.

Policy authorised by

Jane Norman
Managing Director & CEO
Date: 13 July 2023 Review Date: 13 July 2026

Figure 9-2: Cooper Energy Health, Safety, Environment and Community Policy

9.2 Asset Integrity Management

Section 572(2) of the OPGGS Act (Cth) and Section 621(2) of the OPGGS Act (Vic) require titleholders to maintain in good condition and repair all structures that are, and all equipment and other property that is in the title area and is used in connection with operations. The integrity of all Cooper Energy Assets is managed in line with MS08: Technical Management.

The Well Operations Management Plans describe the well integrity management, controls, verification, and maintenance for well activities in the Gippsland Offshore Operations. Well integrity is demonstrated through the maintenance of a primary and a secondary well barrier envelope. The WOMP details the well barrier elements and performance standards and their implementation through the well life cycle.

The Facility Integrity Management Plan describes how Cooper Energy manages integrity of the Gippsland offshore assets, utilising the Plan-Do-Act-Check cycle. The overall strategy is to maintain the assets as close to their design condition as possible. Accordingly, the integrity of the Gippsland offshore assets is maintained and monitored in a number of ways, including:

- design, pressure containment and primary protection functions:
  - design basis and documentation
  - protection and support structures
  - external corrosion protection system
  - internal corrosion control system
  - restriction and safety zone systems
  - intervention procedures
  - pipeline integrity reviews
- monitoring and inspection:
  - marine activity monitoring
  - weather (exceedance) monitoring
  - ROV visual and CP inspection
  - Relevant Persons engagement (facility awareness).

This approach is preferred to ‘controlled deterioration’ as it attempts to maintain enough control effectiveness to prevent ‘surprise’ deterioration threatening integrity, acknowledges that individual control effectiveness will not always be perfect and provides operational flexibility for decommissioning options.

9.3 Project Planning

Activities such as IMR, new stages and decommissioning are planned and executed in accordance with MS15: Asset Lifecycle Management. Cooper Energy uses a gated process; the process workflow is divided into phases (Figure 9-3). Each phase is subject to assurance processes and a gate review, the outcomes of which include continue, stop, hold, or recycle.

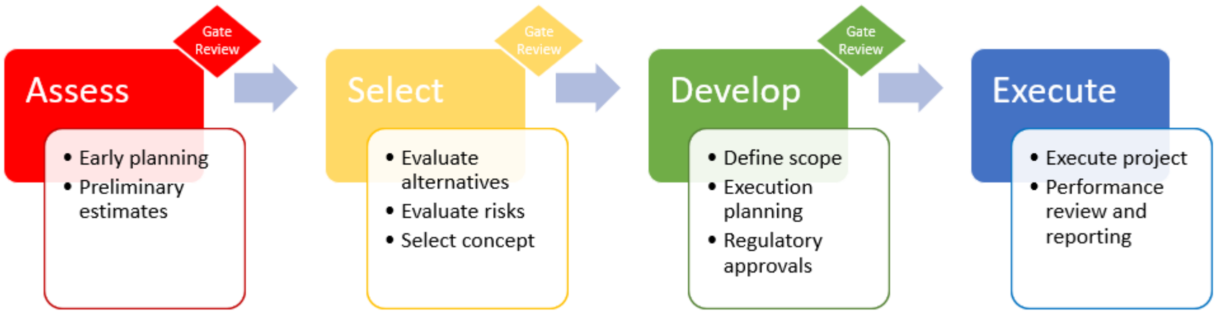


Figure 9-3: Project Workflow

9.3.1 Decommissioning Planning

Decommissioning of an asset involves permanently sealing wells, deconstruction and removal (base case), processing of materials, reagents, waste and infrastructure associated with the operations, and rehabilitation of the area.

Section 572(3) of the OPGGS Act (Cth) and Section 621(3) of the OPGGS Act (Vic) require titleholders to remove all equipment and other property in their title area that is neither used, nor to be used, in connection with operations. This obligation is ongoing and covers both the removal of equipment and property at the end of production and the removal of disused infrastructure at appropriate points throughout the life of an asset.

Cooper Energy's Decommissioning Protocol acknowledges legislative requirements and illustrates the company's management system for integrating decommissioning planning across operations. The Protocol outlines roles and responsibilities, along with requirements for decommissioning planning for onshore and offshore assets and associated financial provisions.

The objectives of this protocol are to:

- define the requirement for decommissioning as part of the lifecycle of assets
- define the requirement for a decommissioning plan to be developed and maintained for each asset, or group of assets within an operational area. The decommissioning plan must consider, where practical, progressive decommissioning of assets when equipment is not intended to be returned to operation
- define the requirements for financial provisions to ensure decommissioning is completed in accordance with the decommissioning plan and that appropriate provisions are allocated for non-operated assets.

Options for other than the complete removal of all property may be considered, in which case the decommissioning plan must demonstrate that the alternative delivers equal or better environmental outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements. Therefore, for the purposes of planning, full removal must be the base case until an alternative end-state is accepted by the regulator.

Where onshore treatment and disposal of wastes is to be undertaken as a component of decommissioning, management of this waste must be in accordance with the respective legislation of the States or Territory. Depending on the remaining operational life, this may require specific plans for:

- waste management
- licensing and regulation of waste transport, storage, treatment, resource recovery and disposal.

As identified in Table 3-5, re-lifing options are being explored for the PB field. A decision tree for returning Patricia-2 and Baleen-4 to production or planning for accelerated well abandonment is presented in Figure 9-4. The basis for the decision tree is to produce the remaining proven reserves from Baleen-4 and Patricia-2 if it is technically and economically viable. Should a deviation of Section 572 of the OPGGS Act (Cth) and/or Section 621 of the OPGGS Act (Vic) be required, approval from the relevant regulator will be sought. A Control Measure (CM8 Decommissioning Protocol) and associated performance standard and measurement criteria have been included within Section 8.

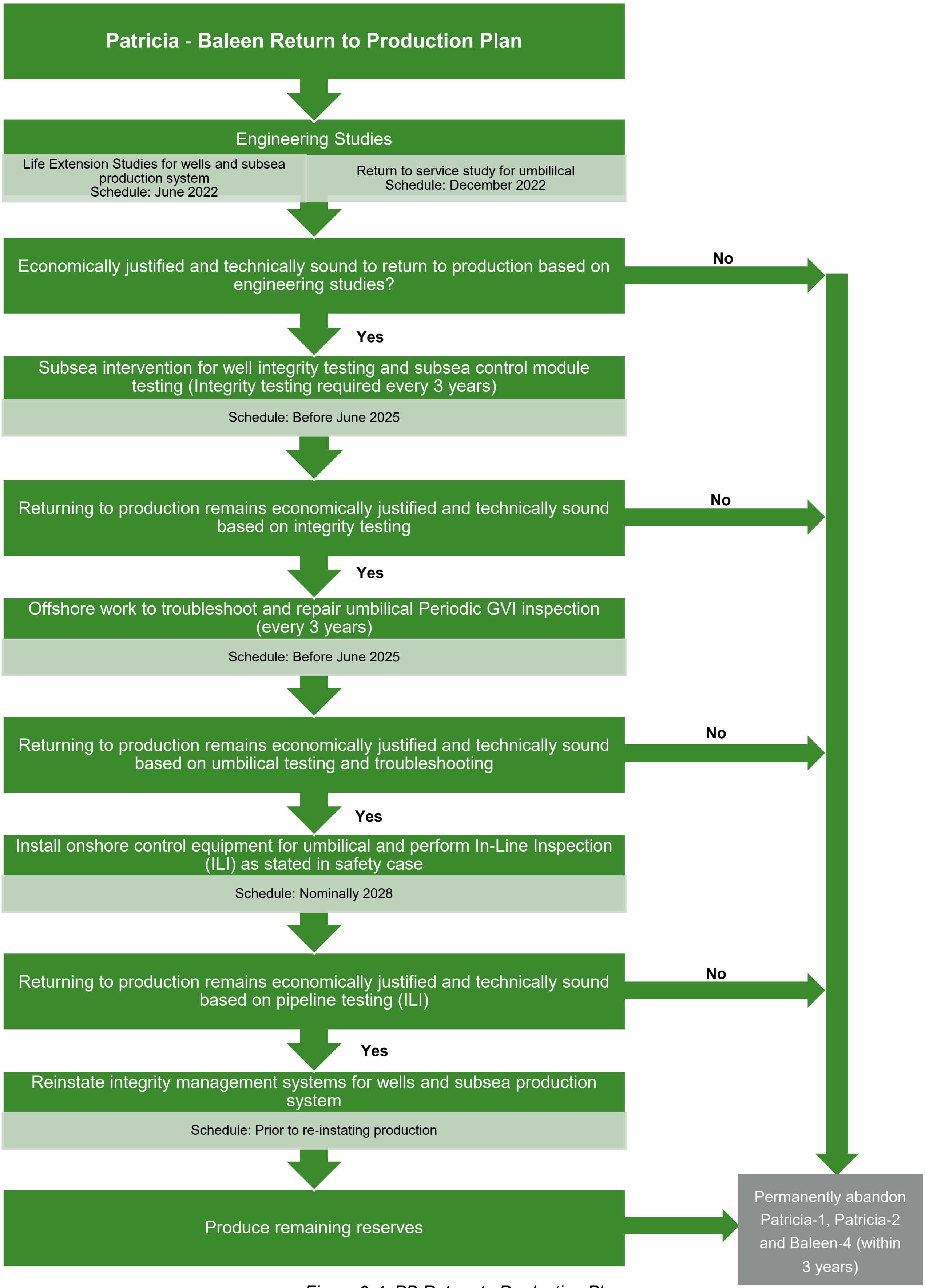


Figure 9-4: PB Return to Production Plan

9.4 Contractor Management

The Supply Chain and Procurement Management Standard (MS11) details Cooper Energy's contractor management system which provides a systematic approach for the selection and management of contractors to ensure any third party has the appropriate safety and environment management system and structures in place to achieve HSEC performance in accordance with Cooper Energy's expectations.

MS11 applies to sub-contractors, Third Party Contractors (TPCs) and suppliers conducting work at Cooper Energy sites or providing services to Cooper Energy. The Standard addresses operational HSEC performance of all contractors while working under a Cooper Energy contract or in an area of Cooper Energy responsibility or which may be covered under the HSEC Management System. The key HSEC steps in MS11 include:

- planning – HSEC assessment of potential contractors, suppliers and/or TPCs
- selection – submission and review of contractors and/or TPCs HSEC management data
- implementation – onsite contractors and/or TPCs HSEC requirements including induction and training requirements
- monitoring, review and closeout – ongoing review of contractors and/or TPCs HSEC performance including evaluation at work handover.

Prior to Contractor commencement of operations, contractors must have in place a Cooper Energy approved HSE Management System that meets minimal regulatory requirements and ensures compliance with this EP.

Cooper Energy will undertake an on-hire inspection of the relevant vessel against EP requirements. Cooper Energy shall also provide primary contractors with this EP and EP commitments register, inclusive of the EPOs and EPSs established in this plan. This is one of a number of means to ensure contractors are aware of, and comply with, EP requirements.

9.5 Organisational Structure, Roles and Responsibilities

As required by the Regulations, this section outlines the chain of command (Figure 9-5) and roles and responsibilities. Table 9-3 details the roles and responsibilities of personnel in relation to the implementation, management and review of this EP. The emergency response structure for the activity is detailed in the Offshore Victoria OPEP.

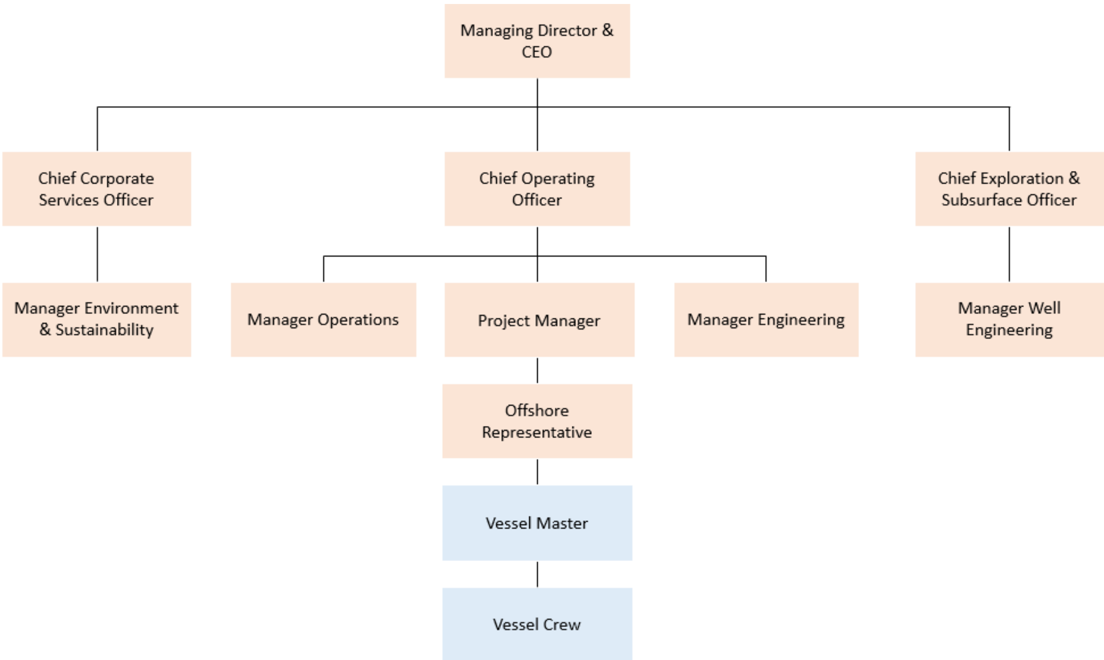


Figure 9-5: Cooper Energy Otway Offshore Operations Organisational Structure

Table 9-3: Cooper Energy Environment Plan Roles and Responsibilities

Role	Responsibilities
Cooper Energy	
Managing Director & CEO	The Managing Director is accountable for ensuring a framework has been established through which the Management System requirements will be met.
Chief Corporate Services Officer	Ensures: • Cooper Energy's Emergency Response preparedness is appropriate for the risks posed by the activity • Emergency Response Training, Competency and Testing is commensurate to the risks associated with the current offshore activity.
Chief Operating Officer	Ensures: • compliance with the Cooper Energy HSEC Policy and Management System • audits and inspections to verify HSEC and integrity performance are scheduled and undertaken • adequate resources are in place to meet the requirements within the EP and OPEP • adequate emergency response capability is in place • incidents and non-conformances are recorded, reported and investigated.
Chief Exploration, Subsurface Officer	Ensures: • compliance with the Cooper Energy HSEC Policy and Management System • audits and inspections to verify HSEC and integrity performance are scheduled and undertaken • adequate resources are in place to meet the requirements within the EP and OPEP • adequate emergency response capability is in place • incidents and non-conformances are recorded, reported and investigated.
	•
Manager Environment & Sustainability	Ensures: • identify and communicate relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP and OPEP to the Operations Manager, Project Manager and Offshore Representative • develop the environmental component of inductions (Section 9.6.3) • maintain and test oil spill response arrangements (Section 9.7.2) • assess any environmentally relevant changes (Section 9.11.3) • review any non-conformances relevant to environment performance to ensure corrective actions are appropriate to prevent recurrence (Section 9.13.6) • prepare and submit environmental incident reports and performance reports to regulators (Section 9.12 and 9.13).
Manager Operations	Ensures in relation to respective area of responsibility (Operations / offshore IMR): • compliance with the Cooper Energy HSEC Policy • compliance with this EP and controls are implemented • contractor prequalification and qualification processes are undertaken (Section 9.4) • personnel are inducted with EP requirements and are aware of their environmental responsibilities (Section 9.6.1) • response arrangements in the OPEP are in place and tested (Section 9.7.2) • environmentally relevant changes are assessed and approved by Cooper Energy (Section 9.11) • environmental incidents are reported internally and externally where required, and investigations undertaken (Section 9.12)
Project Manager	Ensures: • compliance with the Cooper Energy HSEC Policy • compliance with this EP and controls implemented • environmental approvals are in place for the activity to be undertaken (Section 2) • contractor prequalification and qualification processes are undertaken (Section 9.4) • personnel are inducted into this EP requirements and are aware of their environmental responsibilities (Section 9.6.1) • response arrangements in the OPEP are in place and tested prior to the survey commencing (Section 9.7.2) • environmentally relevant changes are assessed and approved by Cooper Energy (Section 9.11)

Role	Responsibilities
	• environmental incidents are reported internally and externally, and investigations undertaken (Section 9.12) • inspections and audits are undertaken (Section 9.13.5) • actions from environmental audits and incidents are tracked to completion (Section 9.13.5.1) • Relevant Person activity pre-start and cessation notifications undertaken (Section 10) • annual progress reporting in accordance with General Direction 824.
Manager Engineering	Ensures: • compliance with relevant statutory and CEMS requirements. • facility Integrity Management Plans are developed, maintained and implemented. • integrity monitoring systems are maintained.
Manager Well Engineering	Ensures: • compliance with relevant statutory and CEMS requirements. • well integrity management plans are developed, maintained and implemented.
Offshore Representative	Ensures: • compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP • inductions are completed, and record of attendance maintained (Section 9.6) • chemicals that have the potential to be discharged to the marine environment are assessed and approved using the Cooper Energy's Offshore Chemical Assessment Procedure (Section 9.8) • environmentally relevant changes are assessed and approved by Cooper Energy (Section 9.11) • incidents are reported to the Cooper Energy Project Manager (Section 9.12) • monitoring and other records (Section 9.13) are collated and provided to the Cooper Energy Project Manager on completion of the program • HSEC inspections are undertaken throughout the offshore activity to ensure ongoing compliance with the EP requirements (Section 9.13.5) • corrective actions identified from incidents or inspections are implemented (Section 9.13.6).
Contractors	
Vessel Master	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.
Vessel Crew	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.

9.6 Training and Awareness

The Regulations require that the implementation strategy detail measures to ensure each employee or contractor working on, or in connection with, the activity is aware of their responsibilities in relation to this EP, including during emergencies or potential emergencies, and has the appropriate competencies and training.

9.6.1 Cooper Energy Personnel

Cooper Energy personnel competency and training requirements are outlined in position descriptions and reviewed during the recruitment process. Competencies and training are initiated as defined in the Training and Development Procedure.

Personnel training records are maintained internally in accordance with MS06 Information and Systems Management.

9.6.2 Contractor personnel

Contractors engaged to work on the activity are assessed and engaged in accordance with the requirements of the MS11 Supply Chain and Procurement Management.

Competency of contractors is assessed as part of the pre-qualification and qualification process and requires contractors to define the competency and training requirements necessary to ensure that contractor personnel have the relevant knowledge and skills relevant to their role.

9.6.3 Environmental Induction

Cooper Energy and contractor personnel who work on the activity will complete an induction.

The environmental component of the induction will include information as detailed in Table 9-4. Records of personnel that complete the induction will be maintained internally in accordance with MS06 Information and Systems Management.

Table 9-4: Environmental components to be included in Environmental Inductions

Component	Operations	Vessel / MODU
Description of the environmental sensitivities and conservation values of the operations area and surrounding waters.	ü	ü
Controls to be implemented to ensure impacts and risks are ALARP and of an acceptable level.	ü	ü
Requirement to follow procedures and use risk assessments/job hazard assessments to identify environmental impacts and risks and appropriate controls.	ü	ü
Procedures for responding to and reporting environmental hazards or incidents.	ü	ü
Overview of emergency response and spill management procedures.	ü	ü
Megafauna sighting and vessel interaction procedures.	ü	ü

9.7 Emergency Response

9.7.1 General Response

Cooper Energy manages emergencies from offshore Victoria activities in accordance with its Incident Management Plan. The purpose of the Incident Management Plan is to provide the Cooper Energy IMT with the necessary information to respond to an emergency affecting operations or business interruptions. The IMP:

- describes the emergency management process
- details the response process
- lists the roles and responsibilities for the IMT members.

9.7.2 Oil Pollution Emergency Plan

In accordance with the Regulations the implementation strategy must include an OPEP / Emergency Response Plan (ERP) and arrangements for testing the response arrangements within these plans.

The Cooper Energy Offshore Victoria OPEP (Appendix 6) and Offshore Victoria OSMP[18] provide for oil spill response and monitoring arrangements for this activity.

Roles and responsibilities for maintaining oil spill response capability and preparedness, testing and review arrangements and oil spill response competency and training requirements are detailed in the OPEP.

Vessels will operate under the vessel's SMPEP (or equivalent appropriate to class) or spill clean-up procedures to ensure timely response and effective management of any vessel-sourced oil spills to the marine environment. The SMPEP (or equivalent) is routinely tested. The SMPEP (or equivalent) is designed to ensure a rapid and appropriate response to any vessel oil spill and provides guidance on practical information that is required to undertake a rapid and effective response, and reporting procedures in the event of a spill.

[18] Available publicly at: https://info.nopsema.gov.au/environment_plans/599/show_public

9.7.3 Source Control Emergency Response Plan

A SCERP provides for source control emergency response arrangements and preparedness for the activities. The SCERP aligns with industry and regulatory guidelines and provide for each of the key source control response strategies outlined in this EP.

Roles and responsibilities for maintaining source control response capability and preparedness, testing and review arrangements and source control response competency and training requirements are detailed in the SCERP. Table 9-5 summarises the response options and key activities identified in the SCERP.

Table 9-5: SCERP Content

Response Options	Topics Addressed
Site Survey	• arrangements for the provision of the Source Control IMT personnel (numbers, competency, capability for the duration of the response) • arrangements for the provision of equipment and material supplies • arrangements for equipment and personnel monitoring and tracking • activation and mobilisation plans, including activation and expenditure authority and regulatory approval processes • logistics plans and providers • SIMOPS planning process • deployment and installation plans • well kill and shut-in plans.
Debris Removal	
Intervention	
Relief Well Drilling	

9.8 Chemical Assessment and Selection

Cooper Energy's Offshore Chemical Assessment Procedure requires that chemicals used offshore for a project and operations that will be or have the potential to be discharged to the environment are assessed and approved prior to use. This process is used to ensure the lowest toxicity, most biodegradable and least bioaccumulative chemicals are selected which meet the technical requirements.

A summary of the evaluation process is detailed in Table 9-6.

Table 9-6: Cooper Energy Offshore Chemical Assessment Procedure Summary

Step	Evaluation	Input	Outcome
1	Characterise proposed chemical.	Confirm the following: • chemical name & supplier • chemical Function/purpose • formulation, where available • CAS number, where available • eco toxicity, where available • estimated use, dosage and discharge.	Proceed to **Step 2.**
2	Determine whether the chemical proposed is to be discharged to the marine environment.	Refer to the EP to determine proximity to priority sensitivities.	Where chemical is to be used in an entirely closed loop system no further action is required.
			Where chemical is to be discharged, proceed to **Step 3**.
3	Determine whether the chemical proposed is on the OSPAR PLONOR (Pose Little or No Risk) List.	Refer to OSPAR PLONOR List	Where the chemical is listed no further action is required and the chemical is approved.
			Where the chemical Is not listed proceed to **Step 4**.
4	Use the Offshore Chemical Notification Scheme (OCNS) Definitive Ranked Lists of Registered Substances to determine the risk banding.	Search the OCNS Definitive Ranked Lists of Registered Substances for the product name or equivalent branding. Always use the latest version.	Is the HQ Band "Gold" or "Silver," or OCNS Group "E" or "D"? If yes go to **Step 5**.
			Where the chemical is not listed go to **Step 6.**
5	Determine whether the chemical has a substitution or product warning.	OCNS Definitive Ranked Lists of Registered Substances or obtain from the current CEFAS template.	Where the chemical does not have a product or substitution warning no further action is required and the chemical is approved.

Step	Evaluation	Input	Outcome
		Always use the latest version.	Where the chemical has a product or substitution warning, proceed to **Step 7**
6	Assess the Ecotoxicity.	LC_{50} or EC_{50} concentrations for representative species; Octanol-water partition coefficient (Log Pow); and Biodegradation information (% biodegradation in 28 days).	Requires a Hazard Assessment and ALARP justification where: **Toxicity** = LC50 <100 mg/L or EC50< 100mg/L **Bioaccumulation** = Log Pow >3 **Biodegradability** <20%
7	Consider an alternative or complete ALARP justification.	Technical justification required to proceed with selected chemical	Where there is no technical justification for the chemical, it is not accepted for use. Where there is a technical justification an ALARP justification must be approved by the Project Manager.

9.9 Invasive Marine Species Risk Assessment

Cooper Energy's Invasive Marine Species Protocol was developed to integrate Australian IMS prevention efforts into Cooper Energy's offshore operations. The procedure details the actions to be undertaken during the contracting phase for a vessel, MODU and submersible equipment (e.g. ROVs) for a project within the Cooper Energy Operational Area (as defined under the EP for the petroleum activity). The procedure incorporates key considerations from IMO (2011) and Australian Government (Marine Pest Sectoral Committee 2018) biofouling guidelines; the inputs, decision points and general flow of the of IMS risk management actions are shown in Figure 9-6.

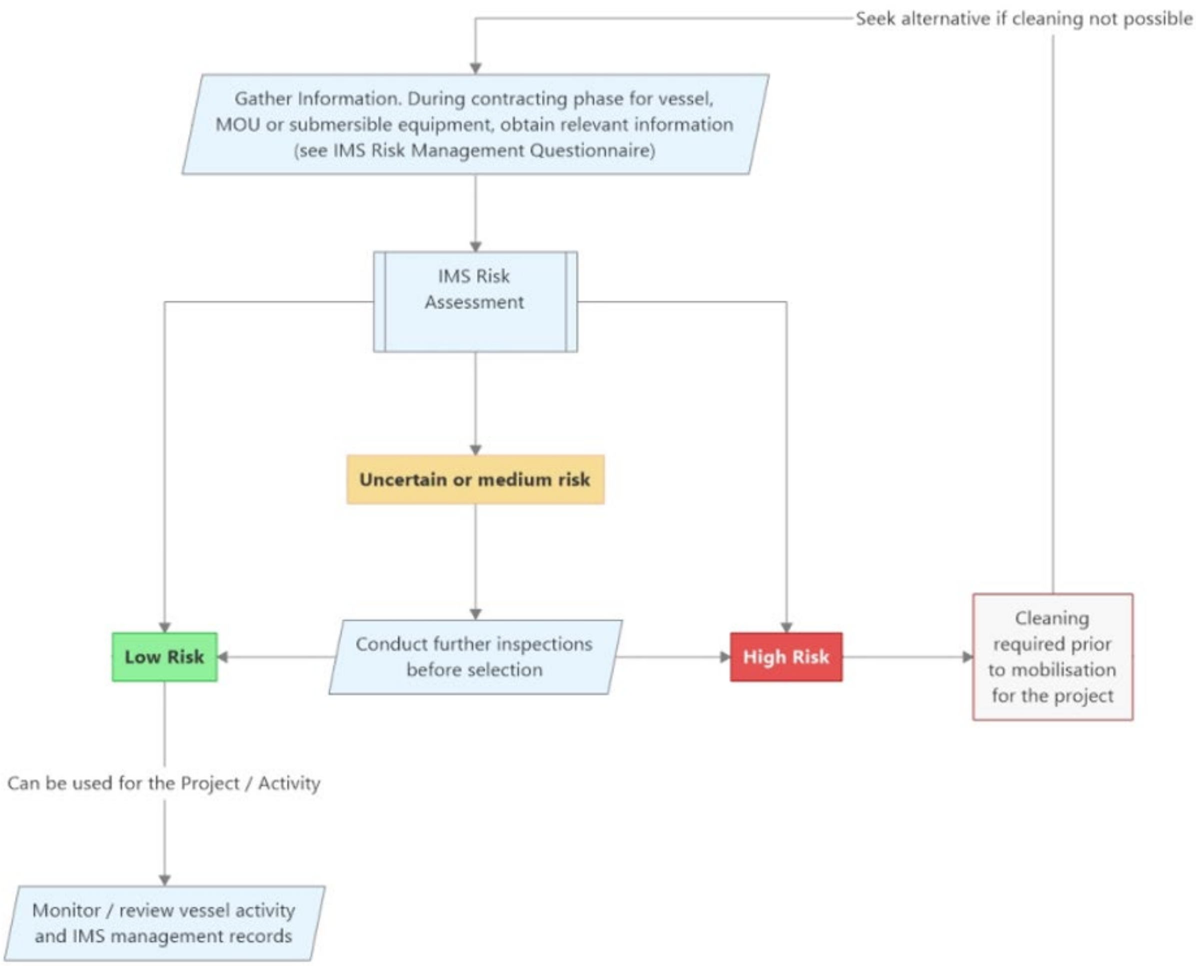


Figure 9-6: Cooper Energy IMS Risk Management Flow

9.10 Marine Mammal Risk Review and Management

Cooper Energy implements risk reviews prior to undertaking offshore campaigns. A risk review framework addressing campaign timing in relation to seasonal sensitivities (pygmy blue whale and southern right whale important behaviours) is shown in Figure 9-7.

Figure 9-7 also detail the monitoring and action protocols for the activity which provides details on level of whale observation effort, triggers for actions and the actions to be taken.

DP Vessel Campaign Risk Review	
Purpose:	The review will seek to identify an environmental window where risks to endangered whales (from subsea noise) are avoided, where practicable, and in any case, ensure that risks are continually reduced to ALARP and are of an acceptable level.
Timing:	Prior to campaign activity commencing at the Otway offshore facilities. The risk review should be undertaken within the 6-months prior to the activity commencing.
Personnel:	This process will involve personnel who can supply relevant information to the activity and/or are the key decision makers for the project. This includes the Project Manager, Lead Engineer and Environment Specialist.
Risk Review Considerations	
Facility drivers	• Integrity management drivers, such as upcoming risk-based inspection, planned or urgent repairs. • Market operator drivers, such as mandated shutdown windows.
Campaign drivers	• Availability of vessel / offshore unit and services. Consider vessels with silent notation (if proposed by tenderer) • Work duration and schedule, • Safe operating limits (weather).
Seasonal environmental sensitivities	• Current conservation advice and actions • Current legislated exclusion zones and associated timing • Seasonal sensitivity of the species across the broader region utilising the Cooper energy Existing Environment, contemporary literature and available sightings databases such as the Atlas of Living Australia and SWIFFT.
Campaign risk events (subsea noise)	• Sound / source level of DP vessels selected for the campaign will be characterised. • Location of the campaign DP vessel activity and predicted noise contours against the expected location of sensitivities. • Campaign timing relative to seasonal sensitivity of both pygmy blue whales and southern right whales. • Campaign timing relative to other noise generating activities and potential for cumulative impacts.
Campaign risk controls	• Suitability of current control measures in the context of the campaign risk event review. • Previously discounted control measures • New techniques and technologies (e.g., for monitoring).

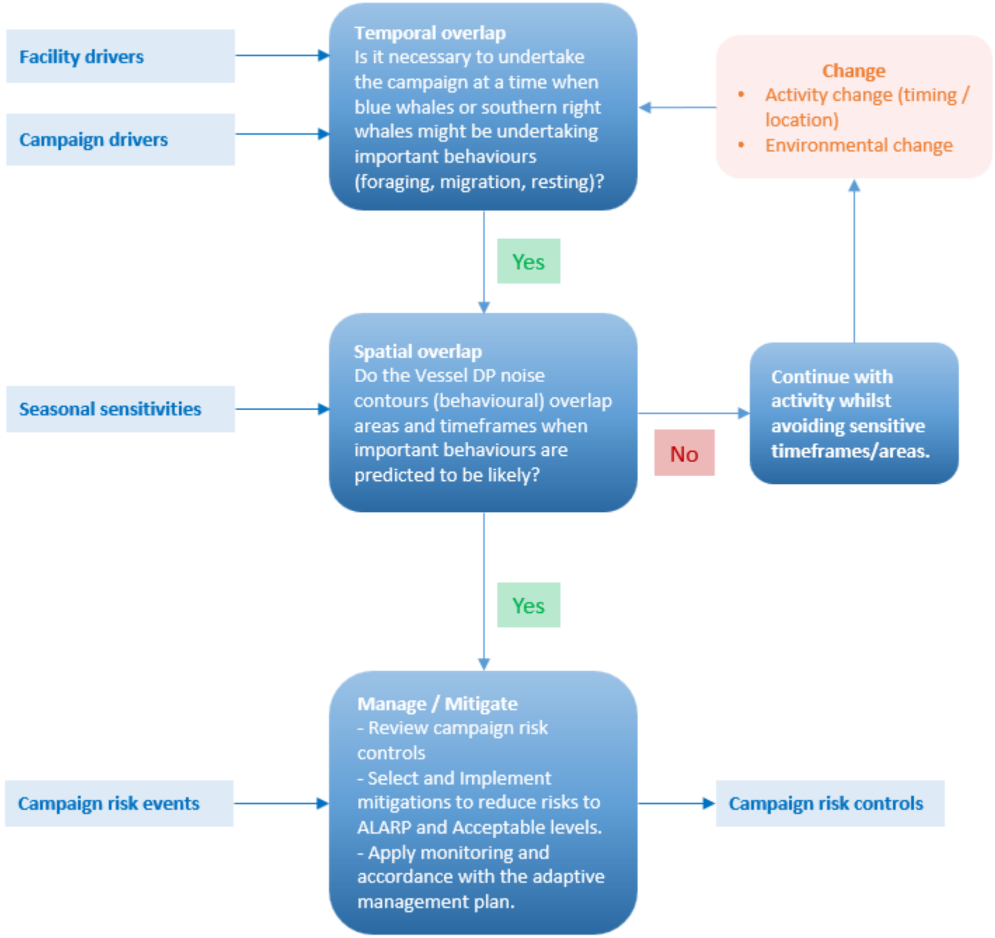


Figure 9-7: Campaign Risk Review Framework

9.11 Management of Change

MS08 Technical Management and Management of Change (MoC) General Protocol describes the requirements for dealing with change management. The objective of the MoC process is to ensure that changes do not increase the risk of harm to people, assets or the environment; and to ensure impacts remain at an acceptable level. This includes:

- deviation from established corporate processes
- changes to offshore operations and/or status of infrastructure
- deviation from specified safe working practice or work instructions/procedures
- implementation of new systems
- 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
  - authorised in the existing management plans, procedures, work instructions or maintenance plans
- proposed changes to activities, assets, equipment (including change of well or infrastructure status that may be undertaken under another EP), processes or procedures that have the potential to impact on the environment or interface with the environmental receptor
- changes to the existing environment including (but not limited to) fisheries, tourism and other commercial and recreational uses, and any changes to protective matter requirements
- changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences)
- changes, updates or environmental performance improvement identified from incident investigations, emergency response activities or emergency response exercises, and annual audits

For any MoC with identified environmental impacts or risks, an impact/risk assessment will be undertaken to ensure that impacts and risks from the change can be managed to meet the nominated EPOs set out in the accepted EP as well as be ALARP and of an acceptable level.

Depending on the nature of the change, a MoC may be completed for a single change (e.g. associated with a discrete offshore campaign), or for a series of changes (e.g. following annual EP review and update). In either case, where a MoC is raised, the change(s) are evaluated against regulatory criteria (Section 9.11.3) and the EP revised and/or resubmitted where required.

9.11.1 Identifying Change

Environmentally relevant changes will be identified via activity and baseline reviews, after action reviews and on an ad-hoc basis. Reviews will seek to identify both internal and external changes which might result in deviations from the impact and risk profiles provided for within the accepted EP. The reviews include a number of elements:

- regular review of new and upcoming regulatory and policy change via access to weekly alerts coving changes across legislation and guidelines relevant to Commonwealth and State Jurisdictions. This process also assists with the identification and evaluation of relevant government sustainability targets such as emissions reduction targets
- involvement with industry associations such as Australian Energy Producers and Carbon Market Institute
- monthly review and reporting of recordable incidents; this includes investigation of incidents and may initiate the change assessment process depending on the nature of the incident
- annual EP audits (refer to Section 9.13) which are subsequently tracked to closure via Synergi

- annual EP review and update; this process involves:
  - update of relevant legislation, integrating changes identified via the regular review process (where those reviews have not already triggered an interim update)
  - check of environmental baseline via review of publicly available government databases including PMST search application and Underwater Cultural Heritage database
  - inclusion of additional or updated environmental baseline relevant to the EP, from sources such as EPBC management plans
- pre-activity reviews. During the planning phase for offshore vessel activities, the campaign components are reviewed in the context of the accepted environment plan to ensure the activities and associated impacts and are provided for
- after-activity reviews or lessons learned reviews following offshore campaigns; these reviews provide a means to identify, share and act upon opportunities for improvement in relation to the management of impacts and risks
- engagement with Relevant Persons (refer to Section 10).

Environmentally relevant changes identified through these processes are recorded and tracked through to integration within relevant documents (e.g. plans, protocols etc.) and implementation within the business.

The regulatory requirement to revise and resubmit an EP is described in Section 9.11.3.

9.11.2 Changes to Titleholders and Nominated Liaison Person

Section 1.5 details the titleholders and nominated liaison person and contact details. In accordance with the Regulations, any change in these details is required to be notified to NOPSEMA and the DEECA as soon as possible.

9.11.3 Revisions to the EP

In the event that the proposed change introduces a significant new environmental impact or risk, results in a significant increase to an existing risk, or through a cumulative effect of a series of changes there is a significant increase in environmental impact or risk, this EP will be revised for re-submission to NOPSEMA and DEECA as per the MoC process described in Section 9.11.

Where a change results in the EP being updated, the change/s are to be logged in the EP Change Register (Appendix 4).

In addition, the titleholder is obligated to ensure that all specific activities, tasks or actions required to complete the activity are provided for in the EP. The Regulations require that where there is a significant modification or new stage of the activity (that is, change to the spatial or temporal extent of the activity) a proposed revision of the EP will be submitted to NOPSEMA and DEECA.

9.12 Incident Reporting and Recording

MS10 Incident and Crisis Management, Incident and Crisis Management Protocol and Incident Investigation and Reporting Protocol provide for a systematic method of incident reporting and investigation and a process for monitoring close out of preventative actions.

The incident reporting and investigation documentation defines the:

- method to record, report, investigate and analyse accidents and incidents
- legal reporting requirements to the regulators within mandatory reporting timeframes
- process for escalating reports to Cooper Energy senior management and the Cooper Energy Board
- methodology for determining root cause
- responsible persons to undertake investigation
- classification and analysis of incidents.

Notification and reporting requirements for environmental incidents to external agencies are listed in Table 9-7. Notification and reporting requirements for oil spills (Level 2/3) are detailed in the OPEP.

Table 9-7: External Incident Reporting Requirements

Incident Type	Description	Requirement	Timing	Contact
Recordable Incident	OPGGS(E)R (Cth) / OPGGSR (Vic): An incident arising from the activity that breaches an EPO or EPS in the EP that applies to the activity, that is not a reportable incident.	As a minimum, the written monthly recordable report must include a description of: • all recordable incidents occurred during the calendar month • all material facts and circumstances concerning the incidents that the operator knows or is able to reasonably find out • corrective actions taken to avoid or mitigate any adverse environmental impacts of the incident • corrective actions that have been taken, or maybe taken, to prevent a repeat of similar incidents occurring.	Before the 15th day of the following calendar month.	**Written Notification:** NOPSEMA - submissions@nopsema.gov.au DEECA -operational.reports@ecodev.vic.gov.au
Reportable Incident	OPGGS(E)R (Cth): An incident arising from the activity that has caused, or has the potential to cause, moderate to significant environmental damage. OPGGSR (Vic): An incident arising from the activity that has caused, or has the potential to cause: • moderate to catastrophic environmental consequences • a breach of, or noncompliance with the OPGGS Act 2010 (Vic), OPGGSR (Vic), Chapter 2–Environment); or the EPOs set out in the EP. For Cooper Energy, reportable incidents include, but are not limited to, those that have been identified through the risk assessment process as having an inherent impact consequence of 'moderate', 'major' or 'critical'; or at a minimum, the following incidents: • a level 2/3 spill incident • IMS Introduction.	**Verbal Notification:** The notification must contain: • all material fact and circumstances concerning the incident • any action taken to avoid or mitigate the adverse environmental impact of the incident • the corrective action that has been taken or is proposed to be taken to stop control or remedy the portable incident. This must be followed by a written record of notification as soon as possible after notification.	**Commonwealth Waters** Within 3 days of notification of the incident.	**Verbal:** NOPSEMA – Phone 1300 674 472
			State Waters Within 2 hours of becoming aware of the incident.	**Verbal:** DEECA - Phone 0419597010
		Written Notification: Verbal notification of a reportable incident to the regulator must be followed by a written report. As a minimum, the written incident report will include: • the incident and all material facts and circumstances concerning the incident • actions taken to avoid or mitigate any adverse environmental impacts • the corrective actions that have been taken, or may be taken, to prevent a recurrence of the incident • the action that has been taken or is proposed to be taken to prevent a similar incident occurring in the future.	**Commonwealth Waters** Within 3 days of notification of the incident.	**Written Notification:** NOPSEMA - submissions@nopsema.gov.au National Offshore Petroleum Titles Administrator (NOPTA) – reporting @nopta.gov.au
			State Waters Within 3 days of becoming aware of the incident.	**Written Notification:** DEECA - ERRChiefInspector@ecodev.vic.gov.au
		Written reports to be submitted to NOPTA (for incidents in Commonwealth waters).	Within 7 days of written report submission to NOPSEMA	NOPTA – reporting @nopta.gov.au
Reportable incident - in the event an AMP may be		Notification must be provided to the Director of National Parks and include: • titleholder details	As soon as possible.	Marine Park Compliance Duty Officer – 0419 293 465

Incident Type	Description	Requirement	Timing	Contact
exposed to hydrocarbons		• time and location of the incident (including name of marine park likely to be affected) • proposed response arrangement • confirmation of providing access to relevant monitoring and evaluation reports when available • contact details for the response coordinator.		
Reportable Incident – Invasive Marine Species		Suspected or confirmed Invasive Marine Species Introduction.	As soon as possible.	DEECA on 0419597010or ERRChiefInspector@ecodev.vic.gov.au.
Reportable Incident - Injury or Death to Fauna		Incidents of injury or death to native fauna including whales and dolphins. https://www.wildlife.vic.gov.au/wildlife-emergencies/whale-and-dolphin-emergencies https://www.zoo.org.au/fighting-extinction/marine-response-unit/	As soon as possible.	DEECA Whale & Dolphin Emergency Hotline - 1300 136 017. Seals, Penguins or Marine Turtles Zoo Victoria Marine Response Unit – 1300 245 678.
		Impacts to MNES, specifically injury to or death of EPBC Act-listed species. https://www.environment.gov.au/biodiversity/threatened/listed-species-and-ecological-communities-notification	Within 7 days.	DCCEEW Phone: +61 2 6274 1111 Email: EPBC.Permits@environment.gov.au
		Vessel strike with cetacean.	Within 72 hours of incident.	DCCEEW – National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike

9.13 Environmental Performance Monitoring and Reporting

This section details the specific measures Cooper Energy will implement to ensure that, for the duration of the activity:

- the environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP and acceptable
- control measures detailed in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level
- environmental performance outcomes and standards set out in the EP are being met

Cooper Energy applies a range of processes to ensure environmental impacts and risks of the activity are identified and reduced to ALARP continuously throughout the life of the activity (Table 9-8).

Table 9-8: Summary of Gippsland Offshore Operations Assurance Processes

Process	Frequency
Change management reviews	Refer to Section 9.11
Tracking of Emissions and Discharges	Refer to Section 9.13.1
Audit and Inspection	Refer to Section 9.13.5
Management of non-conformance	Refer to Section 9.13.6

9.13.1 Emissions and Discharges

Emissions and discharge monitoring and records required for operations and vessel-based activities are detailed in Table 9-9. Copies of emission and discharge records will be retained in accordance with Section 9.14.

Quantitative monitoring, record-keeping and reporting of emissions and discharges is undertaken for all activities within the scope of this EP. As activities are undertaken across different jurisdictions, data reporting is undertaken in accordance with the requirements of the particular jurisdiction.

Record logs of discharges within Commonwealth Waters are retained in accordance with MARPOL.

Table 9-9: Cooper Energy Emissions and Discharge Monitoring

Aspect	Monitoring	Frequency	Record
Routine Operations			
Control Fluids used for valve actuation at the wells	Volume	Ongoing	Record of use/consumption
GHG emissions	Volume (by activity/facility)	Various	Reconciled emissions inventory (annual). NGERS reporting
Leaks, spills and accidental releases	Product type	Upon occurrence	Incident report by event
IMR			
Vessel Discharges	Volume by type of discharge	By activity	Vessel reports
Waste	Waste transfers	By activity	Waste transfer receipts
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume Discharge location	By activity	Record of use/consumption
GHG emissions (from fuel use)	Volume (Fuel usage)	By activity	Daily Reports of fuel use Reconciled emissions inventory (annual)
Spills and accidental releases or losses overboard.	Nature of the material released Quantity of material released	Upon occurrence	Incident report by event Also refer to Section 9.12

9.13.2 Activity Commencement and Cessation Notifications

Activity notification requirements are detailed in Section 10 (Ongoing Consultation and Notifications).

9.13.3 Annual Performance Report

As required by the Regulations, Cooper Energy will submit an annual EP performance report to the regulator (NOPSEMA and DEECA). This report will provide sufficient detail to enable the regulator to determine whether the environmental performance outcomes and standards in the EP have been met.

The report will be submitted annually within 3 months of the EP acceptance date.

9.13.4 Cetacean Reporting

Cetacean observation data will be submitted to the DCCEEW.

Data will be reported within three months of the completion of an offshore activity.

9.13.5 Audit and Inspection

Environmental performance of offshore operations and activities will be audited and reviewed in several ways to ensure that:

- EPSs to achieve the EPOs are being implemented and reviewed
- potential non-compliances and opportunities for continuous improvement are identified
- environmental monitoring requirements are being met.

Non-conformance with the EPS outlined in this EP will be managed as per Section 9.13.6.

Opportunities for improvement or non-compliances noted will be communicated to relevant personnel at the time of the review/inspection/audit to ensure adequate time to implement corrective actions. The findings and recommendations of inspections or audits will be documented and distributed to relevant personnel for comment, and any actions tracked until completion.

9.13.5.1 EP Compliance

The following assurance arrangements will be undertaken:

- annual audit of the performance outcomes and performance standards contained in the EP and the requirements detailed in the implementation strategy. This audit will inform the annual EP performance report submitted to NOPSEMA and DEECA. Any environmentally relevant changes and opportunities to improve environmental performance will be assessed as per the MoC process described in Section 9.11; and incorporated into an EP revision as required.

9.13.5.2 Offshore Vessel Activities

The following arrangements review the environmental performance of offshore vessel and MODU activities:

- a premobilisation inspection will be undertaken for offshore vessels to ensure they will meet the requirements of the EP
- HSEC inspections will be undertaken throughout the offshore activity on a nominal weekly basis to ensure ongoing compliance with relevant EP requirements. The scope of the inspections will include (but is not limited to):
  - vessel spill readiness (i.e. provision spill kits and drills in accordance with vessel SMPEP or equivalent)
  - waste management in accordance with EP, EPO and EPSs
  - chemical inventory checks to ensure campaign chemicals are accepted via the Offshore Chemical Assessment Procedure
  - maintenance checks for equipment identified within an EP EPS (e.g. oily water separator).

Non-compliance and improvement opportunities will be communicated to Cooper Energy HSEC onshore for advice, tracking and reporting in accordance with Section 9.13.6.

9.13.6 Management of Non-conformance

In response to any EP and environmental audit and inspection non-compliances, corrective actions will be implemented and tracked to completion as per the Incident management, Non-Conformity and Corrective Action Standard Instruction.

Corrective actions will specify the remedial action required to fix the breach and prevent its reoccurrence and is delegated to the person deemed most appropriate to fulfil the action. The action is closed out only when verified by the appropriate Manager and signed off. This process is maintained through the Cooper Energy corrective action tracking system.

Where more immediacy is required, non-compliances will be communicated to relevant personnel and responded to as soon as possible. Where relevant the results of these actions will be communicated to the offshore crew during daily toolbox meetings or at daily or weekly HSEC meetings.

Cooper Energy will carry forward any non-compliance items for consideration in future operations to assist with continuous improvement in environmental management controls and performance outcomes.

9.14 Records Management

In accordance with the Regulations, Cooper Energy will store and maintain documents or records relevant to the EP in accordance with the Document and Records Management Procedure.

10 Consultation

The OPGGS(E)R (Cth) require that titleholders:

"must give each Relevant Person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.",

where a 'Relevant Person' has the meaning given by Regulation 25(1) as follows:

(a) each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant

(b) if the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister

(c) if the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister

(d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP, or the revision of the EP

(e) any other person or organisation that the titleholder considers relevant.

The OPGGSR (Vic) establish that the EP must:

- . give each of those consulted sufficient information to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.

To meet these requirements, Cooper Energy has and will continue to undertake consultation with persons and organisations that have an interest in the Gippsland Offshore Operations. This is done as part of the consultation cycle (Figure 10-1).

Figure 10-1: Consultation Cycle

Key learnings and consultation from previous Cooper Energy campaigns and ongoing activities offshore Victoria have also been considered for the current activities where relevant.

The principal objectives of the Cooper Energy consultation strategy are:

- confirm existing Relevant Persons
- identify whether there are additional Relevant Persons to those identified with regard to previously accepted Gippsland activities and previous consultation undertaken
- initiate and maintain open communications between Relevant Persons and Cooper Energy relevant to their interests
- proactively work with Relevant Persons on recommended strategies to minimise negative impacts and maximise positive impacts of all activities

- provide for ongoing consultation that reflects the reasonable requirements of Relevant Persons and the activity schedule.

Cooper Energy has maintained records of consultation and tracks commitments made through to closure.

10.1 Scoping – Identification of Relevant Persons

Cooper Energy has undertaken consultation activities in relation to the Gippsland activities and specifically in relation to the Gippsland offshore facilities since the initial stages of development, or since they were acquired from the previous operators. Cooper Energy has continued to consult in relation to its ongoing activities and in doing so has developed a good understanding of issues and areas of interest of Relevant Persons.

Consultation from previous Cooper Energy campaigns and ongoing activities offshore Victoria informed Cooper Energy's initial list of Relevant Persons. The approach to identifying Relevant Persons was recently broadened in response to recent applicable Case Law and NOPSEMA guidelines A900179 (2023a).

In seeking Relevant Persons, Cooper Energy avoided applying screening mechanisms. In doing so, Cooper Energy undertook both targeted and passive campaigns to identify and consult with Relevant Persons. The targeted approach involved searching for Relevant Persons with search efforts focussed on the Gippsland Environment Sector (see Appendix 2 for definition of Environment Sectors). This sector encompasses the activities and therefore would include the persons more likely to be directly affected by those activities. This environment sector also captures those areas that might be more significantly and more likely affected by a worst-case spill scenario, considering potential timing of shoreline impact and levels of hydrocarbons that could impact shorelines, and probability of impact in the unlikely event of a major spill.

The Gippsland Environment Sector was not used as a limiter to consultation, noting direct and indirect impacts are not limited to spill risks, nor only physical values and sensitivities, but also potential spiritual and intangible values. For those engaged outside the Gippsland Environment sector, sufficient information and time were still provided, but a lesser effort was made in seeking engagement in line with nature and scale of potential impacts and risks outside the sector.

The steps taken by Cooper Energy include:

- reviewing the receptors identified in the existing environment section, persons or groups linked to those receptors, and their functions interests and activities
- reviewing existing Relevant Persons identified and contained within the Cooper Energy stakeholder register (offshore Gippsland)
- reviewing previous Gippsland asset campaign consultation records
- discussing with existing Relevant Persons to identify potential new Relevant Persons or changes to Relevant Persons contacts or consultation preferences
- providing information, opportunities and time for persons to self-identify as relevant
- reviewing Commonwealth and State fisheries jurisdictions and fishing effort in the region
- reviewing and acting upon NOPSEMA guideline Consultation with Commonwealth agencies with responsibilities in the Commonwealth marine area (N-04750-GL1887, (2023b)).

Relevant Persons identified and contacted for this activity are listed in Table 10-2. A subset of these Relevant Persons may be particularly relevant in the event of an oil spill, and these Relevant Persons are listed in Cooper Energy's Emergency Contacts register to prioritise consultation as appropriate and as coordinated with the relevant State Controller should they be activated.

10.1.1 Focussed and extended enquiry

Significant effort was made to contact Relevant Persons through multiple channels, with broad contact initiated early in 2023 via registered post to a large base case list of potentially Relevant Persons. This was followed up by emails, phone calls, webforms and the media campaign. Multiple attempts were made to contact the key First Nations groups proximate to operations where the potential for impacts to interests was considered greater.

Based on nature and scale, and administrative maturity of Relevant Persons, not all Relevant Persons were followed up multiple times or with phone calls. For example, it was considered that large environmental Non-Government Organisations (eNGOs) and shire councils had mature processes where it was reasonable to assume email accounts were monitored. Effort to identify and contact persons or organisations who were distant from the activity, and therefore less likely to be impacted by the activity or an emergency was also generally less than those with the potential to be directly impacted by the activity. A non-response from those groups was reasonably construed to be an assessment of limited impact on their interests, and likely reflected the nature and scale of the activities under the EP.

Figure 10-2 shows the media extended enquiry area within the Gippsland Environment Sector applicable to Gippsland activities. Additional discussion is provided below on First Nations and Local Government administrative areas. These are broken out and mapped so as to show how their communities are represented within the Gippsland Environment sector (Figure 10-3 and Figure 10-4).

Additional opportunity to consult via self-identification as a relevant person was provided through extended enquiry via media. This extended enquiry covered the Gippsland Environment Sector and adjacent environment sectors, along with Melbourne and Sydney metropolitan papers. Some smaller Aboriginal organisations in the Gippsland environment sector were also contacted though they themselves were unlikely to be affected, but they may have been able to provide contacts for community members who might identify as Relevant Persons.

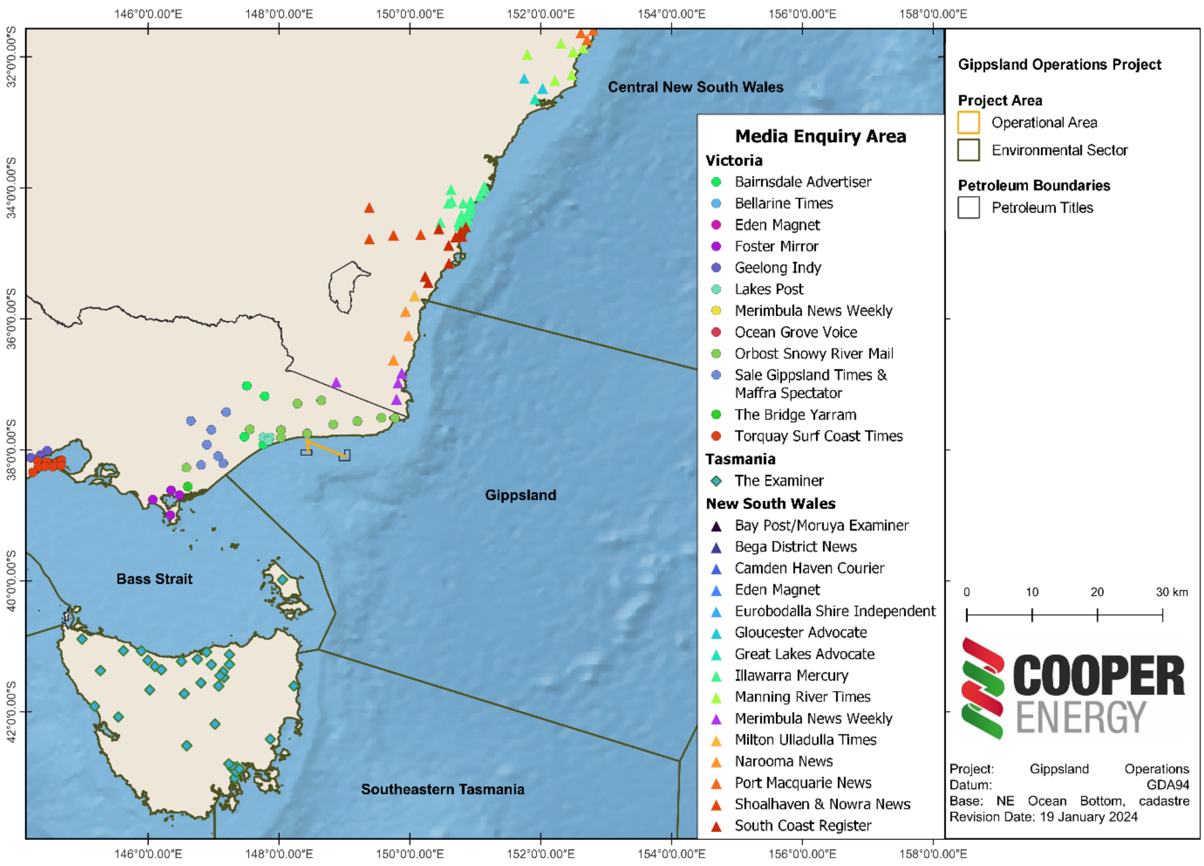


Figure 10-2 Map Showing Media Extended Enquiry Area within Gippsland Environment Sector

First Nations

In NSW, 13 Local Aboriginal Land Councils (LALC) form the South Coast zone (Victoria border to Wollongong), and this zone almost entirely encompasses the South Coast People's Native Title land and sea claim area. These 13 LALCs provide a very good representation over the Native Title claim area.

The constitution, objects and functions of the New South Wales Aboriginal Land Council (NSWALC) are set out in Part 7 of the *Aboriginal Land Rights Act (1983)*. These essentially give NSWALC the mandate to provide for the development of land rights for Aboriginal people in NSW, in conjunction with a network of LALCs through (NSWALC n.d.):

- land acquisition either by land claim or purchase
- establishment of commercial enterprises and community benefit schemes to create a sustainable economic base for Aboriginal communities
- maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials within NSW).

During consultation with the South Coast Zone director, it was advised that within the legislated boundaries, each LALC was independent, with its own CEO and board. As such, the zone administration was not able to consult on the proposed activities within this EP, as each LALC would have its own independent views.

Cooper Energy endeavoured to meet each South Coast Zone LALC individually. To allow for efficiency, the zone administration facilitated a presentation during a South Coast Zone regional forum. Materials were thereafter distributed to individual LALCs and the opportunity to consult individually was provided.

In Victoria, the GLaWAC represents an area comprising the greater Gippsland region. During a meeting with GLaWAC senior management, it was confirmed that GLaWAC management could act on behalf of its members for the purposes of consultation on the proposed activities offshore Gippsland.

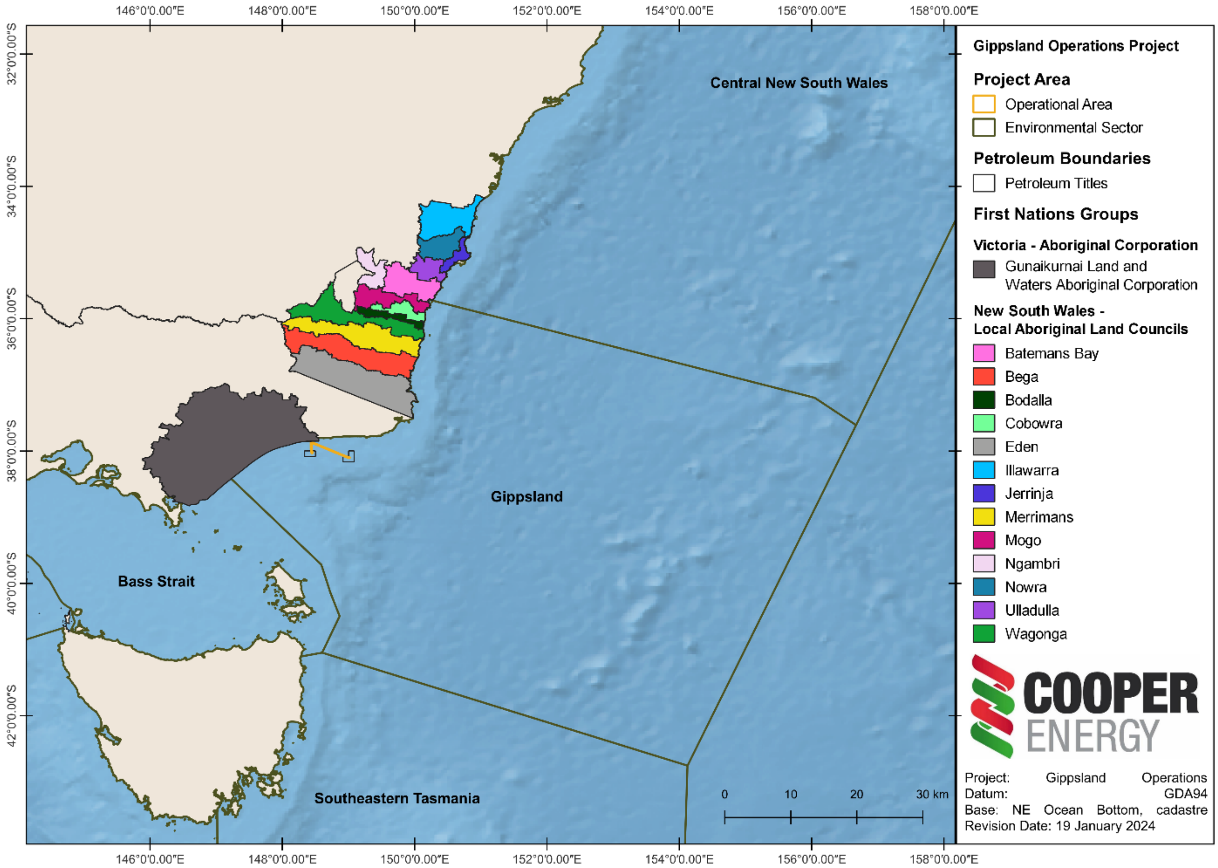


Figure 10-3 Map Showing LALC Area within Gippsland Environment Sector

Local Government

Four local government areas sit within the Gippsland Environment Sector (*Figure 10-4*) which was the focus area of consultation, although Eurobodalla showed no interest in being consulted. There is a general familiarity with the oil and gas industry after over 50 years of activities in the Gippsland Environment Sector, so this type of response is considered reasonable and was not unexpected.

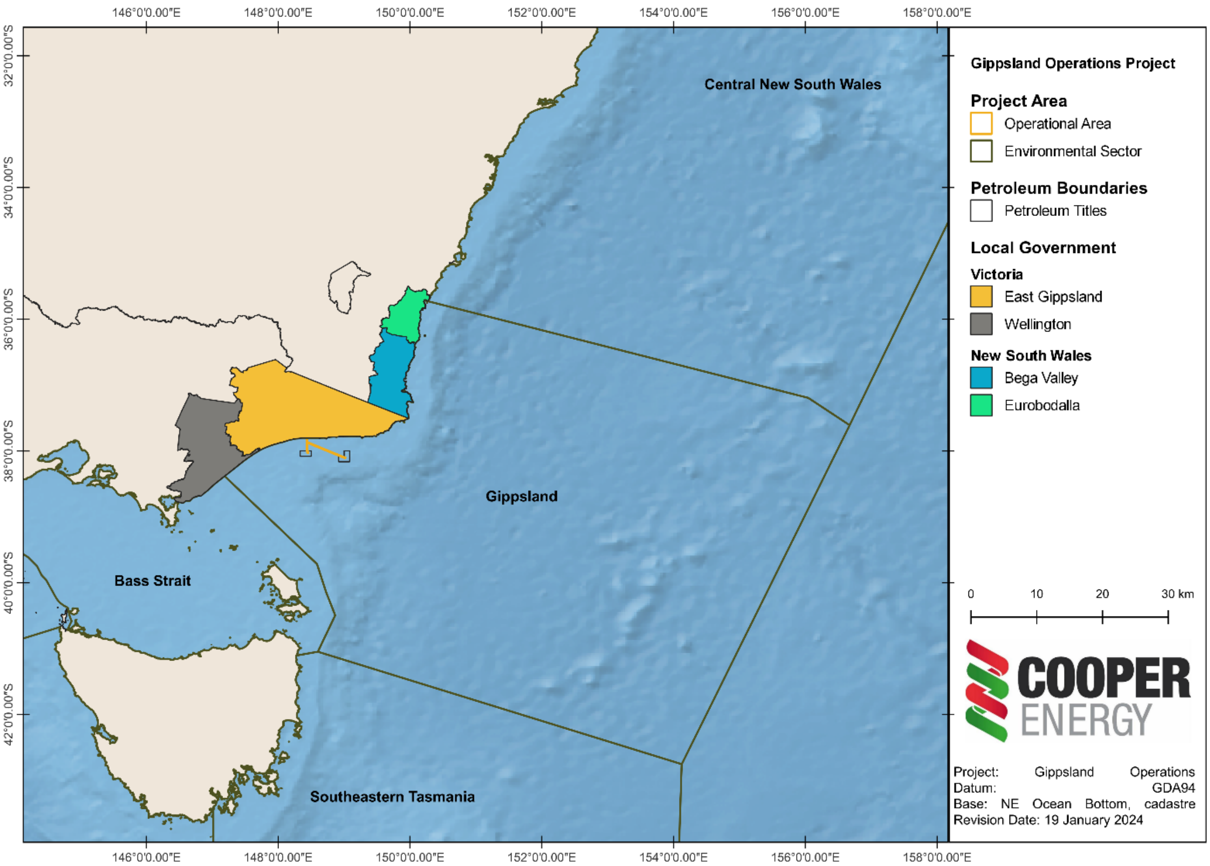


Figure 10-4 Map Showing LGA within Gippsland Environment Sector

10.2 Provision of sufficient information

The Regulations require titleholders to make sufficient information available to Relevant Persons to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.

Cooper Energy integrates consultation into its planning process, ensuring Relevant Persons are:

- provided with details and milestones of the activities
- advised, where they are or may be directly impacted, of any potential hazards/risks and the mitigation measures to address them and provided the opportunity to raise additional concerns.

Consultation methods and media vary with the project phase and level of engagement required (as informed by the relevant person). Typical means of engagement are provided in Table 10-1. Within information materials, readers are also informed of:

- NOPSEMA's brochure "Consultation on offshore petroleum environment plans" which highlights their rights and Cooper Energy's obligations and describes how consultation can be most effective
- how their information will be used, and that they may request that their information not be published.

For consultation to be mutually beneficial and effective it needs to be genuine and meaningful, and not superficial. Cooper Energy makes its staff available to meet for consultation over a wide geographical area with flexibility in timing and location, and discussions are routinely followed up to ensure mutual understanding of issues covered. It was important for Cooper Energy to understand current issues facing Relevant Persons to provide context of where the activities sat within their broader interests, so discussions were often wide ranging and beyond the scope of the EP itself. Relevant Persons are provided various ways to contact Cooper Energy through web forms and email and are provided a direct name and mobile number to contact.

Table 10-1 Relevant Persons for the Gippsland Offshore Operations

Communication method	Description
Media Campaign	Cooper Energy ran advertisements seeking Relevant Persons for consultation across a range of EPs under preparation, including this EP. Regional press coverage was broad, covering the north and east coast of Tasmania, and the Victorian and NSW coastlines from South Australia to Queensland. Distribution also extended a small distance west into South Australia (Grant / Mt Gambier). Advertisements were also carried in the Herald-Sun (Melbourne), the Daily Telegraph (NSW), the Courier Mail (Qld) and the Mercury (Tas). An advertisement was also run in the national Koori Mail which has both digital and paper distribution across the nation. The advertisements provided a written link and QR code that would take interested persons to the activities' website. Sufficient information is contained on the website to enable a person to determine if their functions, interests, or activities might be affected by activities under this EP, their rights and Cooper Energy's obligations to them, and how they could seek to consult or request further information.
Meetings	Cooper Energy is committed to meeting with Relevant Persons for the Project in order to enable transparent and direct feedback on the proposed Project. This includes: • regulator/state agency briefings on a semi-regular basis • meetings with individual Relevant Persons and/or community information sessions where warranted. Face-to-face meetings (where possible, given COVID-19, otherwise video conference or phone calls) have been and will continue to be conducted where agreed and appropriate with Relevant Persons. The purpose of meetings is to provide project updates, reinforce key messages, clarify any areas of uncertainty, listen and learn about Relevant Persons concerns and issues, appropriately address any issues raised and build stronger Relevant Persons relationships.
Letters and emails	Letters and emails were used as an initial consultation tool to introduce the Project to Relevant Persons and establish appropriate forms of communication that will be used during the Project. Written communications may include formal correspondence, Project updates regarding developments or upcoming activities, and specific responses to issues, concerns or requests. Emails may also form a means of full interactive consultation if this suits the Relevant Persons.
Information sheets	Information sheets on the Project were developed to inform Relevant Persons. Information sheets were provided during personal meetings, housed on the Cooper Energy webpage and provided in hard copy upon request by any relevant person. Note that any significant change to relevant activity information (such as project timing) will be re-communicated to Relevant Persons. Further information, such as detailed maps will be tailored to meet the needs of each relevant person's circumstances and will be provided as part of the consultation process as required.
Public display of regulatory documentation	Assessment documents (this EP) will be placed on public exhibition within the NOPSEMA website following acceptance. To protect the rights of parties involved in the consultation process, records of all engagements between Cooper Energy and third parties during the Project development will be maintained by Cooper Energy, subject to Information Privacy requirements.
Cooper Energy activities website	The Cooper Energy activities website will be used to provide information regarding the Project. The website: • contains details on Cooper Energy and the Project • contains any fact sheets or newsletters as they are developed • contain details of any public displays and information sessions • allows documents produced for public display to be downloaded • provides methods for contacting, providing feedback to, or registering complaints with Cooper Energy videos of seabed conditions and petroleum safety zones to provide added context and understanding. https://cooperenergy.wixsite.com/coeoffshore
Address, phone and email	Relevant Persons may wish to contact the Project team via the details below: **Address**: Level 8, 70 Franklin Street, Adelaide SA 5000 **Phone**: (08) 8100 4900 **Email**: stakeholder@cooperenergy.com.au

10.3 Period for consultation

Consultation in relation to the offshore activities in Gippsland has spanned decades. Subsequent to recent case law 2022 FCAFC 193 (Tipakalippa v NOPSEMA), consultation has expanded with the most recent consultation campaign spanning approximately 12-months. During this time the list of Relevant Persons has grown, and individual persons and organisations afforded reasonable time to consult prior to submission of the EP. Relevant Persons are also informed that objections, claims and feedback on the activity will be continuing to be received and considered by Cooper Energy.

Cooper Energy considers 30-60 days to be a reasonable period for consultation, with flexibility depending on the nature and scale of the activity. By exception rather than in relation to nature and scale, the period for consultation afforded during the preparation of this EP has well exceeded this reasonable period.

A significant time has been provided to respond to the latest round of consultation. In particular, it was recognised that First Nations organisations sometimes had limited capacity relative to the large consultation burdens being placed on them by proponents of multiple projects in multiple industries. It was important that Cooper Energy allowed them time to respond without feeling pressured.

Cooper Energy emailed Relevant Persons listed in Table 4 of Appendix 5 in August 2023 to provide additional opportunity to consult, and to re-iterate a request to help in identifying additional interested persons to support broad ongoing consultation. This additional email also contained wording noting that Relevant Persons could request that any sensitive information be withheld from publication.

10.4 Level of interest

The level of interest was in line with the nature and scale of the activities and quite low with a general view that Cooper Energy were carrying on business as usual, and most having no negative comments about the ongoing activities described.

Through a review of the web analytics, general interest in the project activities website was low, with very few repeat visits.

Table 10-2 Relevant Persons for the Gippsland Offshore Operations

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the EP may be relevant – Regulation 25(1)(a)			
Australian Antarctic Division (AAD)	Marine Mammal research, protection and conservation	Administrators of Australian marine mammal sightings database. Experience and specialism in marine mammal monitoring and risk mitigations.	Targeted consultation in relation to marine mammal sightings, risk management and reporting.
Australian Communications and Media Authority (ACMA)	Subsea communication infrastructure	Subsea communication cables occur within Bass Strait area, and support activities may overlap. However, no impact from planned activities to Relevant Persons' functions, interests or activities.	No overlap with the Operational Area. Basslink Cable is >100 km from Cooper Energy offshore assets. General interest in activities within shared marine space.
Australian Fisheries Management Authority (AFMA)	Commonwealth fisheries	Activity is within a Commonwealth fishery area or will impact or potentially impact a Commonwealth fishery area or resource. Via prior consultation, AFMA has recommended engagement with Commonwealth Fisheries Association (CFA) as the peak fishing industry body for Commonwealth waters and that 'Australian Bureau of Agricultural and Resource Economics and Sciences' reports should be reviewed for fishery status. CFA is included in this table as a Relevant Person; the latest 'Australian Bureau of Agricultural and Resource Economics and Sciences' report and study by SETFIA (2021) was used to determine which Commonwealth fisheries have fishing effort within the activity area.	There has been no fishing by licence holders in Commonwealth managed fisheries in the Operational Areas since operations commenced.
Australian Hydrological Service (AHS)	Maritime safety	Interest in identifying and charting potential seabed features and hazard warnings to mariners. Via prior consultation, AHS have requested to provide information at least three weeks prior to commencement of any oil and gas activity to allow for publication of notices to mariners.	Interested in safe navigation of commercial shipping in Australian waters during the activity. Interested in charting changes to infrastructure and exclusion zones.
Australian Maritime Safety Authority (AMSA)	Marine Vessel Safety	Activity focused consultation regarding shipping, emergency response preparedness and offshore activity levels.	Interested in safe navigation of commercial shipping in Australian waters during the activity. Involved in maritime notifications, advice and emergency response.
Department of Agriculture, Fisheries and Forestry (DAFF) – Aircraft, vessels and military & Biosecurity	Biosecurity	DAFF has primary policy and regulatory responsibility for managing marine pest biosecurity through administering the *Biosecurity Act*. Responsible for implementation of marine pest and biosecurity within Australian Waters (12 nm), including conveyances into Australian Waters. Gippsland Offshore Operations will involve activities beyond 12 nm, provisioned by conveyances within 12 nm. The department is a relevant person under Environment Regulation 25(1)(a) of the OPGGS(E)R when a petroleum activity has the potential to introduce or spread marine pests and diseases into Australian waters. The department should be consulted by titleholders to ensure titleholders are planning to meet biofouling requirements and manage ballast water appropriately.	Potential for biosecurity risk associated with conveyances applicable to the Activity, such as equipment and vessels.
DAFF- Fisheries	Fisheries	Activity is within a Commonwealth fishery area or will impact or potentially impact a Commonwealth fishery area or resource.	Consultation in relation to potential impacts to other marine users, including Commonwealth fisheries.
DAFF - Sea Cargo Policy, Industry	Sea Cargo	Government department focusing on Sea cargo policy and elements of biosecurity	Referral from DAFF Biosecurity.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Partnerships and Strategic Engagement			
DCCEEW – Underwater Cultural Heritage	Administration of the Underwater Cultural Heritage Act	DCCEEW administers the UCH Act. DCCEEW regulates activities in relation to protected UCH within Australian waters including the Commonwealth marine area. DCCEEW is a relevant agency for consultation where: • an activity has the potential to directly or indirectly adversely impact protected UCH (see section 30(2) of the UCH Act), whether located or unlocated • an activity or part of the activity is proposed within an underwater heritage protected zone.	Actions resulting in seabed disturbance have the potential to impact underwater heritage. None of the activities are proposed within an underwater heritage protected zone. Underwater heritage protected zones were identified within the spill EMBA.
DCCEEW – Wetlands Section	Administrative authority within Australia for the Ramsar Convention.	Authority overseeing conservation of Ramsar wetlands.	One Ramsar wetland, Gippsland Lakes, was identified within the spill EMBA.
Department of Foreign Affairs and Trade (DFAT)	Australia's shared maritime boundaries	DFAT has no direct role in the management of the Commonwealth marine area but has an interest in ensuring that consultation with foreign entities, both private and government, is effective and is aligned with Australia's interests.	The Gippsland worst case spill scenario extends beyond the Australian EEZ and therefore prudent to check DFAT interest.
Department of Defence (DoD)	National security	Relevant where the proposed activity may impact DoD operational requirements, where the proposed activity encroaches on known training areas and/or restricted airspace and where there is a risk of unexploded ordnance in the area where the activity is taking place.	The Gippsland environment sector overlaps DoD areas.
National Native Title Tribunal (NNTT)	Cultural heritage / spiritual connection	Body that manages applications for and administration of native title in Australia. There are numerous areas of determination along the coastline representing many first nations peoples' communities. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in Commonwealth and State waters. Gippsland Environment Sector intersects the coastline and nearby sea country with determination and claims in place.
Director of National Parks (DNP)	Managing Commonwealth reserves and conservation zones	The DNP is a relevant person for consultation for this project in relation to potential incidents in Commonwealth waters which could impact on the values of a Commonwealth marine park.	Operational Area does not overlap marine parks however, potential EMBA for unplanned spill scenario overlap and impact the values within a Commonwealth marine park. Consult in relation to spill response planning as relevant.
Department of Energy, Environment and Climate Action (DEECA) - Biodiversity Division	Victorian biodiversity	Department protects and preserves Victoria's native landscape through a range of biodiversity programs and also manages biodiversity reference tools/maps and native vegetation information system.	Operational Area intersects Victorian waters and coastline.
DEECA – Biosecurity and agricultural services (BAS)	Victorian biosecurity	DEECA BAS manage advice on biosecurity within Victoria including vessels in state waters/calling into ports. The DEECA BAS has provided advice during the development of Cooper Energy IMS risk management processes.	Potential for biosecurity risk associated with conveyances applicable to the Activity, such as equipment and vessels.
Parks Victoria	Wildlife and habitat protection/conservation in Victoria	Manages Victoria's land and marine national parks and reserves.	There is no overlap with Victorian parks by the Operational Area; however, the EMBA overlaps marine and terrestrial Victorian parks.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
DEECA – Marine National Parks and Marine Parks	Wildlife and habitat protection/conservation	Management of marine national parks within Victorian State Waters is via Parks Victoria.	There is no overlap with Victorian parks by the Operational Area; however, the EMBA overlaps three Victorian MPA.
DISR- Regional Development Victoria (RDV)	Economic development	Partnership between the Australian, state and territory governments to support the growth and development of Australia's regions.	EMBA intersects the area managed by the Gippsland RDA committee.
Department of Transport and Planning (DTP)	Marine pollution response in Victoria	Responsible for marine pollution response arrangements in Victorian jurisdiction. DTP coordinates advice with other state agencies involved in marine pollution response including DEECA and Port Authorities.	EMBA and Support vessel routes overlaps with Victoria waters as such OPEP sets out arrangements with DTP.
Department of Planning and Environment - Environment and Heritage Group NSW	Wildlife and habitat protection/conservation	Environment and Heritage works with communities, businesses, and governments to protect, preserve, and strengthen the quality of their natural environment and heritage.	Petroleum activity is not occurring in NSW waters. Spill EMBA enters NSW waters and intersects with two NSW marine protected areas.
Department of Primary Industry NSW	Wildlife and habitat protection/conservation	The Department of Primary Industries undertakes the day-to-day management of marine parks and aquatic reserves in NSW.	Petroleum activity is not occurring in NSW waters. Spill EMBA enters NSW waters and intersects with two NSW marine protected areas.
Department of Primary Industries – Fisheries NSW	Changes in fishery access and/or habitat	Agency of the NSW Government, responsible for the administration and development for fisheries and aquaculture in NSW.	Petroleum activity is not occurring in NSW waters. Spill EMBA enters NSW waters and overlaps six NSW fisheries.
Transport Safety Victoria (Maritime Safety)	Marine Safety	Manages safety of waterways in Victoria and prepares State Waters Notice to Mariners. Acts as AMSA delegate in Victoria in event of marine incidents.	Notice to Mariners required in State waters for the Activity when IMR vessel operates in State waters.
Transport NSW	Marine pollution response in NSW	Responsible for marine pollution response arrangements in NSW jurisdiction. Transport NSW coordinate advice with other state agencies involved in marine pollution response including NSW EPA and Port Authorities.	EMBA overlaps with NSW waters/shoreline involved in response and management of pollution incidents involving hazardous materials (in collaboration with other government agencies).
NSW Department of Planning, Industry and Environment (See Transport NSW)	Regulator – NSW	In the event of a marine pollution incident, activities associated with spill response may be required to enter NSW waters.	Petroleum activity is not occurring in NSW waters. Spill EMBA overlaps with NSW waters
Victorian Fisheries Authority (VFA) – DISR	Changes in fishery access and/or habitat	Independent statutory authority established to effectively manage Victoria's fisheries resources. It is also a function to respond to any emergency or undertake compliance and enforcement activities. The VFA is the control agency for shark hazards in Victorian waters and is a support agency for emergencies in the aquatic environment.	Operational Area and EMBA overlap with Victorian Fisheries.
The Department of the responsible State Minister– Regulation 25(1)(b)			
DEECA – Earth Resources Regulation	Regulator of exploration, mining, quarrying, petroleum,	In the event of a marine pollution incident, activities associated with spill response will be required in Victorian waters.	Operational Area and EMBA overlap with Victoria waters.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
	recreational prospecting and other earth resource activities in Victoria.		
A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP – Regulation 25(1)(d) [no Relevant Persons were classified under Regulation 25(1)(e)]			
Commonwealth fisheries			
Australian Southern Bluefin Tuna Industry Association	Changes in fishery access and/or habitat	Represents the Australian Southern Bluefin Tuna Industry.	Fishery management area intercepts with Operational Area and Gippsland environment sector.
Bass Strait Scallop Industry Association	Changes in fishery access and/or habitat	Industry association for the Bass Strait Central Scallop Fishery operators.	Operational Area and the Gippsland environment sector intersect the management area for Bass Strait Central Zone Scallop fishery.
Commonwealth Fisheries Association (CFA)	Changes in fishery access and/or habitat	Peak industry body representing the interests of fishers operating in Commonwealth managed fisheries. AFMA recommended engagement with CFA as the peak fishing industry body for Commonwealth fisheries.	Petroleum Activity and support route overlaps with Commonwealth fisheries areas and may restrict access.
Seafood Industry Australia (SIA)	Changes in fishery access and/or habitat	The national peak-body representing members from the wildcatch, aquaculture and post-harvest sectors of the Australian seafood industry.	The Gippsland environment sector overlaps with fisheries who may be members of the peak body.
South East Fishing Trawl Industry Association (SEFTIA)**	Changes in fishery access and/or habitat	Peak industry body representing the interests of fishers operating in the Commonwealth Trawl Sector.	Records indicate LEFCOL (represented by SIV) and SEFTIA have historically represented the majority of fishing vessels that may be impacted by the Gippsland Offshore Operations.
Southern Rock Lobster (SRL)	Changes in fishery access and/or habitat	National peak body working to further the interests of the Australian Southern Rock Lobster Industry. Note Southern Rock Lobsters have extensive larval dispersal and can be found to depths of 150 m, with most of the catch coming from inshore waters less than 100 m deep (VFA 2017). Small quantities of Eastern Rock Lobster are taken off eastern Victoria, particularly near the border of New South Wales and Victoria (VFA 2017).	Petroleum Activity is within the eastern zone of the Rock Lobster Fishery.
Southern Shark Industry Alliance (SSIA)**	Changes in fishery access and/or habitat	Industry body representing interests of its Commonwealth-licenced shark gillnet and shark hook members in the Gillnet Hook and Trap Fishery. Activity is within the Southern and Eastern Scalefish and Shark Fishery management area where there is no fishing effort.	Within fishery area and given fisheries interest in area access. However, no overlap between this aspect of the project and Relevant Person functions, interests, and activities expected given no recent fishing effort. *Noting engagement is via SETFIA.
Southern Squid Jig Fishery	Changes in fishery access and/or habitat	Individual skippers managed by AFMA South East Management Advisory Committee. Activity is within the Southern Squid jig fishery management area, fishing effort record was identified	Within fishery area and given fisheries interest in area access.
Sustainable Shark Fishing Inc.**	Changes in fishery access and/or habitat	Activity is within the Southern and Eastern Scalefish and Shark Fishery management area where there is no fishing effort.	Within fishery area and given fisheries interest in area access. However, no overlap between this aspect of the

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
			project and Relevant Person functions, interests, and activities expected.
Tuna Australia	Changes in fishery access and/or habitat	Peak body representing statutory fishing right owners, holders, fish processors and sellers, and associate members of the Eastern and Western tuna and billfish fisheries of Australia.	Operational Area overlaps Eastern Tuna and Billfish Fishery and Southern Bluefin Tuna Fishery area.
State fisheries			
Abalone Council Australia	Changes in fishery access and/or habitat	Peak industry body representing the wild-harvest abalone Industry from Tasmania, Victoria, South Australia, Western Australia and New South Wales.	Operational Area and Gippsland environment sector are within the Victorian Eastern Abalone Zone. Based on water depths for fishing (<30 m) and habitat overlap between planned activities may occur.
Abalone Council Victoria	Changes in fishery access and/or habitat	The peak body representing interests of abalone divers, quota holders and processors in the Victorian wild harvest abalone fishery.	Operational Area and Gippsland environment sector overlap Victorian Central Abalone Zone. Abalone diving activity occurs close to shoreline (generally to depths of 30 m on rocky reefs). Interaction may occur.
Abalone Victoria Central Zone Ltd	Changes in fishery access and/or habitat	Represents the views and interests of its members and to ensure appropriate governance of member resources. Fishing occurs in water depths <30 m.	Activity is within the Victorian Central Abalone Zone. Interaction may occur.
Australian Wildcatch Fishing (Corporate Alliance Enterprises)	Changes in fishery access and/or habitat	Operate in SESS Fishery	Operational Area and spill EMBA are within the SESS Fishery management area.
Commercial Fishermen's Co-Operative	Changes in fishery access and/or habitat	Supports local commercial fishers in NSW (assist members to maximise their returns from the sale of their seafood catches)	Spill EMBA intersects with NSW waters used for commercial fishing.
East Gippsland Estuarine Fishermen's Association	Changes in fishery access and/or habitat	Industry body representing views and interests of its members which operate within the Gippsland Lakes. Represented by SIV. (Fishery currently closed)	Spill EMBA intersects with East Gippsland waters.
Eastern Victoria Sea Urchin Divers Association	Changes in fishery access and/or habitat	Industry body representing views and interests of its members. Activity is within the eastern zone of the Sea Urchin Fishery.	Activity overlap fishery. Interaction may occur.
Eastern Victorian Rock Lobster Industry Association	Changes in fishery access and/or habitat	Industry body representing views and interests of its members. Note Southern Rock Lobsters have extensive larval dispersal and can be found to depths of 150 m, with most of the catch coming from inshore waters less than 100 m deep (VFA 2017). Small quantities of Eastern Rock Lobster are taken off eastern Victoria, particularly near the border of New South Wales and Victoria (VFA 2017).	Activity overlap fishery. Note engagement is via SETFIA.
Eastern Zone Abalone Industry Association	Changes in fishery access and/or habitat	Industry body representing views and interests of its members. Activity is within the Victorian Eastern Abalone Zone. Based on water depths for the fishery (typically <30 m). It is noted that relevant person has been sent information regarding Sole and BMG activities during 2017 and 2018 with no response.	Operational Area and Gippsland environment sector overlap fishery. Based on water depths for fishing (<30 m) and habitat overlap between planned activities may occur.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Lakes Entrance Fishermen's Society Cooperative Limited	Changes in fishery access and/or habitat	Industry body and fishing services provider. Represents views and interests of its members. Activity overlaps with State fisheries who may be members of the cooperative.	Activity overlap fishery. *Note indirectly engaged via representative body (SIV).
NSW Professional Fishermen's Association	Changes in fishery access and/or habitat	Not-for-profit representative group providing a voice for members of the Professional Fishing Industry in NSW	Spill EMBA and Gippsland environment sector intersects with NSW waters which may be used for commercial and recreational fishing
Port Franklin Fishermen's Association	Changes in fishery access and/or habitat	Industry body representing views and interests of its members. Activity overlaps with State fisheries who may be members of the association. Port Franklin is in South Gippsland.	Activity overlaps with State fisheries who may be members of the association. Note indirectly engaged via representative body (SIV).
Scallop Fishermen's Association Inc.	Changes in fishery access and/or habitat	Represents the interests of scallop fishermen operating within Australia's south east waters. Members hold entitlement to operate within the Bass Strait Central Zone Scallop Fishery, the Victorian Scallop Fishery and the Tasmanian Scallop Fishery.	Operational Area and Gippsland environment sector overlap scallop fishery area.
Seafood Industry Victoria (SIV)	Changes in fishery access and/or habitat	Peak industry body representing the interests of fishers operating in State (Vic) managed fisheries. SIV primary contact for State fishers. Multiple constructive engagements over the years with SIV to discuss Cooper Energy's activities and ongoing engagement. SIV has expressed interest in overlapping activities with its members and reducing the size of PSZs. SIV engagement covers following fisheries; VRLA, AVCZ, Eastern Victoria Sea Urchin Divers Association, Eastern Zone Abalone Industry Association, Lakes Entrance Fishermen's Society Cooperative Limited, Port Franklin Fishermen's Association, San Remo Fishing Cooperative	Activity overlaps with a number of State fisheries. Changes in PSZ and fishing access of interest. Records indicate Lakes Entrance Fishermen's Society Cooperative Limited (represented by SIV) and SETFIA represent the majority of fishing vessels that may be affected by activities.
Victorian Rock Lobster Association (VRLA)	Changes in fishery access and/or habitat	Activity is within the eastern zone of the Rock Lobster Fishery.	Activity overlap fishery. Note previously requested that consultation be undertaken via SIV; as such indirectly engaged via SIV.
Victorian Scallop Fisherman's Association	Changes in fishery access and/or habitat	Representative body of Victorian Scallop Fisherman. Most of our members are based in Lakes Entrance, in East Gippsland, Victoria. Activity is within the Bass Strait Scallop Fishery.	Activity is within the Bass Strait Scallop Fishery. Via previous consultation are mainly concerned regarding seismic surveys.
AMP Licence Holders			
AARNet Pty Ltd	Changes in seabed quality Changes to water quality	Provides telecommunications, cyber security, data and collaboration services and network with focus on research and education sector. Involved in the install of new structures in Central Eastern AMP from 2019 – 2044.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Commonwealth Scientific and Industrial Research Organisation	Changes to water quality. Wildlife and habitat protection/conservation Non-commercial research	Australian government agency responsible for scientific research.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Major Projects Foundation Ltd	Wildlife and habitat protection/conservation	Supports conservation, research and education. Relevant Person is an AMP licence holder for research and monitoring in Beagle.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Stakeholder ID: OI-SCMY	Changes in fishery access and/or habitat Tourism	Undertakes commercial tourism and charter fishing in the Central Eastern AMPs.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Stakeholder ID: OI-SP	Visual amenity	Wildlife, aerial, underwater film and photography specialist who is an AMP licence holder for commercial media and drone use in Beagle, Jervis, Flinders, Freycinet.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Stakeholder ID: OI-JGP	Visual amenity	Wildlife, aerial, underwater film and photography specialist	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Subpartners Pty Ltd	Changes in seabed quality Changes to water quality	Construction company delivering telecommunication infrastructure projects with submarine cable speciality. Relevant Person is an AMP licence holder for commercial structures and works in Beagle AMP from 2018 - 2043.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
The Trustee for The Minderoo Foundation Trust	Changes to water quality Wildlife and habitat protection / conservation Non-commercial research	Philanthropic organisation that is an AMP licence holder for research and monitoring and non-commercial research.	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Southern Cross Cables Ltd	Changes in seabed quality Changes to water quality	Provides telecommunications networks	Petroleum activity is not occurring in AMPs. Gippsland Environment Sector intersects East Gippsland AMP.
Businesses			
Orbost Chamber of Commerce	Local business and community	Promotes and supports the growth of local business and communities in the Orbost region proximate to the Cooper Energy OGP.	Organisation focus area includes locations of the OGP and the greater Orbost district.
Yarram and District Traders Association	Local business and community	Members based business association promoting local organisations, activities and services across Gippsland.	Petroleum activity is not occurring within organisation focus areas which includes local businesses. Gippsland environment sector may intersect with these areas.
ENGOs			
Australian Coastal Society – Victorian Chapter	Wildlife and habitat protection/conservation	Contributes to a number of coastal and marine policy reforms happening in Victoria via working groups and submissions.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Australian Conservation Foundation	Climate change and habitat protection/conservation	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Organisation's focus is climate action and conservation.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Australian Marine Conservation Society	Climate change and wildlife and habitat protection/conservation in Australia	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Society employs conservation experts and collaborate with research centres to safeguard the future of Australia's oceans and also take action against climate change.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Environment Victoria	Wildlife and habitat protection/conservation	Victoria based charity campaigning to solve the climate crisis and build a thriving, sustainable society that protects and values nature. Key focus is climate change and Victorian wildlife.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Friends of the Earth - Melbourne	Climate change and habitat protection/conservation	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Organisation focus includes climate justice, ecosystem conservation, First Nations' allegiance and keeping fossil fuels in the ground.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Greenpeace	Climate change and habitat protection/conservation	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Organisation campaigns include ending the oil age, whale protection and climate change.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
International Fund for Animal Welfare	Wildlife and habitat protection/conservation	Global non-profit helping animals and people thrive together. Run various programs including marine mammal rescue and research, and marine conservation	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Living Ocean	Research and monitoring	Centre for marine studies to contribute to international research, community education, and the conservation of marine environments and animals. Focus areas include climate change. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Marine Mammal Foundation	Water quality Marine wildlife Habitat protection/conservation	Protects the marine environment for mammals (including southern right whales) through research, community engagement, and education.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Ocean Watch	Changes in fishery access and/or habitat Habitat protection/conservation	Not-for-profit environmental company that works to advance sustainability in the Australian seafood industry and operates community-based coastal habitat restoration programs. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Rising Tide Australia	Climate change Community interest	Grassroots activist collective based in Newcastle, Australia, with focus on climate change and demanding Australia honours commitment to the goals of the Paris Climate Agreement. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Sea Shepherd Australia	Wildlife and habitat protection/conservation	Organisation focus is marine conservation to protect global oceans. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Surfers for Climate	Climate change Community interest Water quality Marine wildlife Habitat protection/conservation	A sea-roots movement dedicated to positive climate action with focus being no new oil. Gippsland offshore operations involve a petroleum activity.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Surfrider Foundation Australia	Climate change Community interest Water quality Marine wildlife Habitat protection/conservation	Not-for-profit dedicated to the protection of Australia's waves and beaches through conservation, activism, research and education. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
The Nature Conservation Council of NSW	Wildlife and habitat protection/conservation	Advocate and campaign to protect nature and for a safe climate. Focus areas include climate change and wetlands. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Whale and Dolphin Conservation Australia	Habitat protection/conservation Marine fauna	Dedicated to the conservation and protection of all whales and dolphins in Australia. Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Wilderness Society Melbourne	Wildlife and habitat protection/conservation	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Organisation holds opposition to drilling for oil along Australia's southern coast and support communities to stand up to Big Oil.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
World Wildlife Fund	Climate change and habitat protection/conservation	Gippsland offshore operations involve a petroleum activity being undertaken in offshore Australian waters. Organisation's focus is conservation of nature, climate change and ocean plastic.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
First Nations			
Batemans Bay LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector reaches NSW waters, shoreline and therefore sea country.
Bega LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector reaches NSW waters, shoreline and therefore sea country.
Bidwell first nations clans aboriginal corporation	Cultural heritage / spiritual connection	Corporation represents Bidwell First Nations Clans located in Gippsland eastern Victoria. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects coastline of eastern Gippsland and sea country.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Bodalla LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector reaches NSW waters, shoreline and therefore sea country.
Cobowra LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector reaches NSW waters, shoreline and therefore sea country.
Eden LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector reaches NSW waters, shoreline and coastline of Eden LALC and nearby sea country.
Federation of Victorian Traditional Owner Corporations	Cultural heritage / spiritual connection	An incorporated peak body comprising of seven of the Victorian Traditional Owner Groups. State-wide body convenes and advocates for the rights and interests of Traditional Owners while progressing wider social, economic, environmental and cultural objectives.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects the coastline of Victoria and nearby sea country.
First Nations Legal & Research Services	Cultural heritage / spiritual connection	Provides native title services for traditional owners in Victoria. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects the coastline of eastern Victoria and nearby sea country.
Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC)	Cultural heritage / spiritual connection	Gunaikurnai people are the Traditional Owners of lands from Warragul in the west to the Snowy River in the east. GLaWAC is the Registered Aboriginal Party (RAP) for the Gunaikurnai. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects the coastline of eastern Victoria and GLaWAC sea country.
Illawarra LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects coastline of Illawarra lands and nearby sea country.
Jerrinja LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects coastline of Jerrinja land and nearby sea country.
Krowathunkoolong Keeping Place	Cultural heritage / spiritual connection	Museum in Bairnsdale displaying the heritage of the Gunaikurnai people who have lived in East Gippsland. Organisation is active in local aboriginal working groups. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects coastline of east Gippsland and nearby sea country. While no direct impacts, may be source for additional Relevant Persons within community.
Lake Tyers Aboriginal Trust	Cultural heritage / spiritual connection	Based in Lakes Entrance in Victoria, the trust is made up of self-governing community based on Lake Tyers permanent reserve. In the unlikely event a spill occurs and reaches shorelines, cultural heritage and spiritual connections could be affected.	Petroleum activity occurs in State and Commonwealth waters. Gippsland environment sector intersects coastline of east Gippsland and nearby sea country. While no direct impacts, may be source for additional Relevant Persons within community.
Merrimans LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects south west coastline of NSW and nearby sea country.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Mogo LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the southern NSW coastline and nearby sea country.
Ngambri LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the southern NSW coastline and nearby sea country, and Ngambri is part of the South Coast LALC zone.
Nowra LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the southern NSW coastline and nearby sea country.
NSW Aboriginal Land Council	Cultural heritage / spiritual connection	NSW peak representative body in Aboriginal Affairs to protect interests of its members and the Aboriginal community. The largest member based Aboriginal organisation in NSW. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected. LALC's are significant land holders across the state and have functions under the Act in respect to the management and development of land assets as well as the protection and promotion of Aboriginal culture and heritage.	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the NSW coastline and nearby sea country.
NTSCORP Limited	Cultural heritage / spiritual connection	Native Title Service Provider for Aboriginal Traditional Owners in NSW and the Australian Capital Territory. In the unlikely event a spill occurs that extends into sea country, cultural heritage and spiritual connections could be affected.	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the coastline and nearby sea country with determination and claims in place
South Coast regional LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects the southern coastline of NSW and nearby sea country.
Ulladulla LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects southern NSW coastline and nearby sea country.
Wagonga LALC	Cultural heritage / spiritual connection	Functions include maintenance and enhancement of Aboriginal culture, identity and heritage (including the management of traditional sites and cultural materials).	Petroleum activity is not occurring in NSW waters. Gippsland environment sector intersects southern NSW coastline and nearby sea country.
Local Government			
Bega Valley Shire Council	Community interest	Local government area located adjacent to the south-eastern coastline of NSW.	Information being provided to local government areas where an oil spill may result in shoreline contact.
East Gippsland Shire Council	Community interest	Local government area in Gippsland, Victoria located in the eastern part of the state.	Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Eurobodalla Shire Council	Community interest	Local government area located in the south coast region of NSW in a largely mountainous coastal region and situated adjacent to the Tasman Sea, the Princes Highway and the Kings Highway.	Information being provided to local government areas where an oil spill may result in shoreline contact.
Wellington Shire Council	Community interest	Represents a local government area in Victoria, Australia, located in the eastern part of the state.	Information being provided to local government areas where an oil spill may result in contact with waters nearby the Shire.
Member of Parliament			
Member for Gippsland South – Lower House-Victoria	Community interest Jobs Projects Emergency Response	Government / Community Representative - focal point for the wider onshore community	Information being provided to Member of Parliament representing areas where an oil spill may result in shoreline contact.
Member for Gippsland East-Lower House-Victoria	Community interest Jobs Projects Emergency Response	Government / Community Representative and focal point for the wider onshore community	Information being provided to Member of Parliament representing areas where an oil spill may result in shoreline contact.
Member for Gippsland-Lower House - Commonwealth	Community interest Jobs Projects Emergency Response	Government / Community Representative and focal point for the wider onshore community	Information being provided to Member of Parliament representing areas where an oil spill may result in shoreline contact.
Member for Eastern Victoria – Upper House - Victoria	Community interest Jobs Projects Emergency Response	Government / Community Representative and focal point for the wider onshore community	Information being provided to Member of Parliament representing areas where an oil spill may result in shoreline contact.
Oil and Gas Industry			
3D Oil Limited	Oil and Gas exploration and production Maritime safety Cumulative impacts	3D Oil have Permit in Vic/P74 in Gippsland Basin. Permit work program details potential seismic survey (2023), geological and geophysical surveys (2024) and drilling of one well (2025).	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Asset Energy Pty Ltd	Oil and Gas exploration and production Maritime safety Cumulative impacts	Asset Energy holds an 85% interest in Petroleum Exploration Permit 11 (PEP-11).	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Carnarvon Hibiscus Pty Ltd	Oil and Gas exploration and production Maritime safety Cumulative impacts	CHIB holds VIC/P57. Work program includes one exploration well in 2023 and geophysical and geotechnical studies in 2024. Vic/RL17 (formerly VIC/L31) work program includes geotechnical studies in 2023 within the Gippsland Basin.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Emperor Energy	Oil and Gas exploration and production Maritime safety Cumulative impacts	Proponent holding offshore exploration permit Vic/P47 in the Gippsland Basin which currently contains two gas discovery wells. Seeking to drill an exploration well in 2024.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Esso (a subsidiary of Exxon Mobil)	Oil and Gas exploration and production Maritime safety Cumulative impacts	Oil and Gas proponent with offshore and onshore operations in the Gippsland Basin.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Liberty Petroleum Corporation	Oil and Gas exploration and production Maritime safety Cumulative impacts	Oil and Gas Proponent in the Gippsland Basin holding Vic/P77 and Vic/P78 exploration permits to the east of Cooper Energy. Permit work program outlines a 2024 seismic survey and 2025 exploration well.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
SGH Energy	Oil and Gas exploration and production Maritime safety Cumulative impacts	SGH has 100% interest in the Longtom gas and condensate field in Bass Strait, Victoria but are not the operator.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
The Crown in right of Victoria	Oil and Gas exploration and production Maritime safety Cumulative impacts	Holds a greenhouse gas assessment permit for G-5-AP in Gippsland. Work program in 2023 shows no offshore work.	Information being provided to offshore proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Offshore Wind			
Bluefloat Energy (Greater Gippsland Offshore Wind)	Offshore wind energy exploration and generation	The Greater Gippsland Offshore Wind Project is a 2.085 GW project located off the coast of the Gippsland region of Victoria.	Information being provided to offshore wind proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Corio Generation (Great Eastern Offshore Wind Farm)	Offshore wind energy exploration and generation	Great Eastern Offshore Wind is proposed to be located ~22 km off the central Gippsland coast. Great Southern Offshore Wind is a proposed renewable energy project off the Bass Coast.	Information being provided to offshore wind proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Flotation Energy (Seadragon)	Offshore wind energy exploration and generation	Large scale offshore wind project proposed in Gippsland. Currently in planning and approvals stage.	Information being provided to offshore wind proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Port Anthony Renewables	Offshore wind energy exploration and generation	Organisation committed to establishing themselves as the largest green hydrogen hub in southeastern Australia.	Information being provided to offshore wind proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Star of the South	Offshore wind energy exploration and generation	Proposed to be located off the south coast of Gippsland with the potential to supply up to 20% of Victoria’s electricity needs.	Information being provided to offshore wind proponents near to the Operational Area or within the Gippsland environment sector. Simultaneous activities are a consideration for operational synergies and cumulative impact assessments.
Other			
Australian Oceanographic Services Pty Ltd	Fisheries studies	Oil and Gas and Fishery Liaison with interest in work being undertaken in the area.	Relevant Person has long standing association with both fishing and oil & gas industries offshore Victoria including the Gippsland environment sector.
Catherine Hill Bay Progress Association	Environment and Heritage	Preserving the heritage values and representing Catherine Hill Bay.	Catherine Hill Bay coastline intersects the BMG spill EMBA.
Golden Beach VMMR Recreation Reserve Club	Community interest	Recreation reserve and community hub home to bowls, bush walking and food and drink.	Recommended for inclusion by Wellington Shire Council as local area coastline intersects the Gippsland environment sector.
Golden Paradise Beach Ratepayers and Residents Association	Community interest	Members based not for profit Volunteer Organisation providing a range of services and advocacy for the communities of Golden and Paradise Beach, in Gippsland, Victoria.	Recommended for inclusion by Wellington Shire Council as local area coastline intersects the Gippsland environment sector.
Port Albert Progress Association	Community Interest	Represents local community through involvement in events, fundraising, improvement of facilities and works with local government on development and community planning issues.	Recommended for inclusion by Wellington Shire Council as local area coastline intersects the Gippsland environment sector.
Seaspray Ratepayers Association	Community Interest	Local community group involved in Seaspray developments and planning with a focus on growing Seaspray into a premier tourism destination.	Recommended for inclusion by Wellington Shire Council as local area coastline intersects the Gippsland environment sector.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
Yarram / Port Albert / Tarraville Anglican Church and Markets	Community Interest	Anglican church and parish community markets in Yarram and Tarraville Victoria	Recommended for inclusion by Wellington Shire Council as local area coastline intersects the Gippsland environment sector.
Ports / Ports Operators			
Port Authority NSW	Marine Safety Water Quality	Port Authority of NSW that manages the navigation, security and operational safety needs of commercial shipping in NSW. Encompasses Port Kembla, Port of Eden, Port Botany and Newcastle.	Information being provided to port/operators within the Gippsland environment sector.
Gippsland Ports	Marine Safety Water Quality Emergency Response	Gippsland's local ports stretch over 720 kms from Anderson Inlet to Mallacoota on the south-eastern coastline of Victoria, Snowy River (Marlo), Gippsland Lakes, Corner Inlet and Port Albert, Anderson Inlet (Inverloch) and four waterways.	Information being provided to port/operators within the Gippsland environment sector. Gippsland ports would be involved in the emergency response in the event of a spill.
Recreational Fishing			
Recreational Fishing (NSW)	Fishing Access to fishing areas Ecosystem/fish health Sustainability of fisheries	Aiming to be recognised as the peak body of NSW and represent the interests of the recreational anglers of NSW	Recreational fishing vessels may intersect with the Gippsland environment sector.
Victoria Game Fishing Club	Fishing Access to fishing areas Ecosystem/fish health Sustainability of fisheries	The premier game fishing club in the southern states of Australia	Recreational fishing vessels may intersect with the Gippsland environment sector.
Victorian Bays and Inlets Fisheries Association	Fishing Access to fishing areas Ecosystem/fish health Sustainability of fisheries	Members organisation that act as custodians of marine resources and the environment. Members promote and demonstrate ecologically sustainable and thriving bay and inlet Fisheries and ensure the continued supply of high quality, locally caught fresh seafood, which is valued by the Victorian community.	Recreational fishing vessels may intersect with the Gippsland environment sector.
Victorian Recreational Fishers Association	Fishing Access to fishing areas Ecosystem/fish health Sustainability of fisheries	Peak body representing recreational fishing interests in Victorian waters.	Recreational fishing vessels may intersect with the Gippsland environment sector.
Recreational Groups			
Academy of Scuba	Changes in water quality	Ocean diving training centre.	Information being provided to recreational groups with shoreline location and water-based focus within EMBA.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
	Tourism Fish and invertebrates Fish and invertebrates spawning Ecosystem / fish health Marine fauna		
Boating Industry Association of Victoria	Ecosystem health Water quality	Peak body for the marine sector with members comprising registered boat owners, marine license holders, and boating participants in Victoria.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Dive Industry Association of Australia	Changes in water quality Tourism Fish and invertebrates Fish and invertebrates spawning Ecosystem / fish health Marine fauna	Encourages the exchange of ideas and information on diving-related issues; to seek solutions to matters of common concern, and to offer practical advice and support to its constituent membership.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Diving Industry of Victoria	Fish and invertebrates Fish and invertebrates spawning Ecosystem / fish health Marine fauna Changes in water quality Tourism	Promoting and supporting the diving industry. Activities include liaison with government bodies and authorities on marine conservation, environmental issues and other matters that affect the diving industry and the sport of diving in Victoria.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Ocean Racing Club of Victoria	Ecosystem health Water quality	Club which conducts regular offshore racing in Victoria. Home of blue water classic Melbourne to Hobart and Rudder Cup yacht races (noting route goes along west coast of Tasmania).	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Paddle NSW	Water quality Ecosystem health	Peak body for recreational and competitive paddling in NSW.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Paddle Victoria	Water quality Ecosystem health	Members organisation to support the paddling community	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
SCUBA Divers Federation of Victoria	Fish and invertebrates Fish and invertebrates spawning Ecosystem / fish health Marine fauna Changes in water quality Tourism	Amateur organisation representing diving clubs throughout Victoria.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Surfing Victoria	Water quality Ecosystem health	Governing and organising body for surfing in Victoria.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Windsurfing NSW Association	Water quality Ecosystem health	A network of affiliated windsurfing clubs across NSW.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Windsurfing Victoria	Water quality Ecosystem health	Represents the community of windsurfers in Victoria and promotes all aspects of the sport locally. Windsurfing Victoria is the public voice promoting windsurfing and lobbying to protect access to preferred spots around the State.	Information being provided to recreational groups with shoreline location and water-based focus within the Gippsland environment sector.
Research Groups			
Blue Whale Study	Pygmy blue whale conservation	International research collaboration interested in pygmy blue whale migration in south-east Australia.	Pygmy blue whales have the potential to be impacted by the activity. Potential overlap between the activity or EMBA and the blue whale study area. Sharing of sightings data collected during offshore campaigns.
Deakin University - School of Life and Environmental Sciences	Marine flora and fauna Research Ecosystem health Water quality	Academic Institution with interests and expertise in the marine environment, including built environments and interactions with marine fauna.	Cooper Energy has previously worked with Deakin University to undertake a habitat study focusing on BMG infrastructure. Petroleum activity with potential impacts and risks to the environment (Section 6); therefore, Relevant Person functions, interests, and activities may be affected.
Fisheries Research and Development Corporation	Ecosystem health Water quality Aquaculture Fisheries	A co-funded partnership between the Australian Government and the fishing and aquaculture sectors, to plan and invest in fisheries research, development and extension activities in Australia.	Petroleum Activity and Gippsland environment sector intersect numerous fisheries.
Fishwell Consulting	Ecosystem health Water quality Aquaculture Fisheries	Research advice and consulting services to encourage and promote sustainable fishing practices to the commercial fishing industry within Australia.	Petroleum Activity and Gippsland environment sector intersect numerous fisheries.

Relevant Person	Functions, Interests, Activities	Activity relevance	Reason for inclusion
IMAS – University of Tasmania	Climate change Water quality Ecosystem health	Research body in marine and Antarctic science between the University of Tasmania, CSIRO Marine and Atmospheric Research, the Australian Antarctic Division and other agencies. Research interests in various environment values and sensitivities and support for further research programs with common interests.	Other EPs in the Gippsland area have included this group in consultation upon their request.
Surf Life Saving Clubs			
Lakes Entrance Surf Life Saving Club	Water Quality	Community club undertaking beach patrols, surf sport, events and community social functions.	Relevant coastal area lies within Gippsland environment sector.
Life Saving Victoria	Water Quality	Organisation works with communities, educational institutions, governments, businesses and the broader aquatic industry to achieve new lifesaving and water safety initiatives.	Relevant coastal area lies within Gippsland environment sector.
Seaspray Surf Lifesaving Club	Water Quality	Community club undertaking beach patrols, surf sport, events and community social functions.	Relevant coastal area lies within Gippsland environment sector. Recommended by Wellington Shire Council for inclusion.
Tourism			
NSW Tourism Industry Council	Socio-economic Coastline ecosystem health Water quality Marine fauna	NSW Tourism Industry Council helps businesses operating in the visitor economy.	Tourism operators are present in the Gippsland environment sector
Victorian Tourism Industry Council	Ecosystem health Water quality Marine fauna	Peak tourism industry body advocating for Victoria's tourism and events industry. Represents over 1,000 businesses, providing opportunities for members to connect and keep informed on the latest research, policy development and impacts that shape the Victorian visitor economy.	Tourism operators are present in the Gippsland environment sector

***Actively fish within the vicinity of Gippsland Offshore Operational Area. Although multiple fisheries can legally fish in the area, only a few actually do due to the unsuitability of the area (depth/habitat) and/or the relative lack of target species.*

10.5 Summary of Relevant Persons Consultation

Appendix 5 provides a summary of the Relevant Person consultation undertaken as part of revising the EP and where applicable an assessment of any claims or objections.

All Relevant Person consultation activities along with any actions required and commitments made, are recorded and tracked via a stakeholder engagement register.

10.6 Assessment of Claims and Feedback

Cooper Energy assesses the merit of any claims or objections in line with the following process that also applies to new objections or claims received during ongoing consultation.

For a claim to have merit, it must first and foremost be relevant to the EP. After passing this relevancy test, the objection or claim should have a reasonable and credible basis for related effects or impacts to occur. This test does not need to be exhaustive, as all reasonable matters should be assessed when considering the objects of the Regulations.

Once a claim or objection is considered both relevant and reasonable, Cooper Energy will respond as follows:

1. If the matter raised is already considered in the EP, respond through the sharing of this information for the consideration of the Relevant Person.
2. If the matter raised results in the development of additional controls through further impact and risk evaluations, the Cooper Energy MoC Process shall be applied, and the outcomes will be shared with the Relevant Person.

The above steps may comprise an iterative process, and there may be a point at which consultation on an issue is concluded without the Relevant Person being satisfied with the outcome. Cooper Energy must have fully considered matters raised and demonstrate that impacts and risks of the activity are reduced to ALARP and an acceptable level.

In the case of First Nations spiritual aspects, Cooper Energy will work with the Relevant Person to gain an appropriated understanding of the issue(s) and aim to work collaboratively to manage impacts and risks.

10.7 Ongoing Consultation

Consultation for the Gippsland Offshore Operations scope has spanned a number of decades. The activities and management described within this EP are informed by historical and present consultation and will continue to be shaped by feedback from Relevant Persons. Cooper Energy will continue to provide annual updates on Gippsland Offshore Operations activities to Relevant Persons.

Notifications are captured in Table 10-3. Note, whilst NOPSEMA are not considered a ‘Relevant Person’, they are included here for completeness. The assessment of merit of any new claims or objections will be in accordance with the method outlined above.

During a mid-2023 emergency response exercise, it was noted there was a gap in contacts from the boundary of the GunaiKurnai RAP area and Eden (NSW) LALC. Victoria DTP advised they will coordinate necessary contacts in the case of an emergency event as the numerous very small groups are not part of a formal organisation. As noted below, Cooper Energy will also endeavour to contact these groups as part of its ongoing consultation.

Table 10-3: Ongoing Relevant Person Consultation and Notification

Ongoing Engagement	Timing	Person or Organisation
Provision of operational and offshore activity plans and Cooper Energy contact person flyer with updates on timing and activity details.	Annual (typically Q1) until this EP is closed or replaced.	Relevant Persons
Risk Reviews (fishery activity).	6-monthly	SETFIA.
Meetings, calls, enquiries, emails (e.g. interim activity updates).	Ongoing.	Relevant Persons

Ongoing Engagement	Timing	Person or Organisation
	Stakeholder engagement inbox is monitored throughout the planning and execution phases.	
Regulatory notification of start of an activity.	10 days prior to activity commencing.	DEECA/NOPSEMA
Provision of cetacean sightings.	Within 2 months of activity completion.	AAD Blue Whale Study
Other notifications as agreed during consultation.	As agreed, and as captured in the notifications register.	Relevant stakeholders
Notification to Eden LALC and GLaWAC in the event of an emergency spill scenario.	After activation of the OPEP, in line with OPEP notification requirements.	Eden LALC GLaWAC
Notification of start of activity for publication of AUSCOAST warning and notice to mariners.	3 weeks prior to activity commencing.	TSV/AHS
	24-48 hours prior to activity commencing.	TSV/AMSA
Notification to trawl fisheries of on-water activity. Notification to include: • type of activity • location of activity: coordinates and/or map • timing of activity: start and finish date and duration.	4 weeks prior to activity commencing Then, 1 day prior to activity commencing.	SETFIA, who will provide SMS to eastern fleet
Notification to trawl fisheries of cessation of on-water activity.	Within 10 days of activity completion.	
Regulatory notification of cessation of an activity.	Within 10 days of activity completion.	DEECA/NOPSEMA
Notification of cessation of activity to cease warnings for an activity.	On vessel demobilisation from field.	TSV / AHS / AMSA
Notifications and Consultation in the event of an Oil Pollution Emergency.	Refer to Section 2.4 of the Offshore Victoria OPEP.	Control Agencies Regulators Relevant Persons

Cooper Energy shall determine through internal risk assessment, 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, relevant person 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 as described in Section 9.11. Under the Regulations 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.

Notification to Relevant Persons of significant new or increased risks will be issued prior to submission of the revised EP as part of an ongoing and/or a new consultation process for the revised EP.

11 References

11.1 Cooper Energy Documents

Document Number	Document Name
Cooper Energy Documents	
CMS-TS-PRO-0007	Decommissioning Protocol
BMG-DC-EMP-0001	BMG Closure Project (Phase 1) EP
BMG-DC-EMP-0002	BMG Closure Project (Phase 2) EP
CMS-EN-PCD-0004	Offshore Chemical Assessment Procedure
CMS-EN-PRO-0002	Invasive Marine Species Protocol
CMS-EN-PCD-0006	Offshore Victoria Whale Disturbance Risk Management Procedure
CMS-EN-PRO-0001	Cooper Energy Environmental Protocol
CMS-EN-PRO-0003	Emissions Reduction Protocol
CMS-ER-PRO-0001	Incident Investigation and Reporting Protocol
CMS-ER-PRO-0002	Incident and Crisis Management Protocol
CMS-HR-PCD-0004	Training and Development Procedure
CMS-HS-POL-0001	Health, Safety, Environment and Community (HSEC) Policy
CMS-IM-PCD-0002	Document and Records Management Procedure
CMS-RM-PRO-0001	Risk Management Protocol
CMS-TS-PRO-0002	General Protocol
COE-EN-EMP-0001	Description of the Environment: Projects & Operations
COE-ER-ERP-0001	Incident Management Plan
CMS-ER-PRO-0001	Incident Investigation and Reporting Protocol
PBN-DC-ERP-0001	PB Asset Specific Source Control Emergency Response Plan
SOL-DC-ERP-0001	Sole Asset Specific Source Control Emergency Response Plan
SOL-DC-REP-017	Sole-3 Basic Data Report
VIC-DC-ERP-0001	Victoria Source Control Emergency Response Plan
VIC-ER-EMP-0001	Offshore Victoria Oil Pollution Emergency Plan
VIC-ER-EMP-0002	Offshore Victoria Operational and Scientific Monitoring Plan

11.2 Guidance

Document Number	Document Name
NOPSEMA Guidance	
A652993	Environmental bulletin - Oil Spill modelling, April 2019
N-00500-PL1903	Policy - Section 572 Maintenance and Removal of Property, December 2022
N-04300-GN0166	Guidance Note – ALARP, August 2022
N-04700-IP1349	Information Paper - Operational and scientific monitoring programs, October 2020
N-04750-GL1887	Guideline - Consultation with Commonwealth agencies with responsibilities in the Commonwealth marine area, January 2023
N-04750-GL2086	Guideline - Consultation in the Course of Preparing an Environment Plan, May 2023
N-04750-GN1488	Guidance Note - Oil Pollution Risk Management, July 2021
N-04750-GN1344 A339814	Guidance Note - Environment plan content requirement, December 2022
N-04750-GL1721 A524696	Guideline - Environment Plan decision making, December 2022

Document Number	Document Name
N-04750-IP1899	Information paper - Reducing marine pest biosecurity risks through good practice biofouling management, November 2022
Other Guidance	
AMSA	Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities
Commonwealth of Australia	EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species
DAFF	Australian Ballast Water Management Requirements
DAFF	Australian Biofouling Management Requirements
DCCEEW	Guidance on key terms within the Blue Whale Conservation Management Plan
DCCEEW	Draft Guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage
DCCEEW	National Light Pollution Guidelines for Wildlife
DEWHA	EPBC Act Policy Statement 1.1 – Significant Impact Guidelines 2013
HB 203	Environmental Risk Management – Principles and Process
IMO	Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species
ISO 14001	Environmental Management Systems
ISO 31000	Risk Management
Marine Pest Sectoral Committee	National Biofouling Management Guidance for the Petroleum Production and Exploration Industry
OGUK	The UK offshore oil and gas industry guidance on risk related decision making

11.3 Literature

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12 Glossary

Term	Definition
AAD	Australian Antarctic Division
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACMA	Australian Communications and Media Authority
ADIOS	Automated Data Inquiry for Oil Spills
AFMA	Australian Fisheries Management Authority
AHS	Australian Hydrological Service
AHTS	Anchor handling and tow support vessels
ALA	Atlas of Living Australia
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute
BAS	Biosecurity and agricultural services
bbl	Barrels
BIA	Biologically important area
BMG	Basker Manta Gummy
BRS	Bureau of Resource Sciences
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CEMS	Cooper Energy Management System
CFA	Commonwealth Fisheries Association
CGR	Condensate to gas ratio
CH_4	Methane
CM	Control measure
CMP	Conservation Management Plan
Cooper Energy	Cooper Energy Limited
CO_2	Carbon dioxide
Cth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry
DAWE	Department of Agriculture, Water and Environment (now DCCEEW)
DCCEEW	Department of Climate Change, Environment, Energy and Water
DEECA	(Victorian) Department of Energy, Environment and Climate Action
DFAT	Department of Foreign Affairs and Trade
DISR	Department of Industry, Science, and Resources
DNP	Director of National Parks
DoD	Department of Defence
DP	Dynamic positioning

Term	Definition
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
DSV	Dive support vessel
DTP	(Victorian) Department of Transport and Planning
EES	Environment Effects Statement
EEZ	Economic exclusive zone
EMBA	Environment that may be affected
EMSA	European Maritime Safety Agency
eNGOs	environmental Non-Government Organisations
ENVID	Environmental aspects identification
EP	Environmental Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPO	Environmental performance outcome
EPS	Environmental performance standard
ERP	Emergency Response Plan
ESD	Ecologically sustainable development
GHG	Greenhouse gas
GLaWAC	Gunaikurnai Land and Waters Aboriginal Corporation3
GVI	General visual inspection
HDD	Horizontal directional drill
HIPPS	High integrity pipeline protection system
HP	High-pressure
HSEC	Health, Safety, Environment and Community
IAP	Incident Action Plan
ILI	Inline inspection
IMAS	Institute for Marine and Antarctic Studies
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMOS	Integrated Marine Observing System
IMP	Integrity Management Plan
IMR	Inspection, maintenance and repair
IMS	Invasive marine species
IMT	Incident Management Team
IPA	Indigenous protected areas
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
ITOPF	International Tank Owners Pollution Federation
JRCC	Joint Rescue Coordination Centre
KEF	Key ecological feature
LALC	Local Aboriginal Land Council
LoC	Loss of containment

Term	Definition
LOWC	Loss of well control
LP	Low-pressure
MAE	Major accident events
MARPOL	International Convention for the Prevention of Pollution from Ships
MASP	Maximum anticipated surface pressure
MBES	Multibeam echosounder
MDO	Marine diesel oil
MEG	Mono-ethylene glycol
MES	Monitoring, Evaluation and Surveillance
MMO	Marine mammal observer
MMscf	Million standard cubic feet
MNES	Matters of national environmental significance
MoC	Management of Change
MoU	Memorandum of understanding
MODU	Mobile offshore drilling unit
MPA	Marine Protected Areas
MUTA	Main umbilical termination assembly
N/A	Not applicable
N_2O	Nitrous oxide
NDC	Nationally determined contributions
NEBA	Net Environmental Benefit Analysis
NGER Act	*National Greenhouse and Energy Reporting Act 2007* (Cth)
NO_X	Nitrous oxides
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NSW	New South Wales
NSWALC	New South Wales Aboriginal Land Council
OCNS	Offshore Chemical Notification Scheme
OEUK	Offshore Energies UK
OGP	Orbost Gas Plant
OGUK	Oil and Gas UK
OPEP	Oil Pollution Emergency Plan
OPGGS Act (Cth)	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)
OPGGS Act (Vic)	Offshore Petroleum and Greenhouse Gas Storage Act 2010 (Vic)
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)
OPGGSR	Offshore Petroleum and Greenhouse Gas Storage Regulations 2021 (Vic)
OSMP	Operational and Scientific Monitoring Plan
OWR	Oiled wildlife Response

Term	Definition
PAH	Polynuclear aromatic hydrocarbons
PB	Patricia-Baleen
PER	Public Environment Report
PK	Peak pressure
PLEM	Pipeline End Manifold
PLONOR	Pose Little or No Risk
PMST	Protected matters search tool
psia	Pounds per square inch absolute
PSZ	Petroleum Safety Zones
PTS	Permanent threshold shift
R_{max}	Maximum horizontal distance
RDV	Regional Development Victoria
ROV	Remotely Operated Vehicle
RTM	Response time model
SCERP	Source Control Emergency Response Plan
SEFTIA	South-east Fishing Trawl Industry Association
SEL	Sound exposure levels
SF_6	Sulfur hexafluoride
SFRT	Subsea first response toolkit
SIMAP	Spill Impact Mapping Analysis Program
SMPEP	Shipboard Marine Pollution Emergency Plans
SPL	Sound pressure levels
SPRAT	Species profile and threats
SRL	Southern Rock Lobster
SSIA	Southern Shark Industry Alliance
SSSV	Subsurface safety valve
SUTU	Subsea Umbilical Termination Unit
TEC	Threatened ecological communities
TPC	Third Party Contractors
TRP	Tactical Response Plan
TSSC	Threatened Species Scientific Committee
TTS	Temporary threshold shift
UCH Act	*Underwater Cultural Heritage Act 2018* (Cth)
VFA	Victorian Fisheries Authority
Vic	Victoria
VRLA	Victorian Rock Lobster Association
VSCP	Vessel Safety Check Program
WCD	Worst Case Discharge
WOMP	Well Operations Management Plan

Appendix 1 Legislative and other Requirements Relevant to the Activity

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
Commonwealth				
Australian Ballast Water Management Requirements	The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas.	Provides requirements on how vessel operators should manage ballast water when operating within Australian seas. Section 6.7 details these requirements.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention).	DAFF
Australian Biofouling Management Requirements	Sets out vessel operator obligations for the management of biofouling when operating vessels under biosecurity control within Australian territorial seas.	Provides requirements on biofouling management for vessels and having biofouling management plans. Impacts and risks associated with biofouling management as part of the proposed activities are discussed in Section 6.7 of this EP.	IMO 2011 Guidelines for the Control and Management of Ships' biofouling to Minimize the Transfer of Invasive Aquatic Species.	DAFF
Australian Maritime Safety Authority (AMSA) Act 1990	The aims of the Act are to: • promote maritime safety • protect the marine environment from pollution from ships and other environmental damage caused by shipping • provide for a national search and rescue service. AMSA is the authority responsible for the application of the Act.	The Act is applicable to offshore petroleum activities where these have the potential to affect maritime safety and/or result in pollution and other environmental damage associated with the operation of ships. This is in particular relevant to the potential risk of oil spill associated with offshore petroleum activities. Impacts and risks associated with vessel movements as part of the proposed activities are discussed in Section 6 of this EP.	• International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC) • Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 • International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969 • Articles 198 and 221 of the United Nations Convention on the Law of the Sea 1982.	AMSA
Biosecurity Act 2015 **Biosecurity Regulations 2016**	The *Biosecurity Act 2015* replaced the *Quarantine Act 1908* in June 2016. The *Biosecurity Act* and regulations apply to 'Australian territory' which is the airspace over and the coastal seas out to 12 nm from the coastline. The aims of this Act are to: • provide for managing the following: - biosecurity risks - the risk of contagion of a listed human disease	For the petroleum industry, the Act regulates the condition of vessels and drill rigs entering Australian waters regarding ballast water and hull fouling. The regulations stipulate that all information regarding the voyage of the vessel and the ballast water and hull fouling is declared correctly to the quarantine officers. Noting that the Operational Area is outside of 12 nm from the coastline, the activity does not fall under the *Biosecurity Act 2015*. However, vessels and the MOU travelling to and from the Operational Area will cross into the 12 nm territory limit, and therefore must adhere to relevant requirements. Management measures related to risk associated with the program are presented in Section 6.	International Convention on the Control and Management of Ship's Ballast Water and Sediment (Ballast Water Management Convention) (adopted in principle in 2004 and in force on 8 September 2017).	DAFF

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
	- the risk of listed human diseases entering Australian territory or a part of Australian territory, or emerging, establishing themselves or spreading in Australian territory or a part of Australian territory - risks related to ballast water - biosecurity emergencies and human biosecurity emergencies. • give effect to Australia's international rights and obligations, including under the International Health Regulations, the SPS Agreement and the Biodiversity Convention.			
***Environment Protection (Sea Dumping) Act 1981* and associated permit requirements**	Aims to prevent the inappropriate disposal of wastes (loading, dumping, and incineration) at sea from vessels, aircraft, and platforms. As such this Act regulates the loading and dumping of wastes at sea, as well as the creation of artificial reefs.	A sea dumping permit is needed it for any disposal of waste required to be made at sea from vessels, aircraft and platforms involved in the conduct of petroleum exploration and production activities in Australian waters, excluding operational discharges from ships (e.g. sewage and galley wastes). Thus, if a titleholder proposes to leave infrastructure partially or wholly in-situ, or dispose of infrastructure at a different site, a permit under the *Sea Dumping Act* may be required. Disposal of wastes required during the proposed activities is discussed in Section 6 of this EP.	Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 and 1996 Protocol Thereto (London Convention).	DCCEEW
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	The aims of this Act are to: • protect MNES • provide for Commonwealth environmental assessment and approval processes • provides an integrated system for biodiversity conservation and management of protected areas. MNES include: • world heritage properties • RAMSAR wetlands • listed threatened species and communities	EPBC Protected Matters are described in Section 4. Where offshore petroleum activities have the potential to impact on MNES, an assessment of these impacts is required to be presented in the EP. Potential impacts to MNES due to the proposed activities are assessed in Section 6 of this EP. The OPGGS Regulations preclude undertaking a petroleum activity within a world heritage area. The Gippsland P&A activity is not located within a world heritage area.	• agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 (JAMBA) • agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 (CAMBA) • convention on Biological Diversity and Agenda 21 1992 • convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979	DCCEEW

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
	• migratory species under international agreements • nuclear actions • Commonwealth marine environment • Great Barrier Reef Marine Park • water trigger for coal seam gas and coal mining developments. The assessment process is overseen by NOPSEMA as the delegated authority under the EPBC Act.		• convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 (CITES) • convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (RAMSAR) • international Convention for the Regulation of Whaling 1946.	
Environment Protection and Biodiversity Conservation Regulations 2000	Part 8 of the regulations provide distances and actions to be taken when interacting with cetaceans.	The interaction requirements are applicable to the activity in the event that a cetacean is sighted. Potential impacts to cetaceans due to the proposed activities are assessed in Section 6 of this EP.	None applicable	DCCEEW
Hazardous Waste (Regulation of Exports and Imports) Act 1989	The Act controls the import and export of hazardous waste in Australia	This Act applies to offshore petroleum activities when an Operator is required to move hazardous waste generated during the Activity in or out of Australia. The Act requires that a permit is required to transport controlled wastes. Hazardous wastes to be produced during the program are described in Section 9. Management measures applicable to hazardous wastes are presented in Section 6 of this EP.	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1992.	DCCEEW
National Biofouling Management Guidance for the Petroleum Production and Exploration Industry 2009	The guidance document provides recommendations for the management of biofouling hazards by the petroleum industry	Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of an introduced marine species. The requirements applicable to the activities are presented in Section 6.	• Convention on Biological Diversity • UN Convention on the Law of the Sea • International Convention on the Control of Harmful Anti-Fouling Systems on Ships • IMO Resolution MEPC.207(62) • 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species.	DAFF
National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna	The overarching goal of the strategy is to provide guidance on understanding and reducing the risk of vessel collisions and the impacts they may have on marine megafauna.	Applying the recommendations within this document and implementing effective controls can reduce the risk of the vessel collisions with megafauna. The requirements applicable to the activities are presented in Section 6.	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.	DCCEEW

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
Navigation Act 2012 ***Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth)***	The Act regulates international ship and seafarer safety as well as the protection of the marine environment from shipping and the actions of seafarers in Australian waters. The Act regulates: • vessel survey and certification • vessel construction standards • vessel crew • personnel qualifications and welfare • occupational health and safety • handling of cargoes passengers • marine pollution prevention • monitoring and enforcement activities. The Act also has subordinate legislation contained in Regulations and Marine Orders.	All ships involved in petroleum activities in Australian waters are required to abide to the requirements under this Act. Several Marine Orders (MO) are enacted under this Act which relate to offshore petroleum activities, including: • MO Part 21: Safety of navigation and emergency procedures • MO Part 30: Prevention of collisions • MO 31: SOLAS and non-SOLAS certification. • MO 47: Offshore industry units • MO Part 57: Helicopter operations • MO Part 59: Offshore industry vessel operations • MO 91: Marine pollution prevention—oil • MO 95: Marine pollution prevention—garbage • MO 96 Marine pollution prevention—sewage • MO 97 Marine pollution prevention—air pollution • MO 98: Marine pollution prevention—anti-fouling systems Management measures related to shipping safety during the program are presented in Section 6 of this EP.	• International Convention for the Prevention of Pollution from Ships 1973/78 (MARPOL 73/78) • International Regulations for Preventing Collisions at Sea 1972 (COLREGs)	AMSA
Marine Pest Plan 2018– 2023: National Strategic Plan for Marine Pest Biosecurity	Australia's national strategic plan for marine pest biosecurity. It outlines a coordinated approach to building Australia's capabilities to manage the threat of marine pests over the next five years. It represents agreed priorities and actions of governments, marine industries, and other Relevant Persons to achieve a common purpose: to manage the risks posed by marine pests and minimise their potential harm to marine industries, communities and the environment.	Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of an introduced marine species.	None applicable	DAFF
Minamata Convention on Mercury	The Minamata Convention on Mercury is an international treaty that seeks to protect human health and the environment from anthropogenic (caused by humans) emissions and releases of mercury and mercury compounds.	Applying the recommendations within this document and implementing controls non mercury management can reduce the risk of the introduction of potential impacts from mercury. The requirements applicable to the activities are presented in Section 6.	Minamata Convention was ratified on 7 December 2021	DCCEEW

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
***Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act)** **Offshore Petroleum and Greenhouse Gas Storage (Environment) (OPGGS(E) Regulations 2023**	The Act addresses all licensing, health, safety, environmental and royalty issues for offshore petroleum exploration and development operations extending beyond the 3 nm limit. Part 4 of the OPGGS(E)R specifies that an EP must be prepared for any Petroleum Activity and that activities are undertaken in an ecologically sustainable manner and in accordance with an accepted EP.	The OPGGS Act provides the regulatory framework for all offshore petroleum exploration and production activities in Commonwealth waters, to ensure that these activities are carried out: • consistent with the principles of ecologically sustainable development as set out in section 3A of the EPBC Act • so that environmental impacts and risks of the Activity are reduced to ALARP • so that environmental impacts and risks of the Activity are of an acceptable level. Demonstration that the proposed activities will be undertaken in line with the principles of ecologically sustainable development, and that impacts and risks resulting from these activities are ALARP and acceptable is provided in Section 6 of this EP.	None applicable	NOPSEMA
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989	The Ozone Acts control the manufacture, import, export, use and disposal of ozone depleting substances and synthetic greenhouse gases and products containing these gases. The aims of this Act are to: • control the manufacture, import, export, use and disposal of substances that deplete ozone in the stratosphere and contribute to climate change • achieve a faster and greater reduction in the levels of production and use of ozone depleting substances than are required under the Montreal Protocol • promote responsible management and handling of ozone depleting substances and synthetic greenhouse gases to minimise their impact on the atmosphere.	This Act applies to offshore petroleum activities when an Operator is required to use listed substances under the Act (HCFC, PFC and/or sulphur hexafluoride), e.g. for the operation of machinery such as refrigeration and air condition systems. Relevant management measures are presented in Section 6 of this EP.	• Montreal Protocol on Substances that Deplete the Ozone Layer 1987 • United Nations Framework Convention on Climate Change 1992.	DCCEEW
Protection of the Sea (Harmful Antifouling Systems) Act 2006	The Act aims to protect the marine environment from the effects of harmful anti-fouling systems. Under this Act, it is an offence for a person to engage in negligent conduct that results in a harmful anti-fouling compound being applied to a ship.	All ships involved in offshore petroleum activities in Australian waters are required to abide to the requirements under this Act. The Marine Order MO 98: Marine Pollution Prevention – Anti-fouling Systems is enacted under this Act. The management of risk is discussed in Section 6.	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA

Legalisation/ Requirement	Scope	Applicability to the Activity (*under the OPGGS(E)R*)	Related International Conventions	Authority
	This Act also requires that Australian ships must hold 'anti-fouling certificates', provided they meet certain criteria.			
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	The Act aims to protect the marine environment from pollution by oil and other harmful substances discharged from ships in Australian waters. It also invokes certain requirements of the MARPOL Convention such as those relating to discharge of noxious liquid substances, sewage, garbage and air pollution. This Act requires ships greater than 400 gross tonnes to have pollution emergency plans in place, and also provides for emergency discharges from ships.	All ships involved in petroleum activities in Australian waters are required to abide to the requirements under this Act. Several MOs are enacted under this Act relating to offshore petroleum activities, including: • MO Part 91: Marine Pollution Prevention – Oil • MO Part 93: Marine Pollution Prevention –Noxious Liquid Substances • MO Part 94: Marine Pollution Prevention –Harmful Substances in Packaged Forms • MO Part 95: Marine Pollution Prevention –Garbage • MO Part 96: Marine Pollution Prevention –Sewage • MO Part 97: Marine Pollution Prevention – Air Pollution • MO Part 98: Marine Pollution Prevention – Antifouling Systems. Management measures related to pollution from oil or other hazardous substances are presented in Section 6 of this EP.	MARPOL	AMSA
Underwater Cultural Heritage Act 2018	The Act protects the heritage values of shipwrecks sunken aircraft and other underwater cultural heritage (older than 75 years) below the low water mark. The Act designates protection zones around identified heritage values, where circumstances place a particular site at risk of interference. The Act prohibits any activities within this zone unless a permit has been obtained.	The Act is applicable to any activities that has the potential to result in damage, interference, removal or destruction of an historic value, including offshore petroleum activities that have the potential to interact with known wreck sites and relics. Anyone who finds the remains of a ship, sunken aircraft or other underwater cultural heritage article needs to notify the relevant authorities, as soon as possible but ideally no later than after one week, and to give them information about what has been found and its location. 500 m protected zones to be observed around historic ship/aircraft wrecks under Section 20(1). CM21 requires Installation Procedures to take into account sensitive seabed features including any underwater cultural heritage. There are currently no known underwater cultural heritage artefacts within the operational areas; this is informed through review of cultural heritage database and consultation with Relevant Persons.	• agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972 • UNSECO Convention on Protection of the Underwater Cultural Heritage 2001.	DCCEEW

Victorian Requirements			
Legislation / requirement	**Scope**	**Applicability**	**Authority**
***Emergency Management Act 2013* & Regulations 2003**	The regulations provide for the establishment of governance arrangements for emergency management in Victoria, including the Office of the Emergency Management Commissioner and an Inspector-General for Emergency Management. Provides for integrated and comprehensive prevention, response and recovery planning, involving preparedness, operational coordination and community participation, in relation to all hazards. These arrangements are outlined in the Emergency Management Manual Victoria.	Emergency response structure for managing emergency incidents within Victorian waters. Emergency management structure will be triggered in the event of a spill threatening State waters. Emergency response arrangements are detailed in Section 7 and the OPEP.	Department of Justice and Regulation (Inspector General for Emergency Management)
Environment Protection Act 2017	From July 2021, the EPA will enforce new laws aimed at preventing harm to public health and the environment from pollution and waste. Following the recommendations of a public enquiry, this new Act gives the EPA enhanced powers to prevent risks to the environment and human health. A key element to the new Act is the general environmental duty GED), which shifts the expectation to businesses to: • reduce the risks of harm to the environment • manage activities to avoid the risk of environmental damage • respond to a pollution event if it occurs.	The Operational Area is outside of state waters, so this legislation is only applicable in the event of an oil spill threatening state waters. Management measures in the event of an oil spill are described in Sections 6 and 7.	EPA
***Flora and Fauna Guarantee Act 1988 (FFG Act)* & Regulations 2011**	The purpose of this Act is to protect rare and threatened species and enable and promote the conservation of Victoria's native flora and fauna and to provide for a choice of procedures that can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes. Where a species has been listed as threatened an Action Statement is prepared setting out the actions that have or need to be taken to conserve and manage the species and community.	The EP must assess any actual or potential impacts or risks to FFG Act-listed species (e.g. from accidental hydrocarbon release affecting state waters) and apply controls in line with any Action Statements. Operational Area does not overlap with State land. Any rare or threatened species within the EMBA have been identified in Section 4.4.1. The management of risk applicable Action Statement controls is discussed in Section 6.	DEECA
***Heritage Act 1995* & Heritage (Historical Shipwrecks) Regulations 2007**	The purpose of the Act is to provide for the protection and conservation of historic places, objects, shipwrecks and archaeological sites in State areas and waters (complementary legislation to Commonwealth legislation). Part 5 of the Act is focused on historic shipwrecks, which are defined as the remains of all ships that have been situated in Victorian waters for 75 years or more. The Act addresses, among other things, the registration of wrecks, establishment of protected zones, and the prohibition of certain activities in relation to historic shipwrecks.	Identification of historic places, objects, shipwrecks and archaeological sites in State waters that may be impacted by the activity and reporting of any identified historic places, objects, shipwrecks and archaeological sites or impacts to them. Operational Area does overlap with State waters; however, no heritage places or objects were identified within the Operational Area. As such, only applicable in the event of oil spill which threatens state waters. Where relevant, management measures are presented in Section 6 of this EP.	Heritage Victoria (DEECA)
***Marine Safety Act 2010* & Regulations 2012**	This Act provides for safe marine operations in Victoria of including imposing safety duties on owners, managers and designers of vessels, marine infrastructure and marine safety equipment; marine safety workers, masters and passengers on vessels; regulation and management of vessel use and navigation in State waters; and	Applicable to vessel masters, owners, crew operating vessels in Victorian State waters. Operational Area overlaps with State waters.	Safe Transport Victoria

Victorian Requirements			
Legislation / requirement	**Scope**	**Applicability**	**Authority**
	enforcement provisions of Police Officers and the Victorian Director of Transport Safety. This Act reflects the requirements of international conventions - Convention on the International Regulations for Preventing Collisions at Sea & International Convention for the Safety of Life at Sea. The Act also defines marine incidents and the reporting of such incidents to the Victorian Director of Transport Safety.	The management of risk is discussed in Section 6.	
National Parks Act 1975	This Act established a number of different types of reserve areas onshore and offshore, including Marine National Parks and Marine Sanctuaries. A lease, licence or permit under the OPGGS Act 2010 that is either wholly or partly over land in a marine national park or marine sanctuary is subject to this Act. Activities within these areas require Ministerial consent before activities are carried out.	Applies where there are activities within reserve areas. Operational Area does not within a reserve area. As such, this legislation is only applicable in the event of an oil spill which threatens reserve area. Victorian National Park and other protected terrestrial areas within the EMBA have been identified in Section 4.4.1. Consultation undertaken is detailed in Section 10.	DEECA
Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Act 2010 ***Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Regulations 2021***	Addresses all licensing, health, safety, environmental and royalty issues for offshore petroleum exploration and development operations in Victorian coastal waters (between the low water mark and the 3 nm limit). Section 61 of the Act (Principles of sustainable development) states that the administration of the Act should consider the principles of sustainable development. These principles include involving the community in issues that affect them. The OPGGS Regulations have the objective of ensuring that any petroleum activity in an adjacent area is consistent with the principles of ecologically sustainable development and in accordance with an EP that has appropriate performance objectives and standards as well as an implementation strategy.	The activity is required to meet the requirements of the Act and Regulations. Demonstration that the activity will be undertaken in line with the principles of ecologically sustainable development and in accordance with an EP with appropriate performance objectives and standards is provided in Sections 6. Cooper Energy's implementation strategy is detailed in Section 9. Consultation undertaken is detailed in Section 10.	DEECA
Pollution of Waters by Oil and Noxious Substances (POWBONS) Act 1986 & Regulations 2012	The purpose of the Act is to protect the sea and other waters from pollution by oil and noxious substances. This Act also implements the MARPOL Convention (the International Convention for the Prevention of Pollution from Ships 1973) in State waters. The Act requires the mandatory reporting of marine pollution incidents and restricts various discharges within State waters.	All ships involved in petroleum activities in Victorian waters are required to abide to the requirements under this Act. The management of risk is discussed in Section 6.	Jointly administered by DTP and EPA
Port Management Act 1995	This Act sets out particular provisions for the operation and management of the port of Melbourne and provides Victorian Ports Corporation (Melbourne) (VPCM) with certain powers and functions in the areas of towage, hazardous activities and pollution. Under this Act all managers of local and commercial ports must prepare a Port Safety Management Plan and Environmental Management Plan (together known as SEMPs)	Applicable in the event of an oil spill entering Victorian Ports. Awareness and engagement with ports around SEMPS will facilitate integration of the different safety and environmental regimes that already apply and address any potential overlaps or gaps in emergency response planning. Consultation undertaken is detailed in Section 10. Emergency response arrangements are detailed in Section 7 and the OPEP.	Jointly administered by Environment Protection Authority of Victoria; the Director, Transport Safety; and the Health and Safety Organisation

Victorian Requirements			
Legislation / requirement	**Scope**	**Applicability**	**Authority**
***Wildlife Act 1975* & Regulations 2013**	The purpose of this Act is to promote the protection and conservation of wildlife, prevent wildlife from becoming extinct and prohibit and regulate persons authorised to engage in activities relating to wildlife (including incidents). The Wildlife (Marine Mammal) Regulations 2019 prescribe minimum distances to whales and seals/seal colonies, restrictions on feeding/touching and restriction of noise within a caution zone of a marine mammal (dolphins (150 m), whales (300 m) and seals (50 m)).	Prescribed minimum proximity distances to whales, dolphins and seals by vessels are included in this EP. Reporting requirements are triggered if an incident results in the injury or death of whales, dolphins or seals. Applicable requirements of the proposed activities are described in Section 6 of this EP. Reporting requirements provided in Section 9 of this EP.	DEECA

Appendix 2 Description of the Environment: Projects & Operations

Appendix 3 Protected Matters Search Report (PMST)

Appendix 3.1 PMST (Operational Area)

Appendix 3.2 PMST (EMBA)

Appendix 3.3 PMST (Light exposure area)

Appendix 3.4 PMST (Noise Exposure Area)

Appendix 3.5 PMST (Spill EMBA – Surface)

Appendix 3.6 PMST (Spill EMBA – Shoreline)

Appendix 3.7 PMST (Spill EMBA – In water)

Appendix 4 EP Changes Register

Date	Revision	Change	MOC #	Trigger Resubmission
June 2022	0	Submission to regulators	N/A	N/A
4 March 2019	1	NOPSEMA RFFI	N/A	Yes
December 2019	1a	Updates per MOCs: ADM-19-0011, OPS-19-0029, ADM-19-0007 and ORG-19-0002.	ADM-19-0011 OPS-19-0029 ADM-19-0007 ORG-19-0002	No
September 2021	1b	Annual review	N/A	No
November 2022	1c	Annual review	N/A	No
October 2023	A	Internal draft issued to Cooper Energy for review	N/A	No
February 2024	2	5-year resubmission to regulators Includes updates under relevant MOCs addressing Organisational updates and Relevant Persons Consultation.	MOC-Cooper-2023-100035. MOC-Cooper-2023-100031	5-year resubmission trigger

Appendix 5 Relevant Persons Consultation

Please refer to sensitive information

Appendix 6 OPEP

Appendix 7 Underwater Sound Modelling