Sole-3 & 4 Drilling and Sole-2 Well Abandonment

EP Summary

CONTROLLED DOCUMENT

SOL-EN-EMP-0006

Rev 0

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1.0 Introduction

Cooper Energy (Sole) Pty. Ltd. (Cooper Energy) is the titleholder of Petroleum Production License VIC/L32 in eastern Bass Strait. This permit contains the Sole field (Figure 1-1). Appraisal drilling has previously been undertaken within this lease area. Cooper Energy is now proposing development drilling of two wells, Sole-3 and Sole-4, as well as the abandonment of Sole-2, as part of on-going field development operations within the Sole field.

This Environment Plan (EP) Summary has been prepared to meet Regulation 11(4) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (OPGGSER) and summarises the information provided in the Sole-3 & 4 Drilling and Sole-2 Well Abandonment EP accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

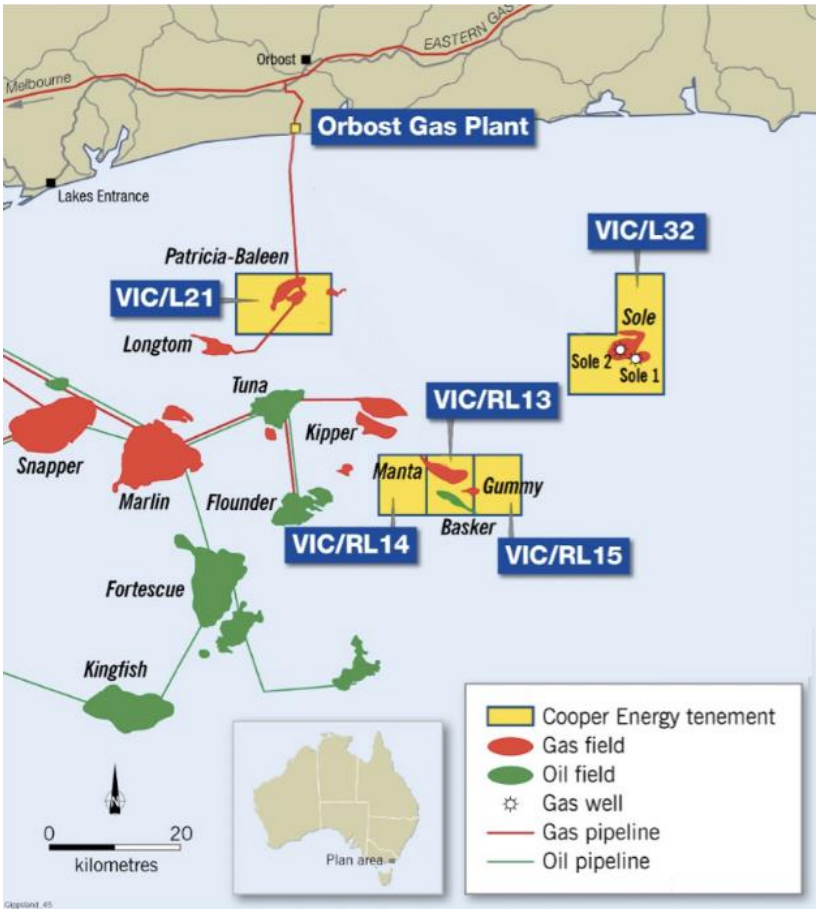

Figure 1-1 Location of Vic/RL32

1.1 Titleholder Nominated Liaison Person

VIC/L32 titleholders nominated liaison person is:

Iain MacDougall (General Manager Operations), Cooper Energy Limited

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2.0 Location of the Activity

2.1 Location

The Sole gas field, located in the Production Licence VIC/L32, is situated in the Commonwealth waters of Bass Strait. The Sole field lies approximately 36 km from the Victorian Coast (Sydenham Inlet) and 65 km from the Orbost Gas Plant on the Victorian coastline (refer Figure 1-1).

The coordinates for the Sole-2, Sole-3 and Sole-4 wells are provided in Table 2-1.

Table 2-1: Sole Well Coordinates (Surface Locations) (GDA94)

Locations	Longitude (E)	Latitude (S)	Water Depth (m)
Sole-2 Well	149° 00' 33.51"	38° 06' 13.10"	125
Sole-3 Well	149° 00' 30.801"	38° 06' 01.184"	125
Sole-4 Well	149° 00' 31.673"	38° 06' 00.066"	125

2.2 Operational Area

The "operational area" for the activities is the area where drilling and well-abandonment activities will take place and will be managed under this EP. This operational area includes:

- A 500 m designated petroleum safety zone (PSZ) around the MODU to manage vessel movements.
- An area out to 2 km from the MODU in which anchoring activities will be undertaken (Section 3.5.2)

Cooper Energy will apply for a PSZ for drilling of the Sole-3 and Sole-4 wells, which will remain in place once wells are suspended.

The transit of the MODU and support vessels is outside the scope of this Plan. These activities are managed under the Commonwealth *Navigation Act 2012.*

2.3 Sole VIC/L32 Hydrocarbon System Overview

The hydrocarbon target within the Sole reservoir is a dry gas reservoir with no condensate observed or recovered during previous well tests on Sole-2. Physical characteristics of the Sole gas is provided in Table 2-2.

Table 2-2 Physical Characteristics of Sole Gas

Rm		Sole Gas
Gas Specific Gravity		0.58
Gas Viscosity @ 1175 psia, 48°C (cP)		0.014
Condensate Gas Ratio		Dry gas, no liquid predicted
Boiling Point Curve (% mass)	Volatiles (<180°C)	99.99
	Semi-volatile (180-265°C)	0.01
	Low Volatility (265-380°C)	-

Rm		Sole Gas
	Residual (>380ºC)	-
Group		I

2.3.1 Flow Rate

Cooper Energy has conducted reservoir simulation to identify the maximum credible blowout rates for the field which is approximately 280 MMscfd. This scenario results in the well flow ultimately being released (blowout) at the seabed, assuming a failed BOP. This scenario is one of a number that were tested via well kill modelling to determine the worst-case blowout rate for the Sole campaign.

3.0 Description of the Activity

3.1 Timing of the Activity

Activities covered under this plan are anticipated to commence in the first half of 2018.

Drilling and abandonment activities, including contingency pre-lay of moorings, are expected to take approximately 70 days, excluding weather and operational delays. During this period, any of the activities described in this plan may be undertaken; operations will be conducted 24-hours a day.

Following completion and clean-up, Sole 3 and 4 will be suspended until the Sole development is ready to receive flow from the reservoir. This EP will remain in force throughout the well suspension phase.

3.2 MODU positioning (Setting and testing anchors)

The MODU engaged to complete this work is the semi-submersible *Ocean Monarch*. The MODU does not have any propulsion capability. It will be towed to the location by support vessels and utilises an eight-point mooring system to maintain position when drilling.

Prior to MODU arrival and hook-up, anchors and chains may be pre-laid and load-tested by the support vessels. Eight anchors will be required, with each having a footprint of approximately 30 m^2. Each anchor is connected to the MODU via a mooring line (approximately 1500 m in length) comprising of chain and wire.

It is anticipated that the same mooring pattern will be used for Sole 3 & 4 wells but likely to be different for abandonment activities at the Sole-2 well. The final mooring analysis will determine each mooring line's required length of chain and wire.

3.3 Blowout Preventer (BOP) Installation and Function Testing

A subsea blowout preventer (BOP) will be installed at Sole 3 & 4 (drilling and completion) and Sole 2 (abandonment) to provide an additional control against the loss of well control.

The BOP is function and pressure tested when first installed on the wellhead, after casing is run and after any maintenance that disassembles previously pressure tested components. Function testing is typically conducted weekly, with pressure testing of the system not normally exceeding 21 days between tests. A full function test to close and open all rams and annulars results in a maximum discharge of approximately 3100 L of diluted control fluid.

3.4 Sole 3 & 4 Drilling, Completion, Clean-up and Suspension

3.4.1 Drilling Operations

Drilling fluids (or muds) will be used during the drilling program to provide a range of functions, including control of formation pressure, wellbore stability, circulation of cuttings out of the well, and maintenance of drill bit and assembly. The drilling methodology proposes using water based fluids, including a combination of seawater with high-viscosity mud sweeps, Water-Based Muds (WBM) and Drill in Fluids (DIF). During the displacement of one fluid to another, there is an interface mixture of both fluids (approximately 100 bbl [16 m^3] per interface) which will be returned to the MODU and discharged.

Upper sections of the well will be drilled riser-less, with cuttings and fluids discharged at seabed. Lower sections will be drilled through a marine riser, with the subsea BOP installed. Fluids and cuttings from lower sections return to the MODU via the riser, and are captured and analysed before discharge overboard. Indicative cuttings volumes of 85 m^3 (riserless drilling)

and 50 m^3 (drilling with riser) are expected to be generated per well, depending on final well depths.

3.4.2 Cementing Operations

At planned intervals during drilling, discharges associated with cementing operations include:

- Cement spacer and interface fluids (subsea and surface discharges);
- Cement unit washings comprising seawater and residual cement (surface discharges);
- Venting of dry cement during bulk transfer between vessels and the MODU (surface discharges).

3.4.3 Well Completions

For lower completions, sand screens combined with a shunt tube gravel pack will be used to prevent formation sand particles from entering the production tubing.

Upper completions will comprise production tubing, a production packer, permanent downhole gauges and a downhole safety valve. Prior to setting the production packer, the tubing annulus is displaced to corrosion inhibited completion brine (likely to be NaCl based) which will remain in the well. At the same time, the tubing is displaced to a base oil.

Well completions will result in a number of discharges from the MODU including:

- Fluids used during drilling that are displaced from the well during completions;
- Gravel pack fluids including water-based carrier fluids, breakers and proppant;
- Tubing treatment fluids, weighted and viscous water based fluids for well control and sweeping the well clean

3.4.4 Wellbore Clean-up and Flowback

Wellbore clean-up and flowback will be undertaken to ensure completion fluids have been removed from the well, and the flowing gas has reached acceptable levels of residual solids and fluids. It is expected that well clean-up will occur for a period of approximately 12-24 hrs per well.

Methanol injection may be used as a contingency during well flow-back to prevent the formation of hydrates. Flaring volumes per well are expected to be: maximum total 80 MMscf gas; 22m^3 base oil underbalance cushion (refer 3.4.3); approximately 1m^3 completion brine, and any other liquids collected in the separator (e.g. methanol). A “green burner” flare will be used to limit smoke and fall out.

3.4.5 Well Suspension

Following completion and well-test activities, Sole-3 and Sole-4 will be left with the subsea trees installed and the wells shut-in, awaiting connection to the Orbost Gas Plant by the Sole Pipeline. Prior to moving off location, the barriers within the well and subsea tree will be tested and contents displaced with treated MEG (or similar).

Hook up and commissioning of the subsea production system is anticipated within approximately 12 months of the completion of the drilling program. During this time the wells will remain in a suspended state. Offshore inspection of the wells during the suspension phase is expected to be infrequent, but may be undertaken periodically.

3.4.6 Logging

During drilling, it is necessary to gather formation information for ongoing drilling operations or to influence the effective recovery of hydrocarbons from the reservoir. Where possible this information is gathered real-time from Logging Whilst Drilling (LWD) tools, but may be obtained using wireline conveyed or pipe conveyed logging tools. Vertical Seismic Profiling (VSP) is not planned.

3.5 Well Abandonment (Sole-2)

3.5.1 Remove corrosion cap from the wellhead

To remove the corrosion cap from the wellhead, an ROV is deployed and a chemical treatment applied (Sulfamic Acid, less than 1 L) to remove any marine growth which may prevent its removal. Once clean, a running tool is deployed to remove the corrosion cap and retrieve it to surface. A small amount of trapped gas may be vented from beneath the corrosion cap.

3.5.2 Remove temporary abandonment plug

Once the riser and BOP are installed (refer Section 3.3), Cooper Energy will re-enter the well and drill out the temporary plugs. Cement cuttings, and metal and rubber chips cuttings will be generated, recirculated to the surface and passed through the MODU solids control equipment, before discharge overboard.

The existing inhibited brine present within the well (approx. 120 bbl (20 m^3)) will be displaced with clean WBM, returned to the surface and discharged.

3.5.3 Perforate the well casing

Prior to installing the permanent reservoir barrier the casing is planned to be mechanically perforated which will result in approximately100 bbl (16m^3) of existing inhibited fluids and trapped gas (35m^3) which will be returned to the MODU in a controlled manner and replaced with water based mud (WBM). All returns will be handled through the MODU closed circulating system, including the mud gas separator; gas will be released to atmosphere via a vent at the top of the derrick and liquids will be routed to mud pits and assessed prior to discharge overboard.

3.5.4 Install permanent barriers

A permanent reservoir barrier and permanent surface cement plug will be set inside the at approximately 50 m below the seabed.

A number of surface discharges (from the MODU) are associated with barrier installation; these include weighted fluids, cement and cement spacers.

Before removing the BOP, cement plugs will be tagged and tested to verify their position and integrity. The BOP can then be flushed (with seawater), disconnected from the wellhead and recovered to the MODU.

3.5.5 Severe and remove surface casing and wellhead

A wellhead cutting tool will be landed onto the wellhead on drill pipe to sever the casing just below the seabed (~1.5m below the seabed). Grit, flocculent and either seawater or freshwater carrier fluid will be used and some will remain in the 30” section of the hole below seabed; some material may disperse to the seabed in close proximity to the well location. Based upon previous wellhead removal, the typical time to cut a wellhead is in the order of 3 – 7hrs.

The wellhead is then pulled free and recovered to the MODU through the moonpool.

3.6 Support Operations

The MODU will be supported by two or three vessels, used to tow the MODU, for anchor handling, the supply of provisions, materials and equipment to the MODU and removal of wastes to shore. One vessel will remain on standby and in attendance to the MODU throughout the work program. The transit of the MODU and support vessels outside this area is outside the scope of this EP; these activities are managed under the Commonwealth *Navigation Act 2012*.

The operation of the MODU and vessels will result in a variety of planned emissions and discharges to the marine environment, such as cooling water and brine, treated bilge, sewage and food waste, and ballast water.

Personnel will access the *Ocean Monarch* by helicopter, which is expected to operate out of Tooradin airfield. Flights to the MODU are expected 5-7 days each week. Helicopter operations within the operational area are limited to landing and take-off on the helideck of the MODU.

A ROV will be used during the activities. The ROV is deployed from the MODU/support vessel and can be fitted with various tools and camera systems to assist in the running of the well control equipment, operation of valves on subsea infrastructure, as well as visual and sonar survey. Sound generated during sonar surveys is expected to be typical of commercial sonar units, with frequency range between 3kHz – 200KHz, and source levels between 150 – 235 dB re 1 uPa @ 1m.

4.0 Description of the Environment

4.1 Regional Setting

The Sole-3 & 4 Drilling and Sole-2 Well Abandonment wells are located within the South-east Marine Bioregion, on the Twofold Shelf (meso-scale IMCRA region), approximately 55 km southeast of Marlo, and 40 km southwest of Point Hicks in Victoria.

The continental shelf within the Twofold Shelf region 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) south-west of Cape Howe (IMCRA, 1998). The wide shelf area is relatively featureless and flat (Santos, 2015). 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). At the Sole-2 location, in 125 m water depth, the seabed is comprised of fine to coarse sand and areas of shell (CEE Consultants, 2003).

The continental slope is relatively narrow at the Victoria/New South Wales border, and becomes broader and shallower in the southern area of the Gippsland Basin (Barton *et al.*, 2012). Cold water upwellings are associated with the narrow continental shelf; these upwellings are part of the Upwelling East of Eden Key Ecological Feature (KEF).

Wave energy in this bioregion is relatively low. Water temperatures are also generally warmer than elsewhere on the Victorian open coast due to the influence of the East Australian Current.

The coast is dominated by dunes and sandy shorelines, with occasional rock outcrops; and there are extensive areas of inshore and offshore soft sediments habitat (Barton *et al.*, 2012). This region also has occasional low-relief reef immediately beyond the surf zone. The fauna is characterised by distinctive assemblages of reef fish, echinoderms, gastropods and bivalves; this bioregion is notable for the presence of species that also occur along the southern New South Wales coast but not in central or western Victorian waters (IMCRA, 1998).

An ROV survey at Sole-2 showed that the seafloor was clear and flat (OMV Australia, 2002). The benthic habitat at the Sole wells is expected to be similar to that observed during a survey along the Patricia-Baleen pipeline route; noting however that it is deeper habitat and therefore less influenced by waves and receives less light (Figure 4-1). The Patricia-Baleen survey found sand and shell/rubble seabed, with sparse epibiotic (e.g. sponges) coverage; no reef systems were noted along the pipeline route. Similarly, surveys for the BMG wells (approximately 135-265 m water depth) note a featureless seabed. There has been extensive demersal fishing activity in the area so seabed biota is expected to be modified from trawling and netting activities (CEE Consultants, 2003).

Therefore, based on the above survey information, it is expected that the benthic habitat around the Sole well sites, and within the operational area, is predominantly sandy substrate. Some sparse epifauna (e.g. sponges) and infauna may be present.

(Source: CEE Consultants, 2003)

Figure 4-1 Images from Patricia-Baleen pipeline survey showing medium sand habitat (left) and hard calcareous areas (right)

4.2 Environment that May be Affected

The Environment that May be Affected (EMBA) is based on the maximum credible hydrocarbon spill event that might occur during petroleum activities. For the activities under this EP, the EMBA is based on hydrocarbon exposures above impact thresholds for the accidental release of marine diesel oil (MDO) from a vessel collision. Based on stochastic modelling results (RPS, 2017), the EMBA extends along waters off the eastern Victoria coast (Figure 4-2).

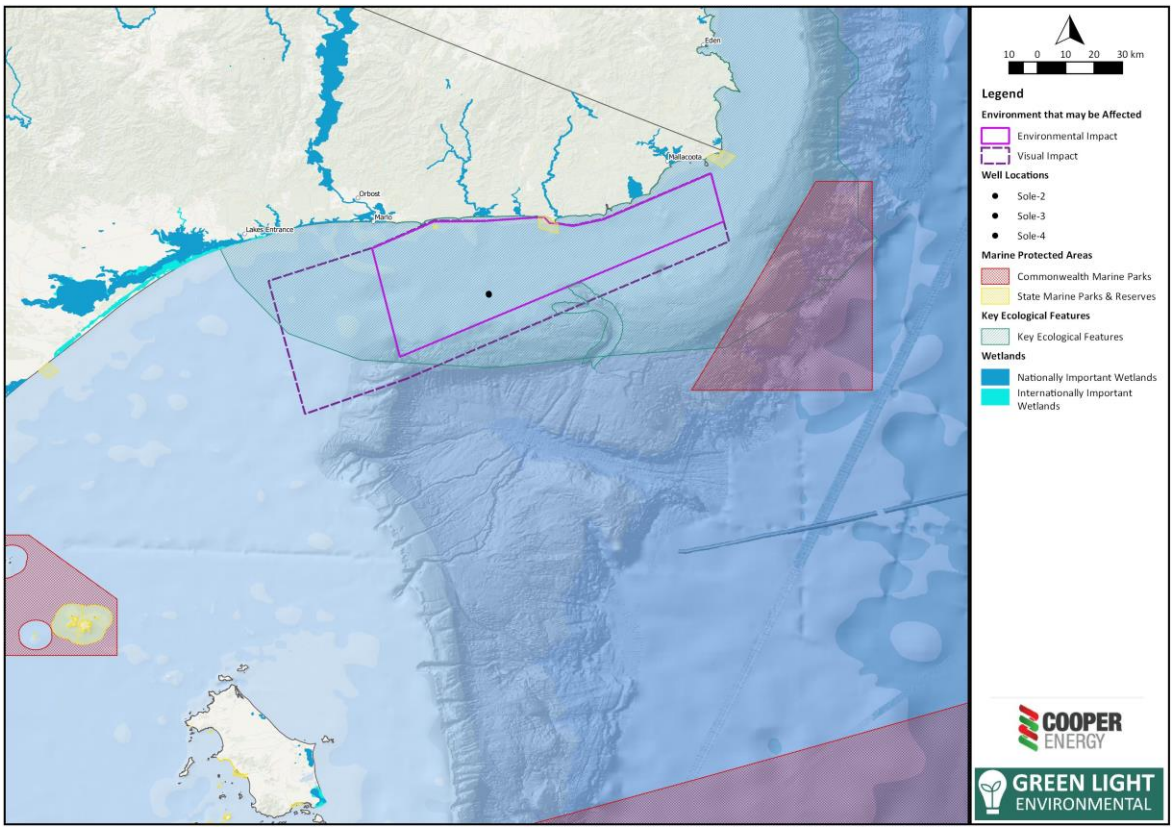

Figure 4-2 EMBA for the Sole-3 & 4 Drilling and Sole-2 Well Abandonment Activities

4.3 Ecological and Social Receptors

The following tables show the presence of ecological (Table 4-1) and social (

Table 4-2) receptors that may occur within the operational area and EMBA.

The Operational Area extends 2 km from the well location, as defined in Section 2.2, and the EMBA is defined in Section 4.2. The tables below present information from the relevant EPBC Protected Matters Searches, and from other literature and data available for the Gippsland region.

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

Table 4-1: Presence of Ecological Receptors within the Operational Area and the EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
Habitat	Soft Sediment	Predominantly unvegetated soft sediment substrates	• Key habitat (e.g. benthic invertebrates)	✓	The operational area is located on the flat outer shelf plain of the Twofold Shelf. The benthic habitat within the operational area is expected to be featureless (e.g. no reef presence), with the seabed comprising of predominantly sandy substrate.	✓	The Gippsland Basin is composed of a series of massive sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment. 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.
	Seagrass	Seagrass meadows	• Nursery habitat (e.g. crustaceans, fish) • Food source (e.g. dugong, turtles)	–	Not present.	✓	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.
	Algae	Macroalgae	• Nursery habitat (e.g. crustaceans, fish) • Food source (e.g. birds, fish)	–	Not present.	✓	Macroalgae communities are generally found on intertidal and shallow subtidal rocky substrates. They are not common as a dominant habitat type in East Gippsland, but do occur in mixed reef environments. Species may include Bull Kelp and other brown algae species.
	Coral	Hard and soft coral communities	• Nursery habitat (e.g. crustaceans, fish) • Breeding habitat (e.g. fish)	–	Not present.	✓	Soft corals can be found at most depths throughout the continental shelf, slope and offslope 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. Soft corals can occur in a variety of water depths.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
Marine Fauna	Plankton	Phytoplankton and zooplankton	• Food Source (e.g. whales, turtles)	✓	Phytoplankton and zooplankton are widespread throughout oceanic environments; however increased abundance and productivity can occur in areas of upwelling (e.g. around the Upwelling East of Eden).	✓	Phytoplankton and zooplankton are widespread throughout oceanic environments; however increased abundance and productivity can occur in areas of upwelling (e.g. around the Upwelling East of Eden and Bass Cascade features).
	Seabirds and Shorebirds	Birds that live or frequent the coast or ocean	• Listed Marine Species	✓	31 seabird and shorebird species (or species habitat) may occur within the operational area. One species (Australian Fairy Tern) is listed as potentially foraging in the area; no other important behaviours were identified for other species. The operational area intersects foraging BIAs for: Antipodean Albatross, Wandering Albatross, Buller's Albatross, Shy Albatross, Campbell Albatross, Black-browed Albatross, and the Common Diving-Petrel.	✓	74 seabird and shorebird species (or species habitat) may occur within the EMBA; with breeding, foraging and roosting behaviours identified for many species. The EMBA intersects foraging BIAs for a number of albatross (Antipodean, Wandering, Buller's, Shy, Campbell and Black-browed); the White-faced Petrel, Common Diving-Petrel and the Short-tailed Shearwater. Roosting and breeding for a variety of bird species, including petrels, shearwaters and terns, does occur in eastern Victoria; however, this is associated with coastal areas which are outside of the EMBA.
			• Threatened Species	✓		✓	
			• Migratory Species	✓		✓	
			• BIA – Breeding	–		✓	
			• BIA – Foraging	✓		✓	
			• Behaviour – Breeding	–		✓	
			• Behaviour – Foraging	✓		✓	
			• Behaviour – Roosting	–		✓	
	Marine Invertebrates	Benthic and pelagic invertebrates	• Food Source (e.g. fish)	✓	Marine invertebrates may occur within the operational area. Epifauna is expected to be sparse given the water depths. Studies of infauna in shallower waters of east Gippsland has indicated a high species diversity and abundance. Infauna may also be present within the	✓	A variety of invertebrate species may occur within the EMBA, including sponges and arthropods. Infauna studies along the Victorian coast showed high species diversity, particularly in East Gippsland. Commercially important species (e.g. Rock Lobster, Giant Crab) may occur within the EMBA.
			• Commercial Species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
					sediment profile of the operational area. Given the lack of suitable habitat, commercially important species (e.g. Rock Lobster, Giant Crab) are unlikely to occur in significant numbers within the operational area.		
	Fish	Fish	• Commercial Species	✓	Commercial fish species may occur within the operational area, however given the lack of suitable benthic habitat, their abundance is expected to be low.	✓	Commercial fish species may occur within the EMBA, including Pink Ling, and species of wrasse, flathead and warehou.
			• Threatened Species	–	Not present.	✓	Two threatened fish species (or species habitat) may occur within the EMBA: • The Australian Grayling is diadromous, and while typically found in freshwater streams (Victoria, New South Wales and Tasmania), does appear to spend part of its lifecycle in coastal waters. • The Black Rock Cod is typically found in coastal NSW (up to 50 m water depth), in near-shore rocky and offshore coral reef areas.
		Sharks and Rays	• Threatened Species	✓	Four shark species (or species habitat) may occur within the operational area. No important behaviours were identified. The operational area is within a distribution BIA for the Great White Shark.	✓	Four shark species (or species habitat) may occur within the EMBA. The Great White Shark has known aggregation areas within eastern Victoria waters; the EMBA intersects a foraging and distribution BIA for this species. Breeding behaviour is noted for the Great White Shark in the EPBC Protected Matters search, however the
			• Migratory Species	✓		✓	
			• BIA – Foraging	–		✓	
			• BIA – Distribution	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
			• Behaviour – Breeding	–		✓	breeding BIA is outside of the EMBA.
		Syngnathids	• Listed Marine Species	✓	27 syngnathid species (or species habitat) may occur within the operational area. No important behaviours of BIAs have been identified.	✓	28 syngnathid species (or species habitat) may occur within the EMBA. No important behaviours of BIAs have been identified.
	Marine Reptiles	Turtles	• Listed Marine Species	✓	Four marine turtle species (or species habitat) may occur within the operational area. No important behaviours of BIAs have been identified.	✓	Four marine turtle species (or species habitat) may occur within the EMBA. While foraging (Green Turtle, Leatherback Turtle, and Hawksbill Turtle) and breeding (Loggerhead Turtle) behaviours have been identified in the EPBC Protected Matters search, no known aggregation areas or habitat critical to the survival of the species occurs within the EMBA.
			• Threatened Species	✓		✓	
			• Migratory Species	✓		✓	
			• Behaviour – Breeding	–		✓	
			• Behaviour – Foraging	–		✓	
	Marine Mammals	Pinnipeds	• Listed Marine Species	–	Not present.	✓	Two pinniped species (or species habitat) may occur within the EMBA. One species (Australian Fur-seal) has breeding behaviour identified; there is known breeding sites in eastern Victoria (e.g. The Skerries), however these occur outside of the EMBA. No BIAs have been identified in the area.
			• Behaviour – Breeding	–		✓	
		Whales	• Listed Marine Species	✓	21 whale species (or species habitat) may occur within the operational area. Foraging	✓	22 whale species (or species habitat) may occur within the EMBA. Foraging behaviours were identified for some species (Sie, Fin and Pygmy
			• Threatened Species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
			• Migratory Species	✓	behaviours were identified for some species (Sie, Fin and Pygmy Right Whales); no other important behaviours were identified. The operational area intersects a distribution BIA for the Southern Right Whale, and a foraging BIA for the Pygmy Blue Whale.	✓	Right Whales); no other important behaviours were identified. The EMBA intersects a distribution and migration BIA for the Southern Right Whale, and a foraging BIA for the Pygmy Blue Whale.
			• BIA – Foraging	✓		✓	
			• BIA – Migration	–		✓	
			• BIA - Distribution	✓		✓	
			• Behaviour – Foraging	✓		✓	
		Dolphins	• Listed Marine Species	✓	Six dolphin species (or species habitat) may occur within the operational area. No important behaviours of BIAs have been identified.	✓	Eight dolphin species (or species habitat) may occur within the EMBA. No important behaviours of BIAs have been identified.
			• Migratory Species	✓		✓	

Table 4-2: Presence of Social Receptors within the Operational Area and the EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
Natural System	Commonwealth Marine Area	Key Ecological Features	• High productivity • Aggregations of marine life	✓	The operational area intersects with one KEF: • Upwelling East of Eden: an area of episodic upwelling known for high productivity and aggregations of marine life, including Blue Whales, Humpback Whales, seals, sharks	✓	Four KEFs intersect with the EMBA: • Bass Cascade: a seasonal (winter) feature causing nutrient rich waters to rise, leading to higher productivity and aggregations of fish and whales. This feature has not yet been spatially defined. • Big Horseshoe Canyon: a feature at the easternmost end of the Bass Canyon system;

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
					and seabirds.		the hard substrates provide attachment sites for benthic flora and fauna, thus increasing structural diversity and creating sheltering habitat for benthic fishes. • Shelf Rocky Reefs and Hard Substrates: Theses hard substrate areas provide attachment sites for macroalgae and sessile invertebrates, thus increasing the structural diversity of shelf ecosystems. The reefs also provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity. This feature has not yet been spatially defined. • Upwelling East of Eden: an area of episodic upwelling known for high productivity and aggregations of marine life, including Blue Whales, Humpback Whales, seals, sharks and seabirds.
	State Parks and Reserves	Marine Protected Areas	• Aggregations of marine life	–	Not present.	✓	Two State Marine Protected Areas intersect with the EMBA: • Beware Reef Marine Sanctuary: protects partially exposed granite reef that is home to abundant marine life and is a haul-out site for Australian and New Zealand Fur-seals. Forests of Bull Kelp and the remains of a shipwreck also occur within the sanctuary. • Point Hicks Marine National Park: supports a range of habitats including granite subtidal reef, intertidal rock platforms and offshore sands. These substrates host varied benthic flora and fauna including macroalgae, sponges, and seafans; and a diverse invertebrate assemblage (e.g. seastars, sea urchins, abalone, and nudibrancs). Pelagic fish diversity is also high including schools of Butterfly Perth, Silver Sweep and Banded

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
							Morwongs.
Human System	Commercial Fisheries	Commonwealth-managed	• Economic benefit	✓	While a number of Commonwealth-managed fisheries have management areas that intersect with the operational area, active fishing effort within this area is expected to be minimal given the lack of suitable benthic habitat features within the operational area.	✓	A number of Commonwealth-managed fisheries have management areas that intersect with the EMBA. Fishing intensity data suggests that the Southern and Eastern Scalefish and Shark Fishery and the Southern Squid Jig Fishery are the two with activity that may occur within the EMBA.
		State-managed	• Economic benefit	✓	A number of State-managed fisheries have management areas that intersect the operational area, but active fishing effort within this area is expected to be minimal given the lack of suitable benthic habitat features within the operational area. There has been no recent fishing effort within the eastern zone of the Giant Crab fishery in Vic, and most of the Rock Lobster catch is in waters <100 m deep (Sole well depth is approximately 125 m).	✓	A number of State-managed fisheries have management areas that intersect with the EMBA. Fishing intensity data is not available; however, it is possible that the Giant Crab, Rock Lobster, Scallop and Wrasse fisheries may be active within the EMBA.
	Recreational Fisheries	State-managed	• Community engagement	✓	Recreational fishing may occur within the operational area, but activity is expected to be minimal given its location >30 km offshore.	✓	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)

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		EMBA	
	Recreation and Tourism	Various human activities and interaction	• Community engagement • Economic benefit	✓	Marine-based recreation and tourism may occur, but activity is expected to be minimal given its location >30 km offshore.	✓	In East Gippsland, primary tourist locations include Marlo, Cape Conran and Mallacoota. The area is renowned for its nature-based tourism, recreational fishing and water sports.
	Industry	Shipping	• Community engagement • Economic benefit	✓	The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. The Sole wells do not coincide with major shipping routes.	✓	The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. However, shipping routes typically occur only through the southern extent of the EMBA. There are no major ports within the EMBA, but minor ports do exist (e.g. Lakes Entrance) that support commercial and recreational fishing industries.
		Oil and Gas	• Economic benefit	✓	Petroleum activity within the operational area is Cooper operated assets.	✓	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.
	Heritage	Maritime	• Shipwrecks	–	Not present.	✓	Numerous shipwrecks have been recorded in nearshore and coastal Victorian waters. The two in closest proximity to the Sole well locations are to *Commissioner* and *SS Federal*, approximately 11 km and 12 km (respectively) to the northeast.
		Indigenous	• Indigenous use or connection	–	Not present.	✓	Through cultural traditions, Aboriginal people maintain their connection to their ancestral lands and waters. The Gunaikurnai, Monero and the Bidhawel (Bidwell) Indigenous people are recognised as the traditional custodians of the lands and waters within the East Gippsland Shire.

4.4 Conservation Values within the EMBA

The following table provides details of the features present within the EMBA for those receptors identified within Table 4-3. Note, no Commonwealth Marine Reserves, internationally (Ramsar) or nationally important wetlands, World, National or Commonwealth heritage places occur within the EMBA.

Descriptions of the features or species and species habitat is provided in Appendix A.

Table 4-3: Summary of conservation values and sensitivities within the EMBA

Receptor Type	Value and Sensitivities	Features present within the EMBA
Commonwealth Marine Area	Key Ecological Features	• Bass Cascade • Big Horseshoe Canyon • Shelf Rocky Reefs and Hard Substrates • Upwelling East of Eden
Seabirds and Shorebirds	Threatened and/or migratory species	• Numerous threatened (34) and migratory (39) species or species habitat present (including various albatross, petrel, plover, sandpiper, shearwater and tern species)
Fish	Threatened and/or migratory species	• Two threatened fish species or species habitat present (Australian Grayling, Black Rockcod) • Two threatened (Great White Shark, Whale Shark) and four migratory (Great White Shark, Shortfin Mako Shark, Porbeagle Shark, Whale Shark) shark species or species habitat present
Marine Reptiles	Threatened and/or migratory species	• Four threatened and migratory marine turtle species or species habitat present (Loggerhead Turtle, Green Turtle, Leatherback Turtle, Hawksbill Turtle)
Marine Mammals	Threatened and/or migratory species	• Five threatened whale species or species habitat present (Sie Whale, Blue Whale, Fin Whale, Southern Right Whale, Humpback Whale); and nine migratory whale species or species habitat present • Two migratory dolphin species or species habitat present (Dusky Dolphin, Killer Whale)

5.0 Environmental Impact and Risk Assessment Methodology

This section describes the environmental impact and risk assessment methodology employed for activities to be undertaken as part of the Sole-3 & 4 Drilling and Sole-2 Well Abandonment, adopting Cooper Energy's risk assessment framework and toolkit to evaluate the potential impacts and risks.

For the Cooper Energy offshore activities, environmental aspects, impacts and risks have been identified and assessed through the following steps:

- Establish the context for the assessment by defining the activity and associated environmental aspects;
- Identifying the impact or risk associated with the environmental aspects;
- Identifying the ecological and social receptors with the potential to be exposed to the hazard;
- Evaluate the potential impact or risk (consequence);
- Determine the ALARP decision context and identify control measures;
- Evaluate the likelihood of the impact or risk (consequence) occurring;
- Assigning residual risk rating (after control measures are implemented) utilizing the Cooper Energy qualitative risk matrix. In accordance with the Cooper Energy acceptance criteria, the impacts and risks continue to be reassessed until it is demonstrated the impact or risk is reduced to a level which is as low as reasonably practicable (ALARP) and is acceptable according to the Cooper Energy acceptance criteria; and
- Evaluate the acceptability of the potential impact or risk.

Figure 5-1 provides the process adopted for managing impacts and risks associated with the petroleum activity.

Figure 5-1: AS/NZS ISO 31000 – Risk Management Methodology

5.1 Impact and Risk Evaluation

5.1.1 Establish the context

After describing the petroleum activity, an assessment was carried out to identify potential interactions between the petroleum activity and the receiving environment. The outcomes of stakeholder consultation also contributed to aspect identification.

Based upon an understanding of the environmental interactions, relevant impacts or risks were defined. Ecological and social receptors identified with the potential to be exposed to an aspect and subsequent impacts or risks were then summarised enabling a systematic evaluation to be undertaken.

5.1.2 Evaluate the potential impact (consequence)

After identifying the potential impacts or risks; consequences were determined based on:

- the spatial scale or extent of potential impact or risk of the environmental aspect within the receiving environment
- the nature of the receiving environment (within the spatial extent), including proximity to sensitive receptors, relative importance, and sensitivity or resilience to change
- the impact mechanisms (cause and effect) of the environmental aspect within the receiving environment (e.g. persistence, toxicity, mobility, bioaccumulation potential)
- the duration and frequency of potential effects and time for recovery
- the potential degree of change relative to the existing environment or to criteria of acceptability.

Consequence definitions are provided in Table 5-1.

Table 5-1: Definition of Consequence

Descriptor	Environment	Regulatory, reputation, community and media
5. Critical	Severe long-term impact on highly-valued ecosystems, species populations or habitats. Significant remedial/recovery work to land/water systems over decades (if possible at all).	Critical impact on business reputation &/or international media exposure. High-level regulatory intervention. Potential revocation of License/Permit. Operations ceased.
4. Major	Extensive medium to long-term impact on highly-valued ecosystems, species populations or habitats. Remedial, recovery work to land or water systems over years (~5-10 years).	Significant impact on business reputation and/or national media exposure. Significant regulatory intervention. Operations ceased.
3. Moderate	Localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function. Remedial, recovery work to land/water systems over months/year.	Moderate to small impact on business reputation. Potential for state media exposure. Significant breach of regulations, attracting regulatory intervention.

Descriptor	Environment	Regulatory, reputation, community and media
2. Minor	Localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. Remedial, recovery work to land, or water systems over days/weeks. No significant impacts to third parties.	Some impact on business reputation and/or industry media exposure. Breach of regulations - event reportable to authorities.
1. Negligible	Temporary localised impacts or disturbance to plants/animals. Nil to negligible remedial/recovery works on land/water systems.	Minimal impact on business reputation. Negligible media involvement. No regulatory breaches or reporting.

5.1.3 Determine the ALARP decision context and identify control measures

In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, Rev 6, June 2015), Cooper Energy have adapted the approach developed by Oil and Gas UK (OGUK) (formerly UKOOA; 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 severity 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, additional assessment is required, and the precautionary approach applied for those controls that only have a marginal cost benefit.

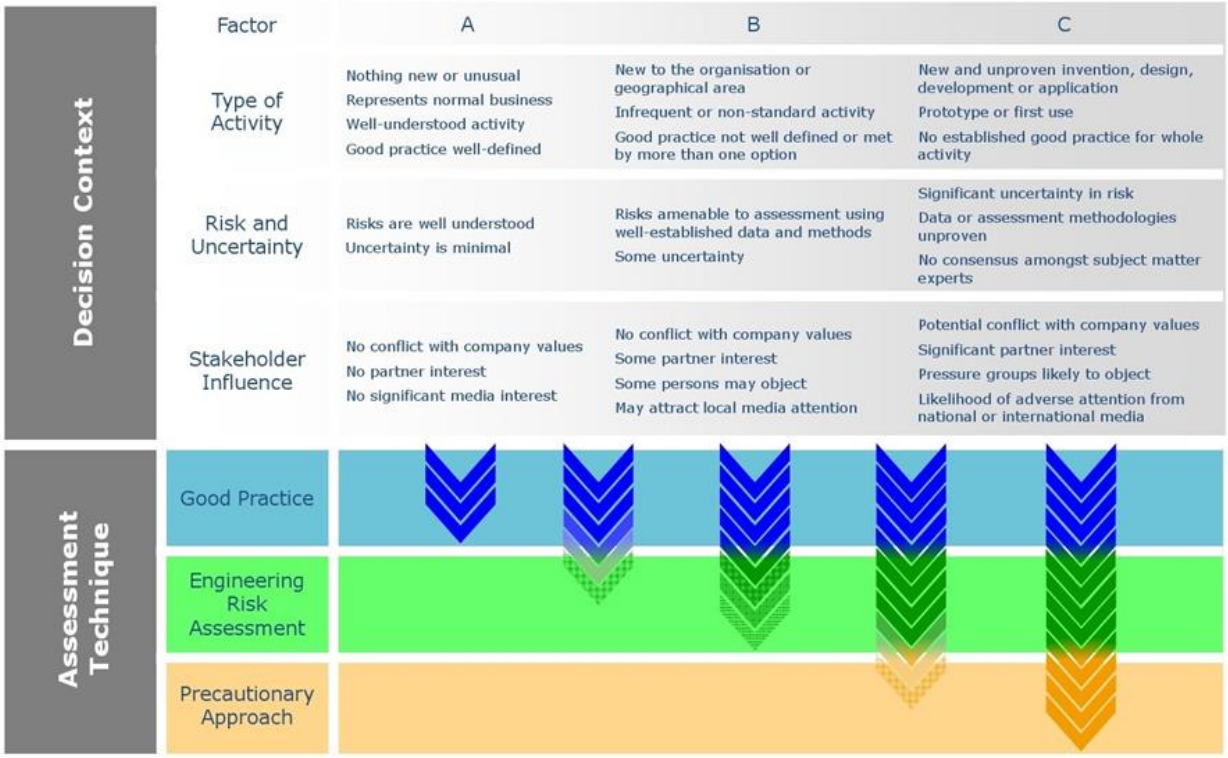

Figure 5-2: ALARP Decision Support Framework

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

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 6.0.

The assessment techniques considered include:

- good practice
- engineering risk assessment
- precautionary approach.

5.1.4 Evaluate the likelihood of the impact (consequence) occurring

The likelihood of a defined consequence occurring was determined, considering the control measures that have been previously identified. Likelihood levels are determined according to the Cooper Energy qualitative risk matrix (Table 5-3). Likelihood definitions are provided in Table 5-2.

Table 5-2: Definition of Likelihood

Descriptor	Description
A. Almost certain	Common event, expected to occur in most circumstances within Cooper Energy operations (i.e., several times a year).
B. Likely	Event likely to occur once or more during a campaign, ongoing operations or equipment design life.
C. Possible	Infrequent event that may occur during a campaign, ongoing operations or equipment design life.
D. Unlikely	Unlikely event, but could occur at sometime within Cooper Energy operations (has

Descriptor	Description
	occurred previously in similar industry).
E. Remote	Rare event. May occur in exceptional circumstances of Cooper Energy operations (not heard of in recent similar industry history).

5.1.5 Assigning residual risk rating

Based upon the identified consequence and likelihood levels, Cooper Energy use the qualitative risk matrix (Table 5-3) to rate the residual risk level.

Table 5-3 Cooper Energy Qualitative Risk Matrix

		CONSEQUENCE				
		1.Negligible	2.Minor	3.Moderate	4.Major	5.Critical
LIKELIHOOD	Almost Certain	M	M	H	H	H
	Likely	M	M	M	H	H
	Possible	L	M	M	H	H
	Unlikely	L	L	M	M	H
	Remote	L	L	L	M	M

5.1.6 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 works at several levels, as outlined in Table 5-4 and is based on NOPSEMA's Guidance Notes for EP Content Requirements (N04750-GN1344, Rev 3, April 2016) and guidance issued in Decision-making – Criterion 10A(c) Acceptable Level (N-04750-GL1637, Rev 0, Nov 2016). The acceptability evaluation for each aspect associated with this activity is undertaken in accordance with Table 5-4.

Table 5-4 Cooper Energy Acceptability Evaluation

Factor	Criteria / Test
Cooper Energy Risk Process	• Is the level of risk High? (if so, it is considered unacceptable)

Principles of Ecologically Sustainable Development (ESD) [See below]	• Is there the potential to affect biological diversity and ecological integrity? (Consequence Level Major [4] and Critical [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	• Confirm that all good practice control measures have been identified for the aspect including those identified in relevant EPBC listed species recovery plans or approved conservation advices.
Internal Context	• Confirm that all Cooper Energy HSEC MS Standards and Risk Control Processes have been identified for this aspect
External Context	• What objections and claims regarding this aspect have been made, and how have they been considered / addressed?

ESD Principles are:

A. Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations

   T*his principle is inherently met through the EP assessment process. 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. Where the activity has the potential to result in serious or irreversible environmental damage, 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

D. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making

   An assessment is completed to determine if there is the potential to impact biological diversity and ecological integrity

E. Improved valuation, pricing and incentive mechanisms should be promoted

   Not relevant to this EP

5.2 Monitor and Review

Monitoring and review activities are incorporated into the impact and risk management process to ensure that controls are effective and efficient in both design and operation. This is achieved for the Sole-3 & 4 Drilling and Sole-2 Well Abandonment activities through the environmental performance outcomes, standards and measurement criteria. Additional aspects of monitoring and review 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); and
- Identifying emerging risks.

6.0 Risk and Impact Evaluation

This Section summarises the impacts and risks associated with the petroleum activity appropriate to the nature and scale of each impact or risk, and provides the control measures that are used to reduce the risks to ALARP and an acceptable level.

6.1 Physical Interaction (Collision with Marine Fauna)

Table 6-1 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Physical Interaction (Collision with Marine Fauna).

Table 6-1 Physical Interaction (Collision with Marine Fauna) EIA / ERA

Cause of Aspect	The movement of vessels within the operational area and the physical presence of the vessel has the potential to result in collision with marine fauna.
Summary of impact(s)	Interaction with fauna has the potential to result in: • injury or death of marine fauna
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Megafauna	Several marine mammals (whale, dolphin) and turtle species, including those listed as either threatened and/or migratory under the EPBC Act have the potential to occur within the operational area. The operational area is located within a foraging BIA for the Pygmy Blue Whales (associated with the 'Upwelling East of Eden' KEF), and a distribution BIA for the Southern Right Whale and Great White Shark. For the Southern Right Whale, while the operational area is within a distribution BIA, it does not intersect with known aggregation areas (again occurring further west). Similarly, for the Great White Shark, known aggregation areas (foraging, breeding), while in eastern Victoria, occur beyond the vicinity of the operational area. Both the Southern Right Whale and Great White Shark migrate north along the east coast of Australia, typically beginning in autumn; and return in spring (Great White Shark) or early-summer (Southern Right Whale). The Great White Shark has been recorded in higher numbers during November/December in Victorian waters (coinciding with seal pupping season); this is outside of the anticipated timing of works for the Sole EP activities. Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels and facilities. The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel, while others are curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson et al.1995). Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs (Whale and Dolphin Conservation Society, 2006). Laist et al. (2001) identifies that larger vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels travelling faster than 14 knots. Vessels typically used to support workover activities do not have the same limitations on manoeuvrability and would not be moving at these speeds when conducting activities within the scope of this EP, inside the operational area. The duration of fauna exposure to vessel strike is limited to the duration of this activity which is expected to be approximately 70 days. If a fauna strike occurred and resulted in

	death, it is not expected that it would have a detrimental effect on the overall population. Consequently, the potential impacts and risks from fauna strike are considered to be **Minor (2)** as this type of event may result in a localised short-term impact to species of recognised conservation value but is not expected to affect the population or local ecosystem function.
ALARP Decision Context	**A**
Summary of Control Measures	
• Adherence to EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans – The Australian Guidelines for Whale and Dolphin Watching describes strategies to ensure whales and dolphins are not harmed during offshore interactions with people. • Vessel strike reporting	

Likelihood	Unlikely (D)	**Residual Risk**	Low

6.2 Physical Interaction (Other Marine Users)

Table 6-2 provides a summary of the EIA / ERA for Physical Interaction (Other Marine Users).

Table 6-2: Physical Interaction (Other Marine Users) EIA / ERA

Cause of Aspect	The movement of vessels within the operational area, and the physical presence of the MODU and vessels has the potential to result in interactions with other marine users. Once well suspension has been complete at Sole-3 & 4, the wellheads and subsea production trees will remain on the seabed and could result in a physical interaction with other marine users. Cooper Energy will apply for a PSZ at the Sole-3 & 4 wells. Offshore inspection of the wells during the suspension phase will involve a single vessel and deployment of an ROV within the PSZ.
Summary of impact(s)	Interaction with other marine users has the potential to result in: • a disruption to commercial activities.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Commercial Fisheries Other marine users	Several commercial fisheries have management areas that overlap the operational area associated with the EP; however, fishing activity in the area is low. Two stakeholders have indicated concern over possible cumulative impacts from multiple wells and associated exclusion zones, which may impact on the total area available for fishing. During drilling and abandonment activities covered under this EP, the PSZ to be placed around the MODU will only be temporary. Once completed, a permanent PSZ, as provided for in Part 6.6 of the OPGGSA 2006 will be applied for the Sole-3 and 4 wells. For safety reasons, in particular to avoid interaction between the subsea facilities and other marine users, establishing a PSZ is considered necessary and will be exclusive. The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. However, the Sole-3 & 4 Drilling and Sole-2 Well Abandonment locations do not coincide with major routes; with higher volumes of traffic located to the south of the wells. Therefore, relatively small numbers of vessels are likely to be encountered within the operational area. The most credible impact to other marine users would be the minor deviation of commercial vessels around PSZ. The PSZ is limited to 500 m, so any required deviations would be minor and thus have negligible impact on travel times or fuel

	use of these vessels. Based on the above assessment, any impacts would be **Negligible (1)**, with little to no potential impacts to external stakeholders.		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Pre-start notifications • Petroleum Safety Zone			
Likelihood	Remote (E)	**Residual Risk**	Low

6.3 Light Emissions

Table 6-3 provides a summary of the EIA / ERA for Light Emissions.

Table 6-3: Light Emissions EIA / ERA

Cause of Aspect	The MODU and support vessels will generate light while in the operational area. Lighting is used for marine safety to ensure clear identification of vessels to other marine users and to allow activities to be undertaken safely 24 hours a day. Lighting will typically consist of bright white (i.e., metal halide, halogen, fluorescent) lights, and are not dissimilar to other offshore activities in the region, including fishing and shipping. Light emissions will also be generated during flaring for a very short duration (12 - 24 hours).
Summary of impact(s)	A change in ambient light levels may have the potential to result in: • Attraction of light-sensitive species such as seabirds, squid and zooplankton in turn affecting predator-prey dynamics; and • Alteration of behaviour that may affect species during breeding periods (e.g. shearwaters, turtle hatchlings).
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Seabirds, squid and zooplankton	**Localised light glow that may act as an attractant to light sensitive species** High levels of marine lighting can attract and disorient seabird species resulting in species behavioural changes (e.g. circling light sources leading to exhaustion or disrupted foraging), injury or mortality near the light source (e.g. Marquenie *et al.* 2008; Weise et al. 2001). These studies indicate that migratory birds are attracted to lights on offshore platforms when travelling within a radius of 5 km from the light source, but their migratory paths are unaffected outside this zone (Shell, 2010). Other marine life may also be attracted to the MODU or support vessels (e.g., fish, squid and plankton) that can aggregate directly under downward facing lights. These are prey species to many species of marine fauna and given the nature of the activity, any impacts arising from light emissions will be localised and temporary. Consequently, the potential impacts and risks from light emissions are considered to be **Negligible (1)** as this type of event may result in temporary localised impacts or disturbance to animals but is not expected to affect the population or local ecosystem function.
Turtles, seabirds	**Alteration of behaviour from light-sensitive species during breeding periods**

	Turtles Light pollution can be an issue along, or adjacent to, turtle nesting beaches where emerging hatchlings orient to, and head towards, the low light of the horizon unless distracted by other lights which disorient and affect their passage from the beach to the sea (EA, 2003). Given the absence of known turtle nesting in Victoria, impacts to turtle hatchlings are not expected. Seabirds Artificial light can cause significant impacts on burrow-nesting petrels and shearwaters. The operational area is approximately 40 km from the closest shoreline. Given the distance offshore, changes to ambient light levels in seabird breeding areas are not expected to occur, thus impacts to breeding periods from light emissions are not expected.
ALARP Decision Context	**A**
Summary of Control Measures	
• Lighting will be limited to that required for safe work and navigation.	

Likelihood	Possible (C)	**Residual Risk**	Low

6.4 Underwater Sound Emissions

Table 6-4 provides a summary of the environmental impact assessment (EIA) for Underwater Sound Emissions.

Table 6-4: Underwater Sound Emissions EIA

Cause of Aspect	Underwater sound emissions will be generated from: • Drilling operations (mechanical operation of the drill string and other machinery) • Sonar inspection (e.g. ROV mounted sonar survey during and after the drilling and well abandonment) • Support operations (MODU/vessel operations) • Support operations (helicopter operations)
Summary of impact(s)	The potential impacts of underwater sound emissions in the marine environment are: • Localised and temporary fauna behavioural disturbance that affects migration or social behaviours; and • Auditory impairment, Permanent Threshold Shift (PTS).
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Marine mammals Marine turtles Fish and sharks Commercial Fisheries	**Localised and Temporary Fauna Behavioural Disturbance** Marine Mammals Using the National Marine Fisheries Service (NMFS) guidance for sounds such as vessel noise, behavioural disturbance may occur within 4km of the MODU / vessel. The operational area is located within a foraging BIA for the Pygmy Blue Whale, and a distribution BIA for the Southern Right Whale; both species typically occur as individuals or in small (2–3 individuals) groups. Therefore, within the open water environment of the operational area, it is anticipated that cetacean numbers would be low, and so it is not

	expected that exposure to these sound levels would result in a significant change to foraging behaviours or natural movement that would result in further impact at either the individual or local population levels. Consequently, the potential impacts and risks from noise emissions are considered to be **Minor (2).** Marine Turtles Using the limited information available, it has been reported that behavioural and masking changes are likely to occur at levels above 120 dB re 1 µPa. The operational area is not within an identified turtle BIA and more than 40 km from beaches. Within the open water environment of the operational area, it is anticipated that turtle numbers would be low, and so it is not expected that exposure to these sound levels would result in a significant change to foraging behaviours or natural movement that would result in further impact at either the individual or local population levels. Consequently, the potential impacts and risks from noise emissions are considered to be **Minor (2)**. Fish and sharks Sound levels are expected to be below the Popper et al. (2014) threshold for injury in fish with a high or medium hearing sensitivity. For some fish, a strong 'startle' response has been observed at lower sound levels, with fish shown to move away from the noise source. Using a conservative approach, Cooper Energy has estimated that fish may exhibit a behavioural response to expected sound levels within 3km of the sound source (well location). Any behavioural impacts would be temporary. Consequently, the potential impacts and risks from noise emissions are **Negligible (1)**. Commercial fisheries The EMBA is located within an important commercial fishing area. Localised and temporary behaviour changes in fish have the potential to adversely affect commercial fishing operations. During stakeholder consultation, concern was raised by South East Trawl Fishing Industry Associate (SETFIA) regarding the potential impact of seismic survey on marine invertebrates and fish. Cooper Energy provided sufficient information to show that, as seismic survey will not be undertaken, impacts from the activities are unlikely to result in impacts to fish and will not affect commercial fishing. As potential impacts and risks from noise emissions to fish and sharks is determined to have a negligible consequence, impacts and risks to commercial fisheries from noise emissions are also considered to be **Negligible (1)**.
Marine mammals Fish and sharks Marine invertebrates Marine turtles	**Auditory Impairment, Permanent Threshold Shift (PTS)** The pulsed sound generated by sonar survey may exceed proposed threshold levels in close proximity to the source. Marine Mammals Southall et al. (2007) suggests that to instantaneous injury in cetaceans resulting in a permanent loss in hearing occurs when sound exceeds 230 dB re 1 µPa (Peak SPL). Received source levels are estimated to drop below this threshold within 2m of the sound source. Temporary auditory threshold shifts, and avoidance behaviour by cetaceans may extend further afield; sound levels which could induce avoidance behaviour are predicted to be localised, limited to individuals within approximately 500-1000 m of the source based on upper response criteria of 180 dB re 1µPa (Southall et al., 2007). Given the sonar surveys are limited in duration (a matter of hours), any avoidance of the area would be temporary. Impacts to marine mammals are therefore predicted to be **Minor (2).**

	Fish Popper *et al.* (2009) have previously proposed that peak-to-peak SPL (~207 dB re 1 µPa) has the potential to result in a recoverable injury in fish that have high or medium hearing sensitivity. The sound pressure levels produced by the sonar may therefore have the potential to effect fish in the near vicinity. Based on the sound propagation estimates sound levels of 207 dB re 1uPa would be limited to within 30 m of the sonar. Behavioural responses are expected to be short-lived, with duration of effect less than or equal to the duration of exposure. For some fish, strong 'startle' responses have been observed at sound levels of 200 to 205 dB re 1µPa, indicating that sounds at or above this level may cause fish to move away from the sound source. Such levels are only expected within approximately 50 to 100 m of the sound source. Other studies (McCauley *et al.* 2003) have found that active avoidance may occur in some fish species at sound levels of ~161–168 dB re 1µPa rms (~186-193 SPL_{peak}), which may occur within 3 km of the sonar. Whilst fish may initially be startled, moving away from the sound source; once the source moves on fish would be expected to move back into the area. Sonar surveys will be short in duration and hence any small disturbance to fish communities in the area would be negligible from a temporal perspective. Any potential impacts are expected to be limited, with short-term effects to populations in the area. Impacts to fish are therefore predicted to be **Minor (2)**. Marine Invertebrates Assuming a potential impact threshold of 202 dB re 1 µPa (peak-to-peak SPL), only those within 50 m of the source might be impacted. Unlike fish, the (relatively slow) motility of invertebrates is unlikely to allow them to avoid the sound propagated from the sonar. However, given the short duration of the sonar surveys, and the reduction in sound levels to below threshold levels over a short distance, only low numbers of invertebrates have the potential to be affected. Potential impacts to invertebrate communities are therefore predicted to be **Minor (2)**. Turtles It has been reported that physical injury and/or instantaneous permanent hearing damage to adult turtles is likely to occur at 240 dB re 1 µPa. No supporting literature is available to determine levels of continuous noise that results in threshold hearing loss for marine turtles. Based on the sound levels produced during sonar survey, physical injuries to turtles due to sonar pulses are not expected.
ALARP Decision Context	**A**
Summary of Control Measures	
• Planned Maintenance Schedule • Adherence to EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans	

Likelihood (species of recognised conservation value)	Unlikely (D)	**Residual Risk**	Low
Likelihood (fish)	Possible (C)		
Likelihood (Commercial Fisheries)	Remote (E).		

6.5 Physical Presence – Seabed Disturbance

Table 6-5 provides a summary of the EIA / ERA for Physical Presence – Seabed Disturbance.

Table 6-5 Physical Presence – Seabed Disturbance EIA

Cause of Aspect	During the activity, the MODU will be anchored to the seabed to enable drilling and abandonment activities to be undertaken. If possible, the MODU will kedge between well locations, reducing the area of seabed disturbance, however for the purposes of this assessment it has been assumed that two anchoring locations will be required: one at Sole-3 & -4, and one at Sole-2. Drilling activities will directly disturb the seabed through presence of the wellbore – each wellhead, assuming a 42" (1,067 mm) surface hole and 36" (914 mm) conductor casing, will occupy an area of 0.9 m2 for each well, or 1.8 m^2 in total for both wells.
Summary of impact(s)	Seabed disturbance has the potential to impact on receptors through: • Smothering and alteration of benthic habitats • Localised and temporary increase in turbidity near the seabed
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Benthic habitats and fauna	**Smothering and Alteration of benthic habitat** The area of benthic habitat expected to be disturbed by planned activities is approximately 30 m^2 per anchor (8 anchors at each location) and 10 m^2 per clump weight (8 at each location). Total disturbance area is therefore expected to be very small. The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibiotic communities (typically sponges). Any impact will be limited to the immediate vicinity of the well locations, and thus the extent of potential impact is localised. The type of damage that could be sustained may include destruction of habitat. However, due to the similarity of surrounding habitat, and lack of sensitive benthic habitats, it is expected that recovery is likely. It is expected that any localised impacts from anchoring would rapidly recolonise and recover following any disturbance, therefore the potential impact has been determined as **Negligible (1).** **Localised and temporary increase in turbidity near the seabed** Benthic fauna may be disturbed through the temporary increase in turbidity near the seafloor as a result of seabed disturbance during anchoring. The area of increased turbidity is likely to be a very small area localized around the disturbance points where anchors or weights sit on the seabed. The mechanical impact from anchoring is too small to create suspension on a hard substrate; and for sandy substrate, the high settling velocity ensures the particles do not remain in suspension for an extended period of time (Ramboll Danmark, 2008). Given the predominantly sandy substrate within the operational area, the area of increased turbidity is likely to temporally and spatially be a very small area, and localised around the disturbance points where anchors or wet-stored equipment are placed or retrieved from the seabed. While anchored, the MODU will remain stationary, and therefore no significant sweep (i.e. movement of anchor chain over seabed surface) is expected to occur. No significant benthic communities, including fishery stocks are expected to be impacted

	from anchoring activities. Given the lack of suitable habitat, commercially important species are unlikely to occur within the operational area. In particular, there has been no recent fishing effort within the eastern zone of the Giant Crab fishery in Victoria, and most of the catch for Rock Lobster is typically in waters <100 m deep (the depth at the Sole wells is approximately 125 m). The location of the wells within a homogenous seabed area, and lack of sensitive benthic features, means that turbidity resulting from the described activities is expected to result in only temporary and localised impacts or disturbance, therefore the potential impact has been determined as **Negligible (1)**.
ALARP Decision Context	**A**
Summary of Control Measures	
• Undertake mooring analysis • Monitor mooring line tensions • Sole-2 wellhead will be removed during the Sole-2 well abandonment campaign.	

Likelihood	**Unlikely (D).**	**Residual Risk**	Low

6.6 Atmospheric Emissions

Table 6-6 provides a summary of the EIA / ERA for Atmospheric Emissions.

Table 6-6 Atmospheric Emissions EIA / ERA

Cause of Aspect	The following activities were identified as having the potential to result in air emissions: • Use of fuel (support vessels and MODU) • Flaring of gas from wellbore clean-up and flowback • Venting of gas from the annulus • Venting of gas during onsite analysis of the separator Flaring and venting will be undertaken intermittently over a few days. Volumes released are controlled such that only small amounts are released at any given time.
Summary of impact(s)	Generation of atmospheric emissions has the potential to result in: • chronic effects to sensitive receptors from localised and temporary decrease in air quality from diesel combustion; • contribution to the global greenhouse gas (GHG) effect.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Seabirds Marine megafauna that surface for air (e.g. cetaceans and marine turtles)	**Localised and temporary decrease in air quality from diesel combustion** The use of fuel (specifically marine-grade diesel) to power engines, generators and mobile and fixed plant (e.g., ROV, back-deck crane, generator), will result in gaseous emissions of greenhouse gases (GHG). The quantities of atmospheric emissions and related impacts will be similar to other vessels and helicopters operating in the region. Emissions from engines, generators and deck equipment may be toxic, odoriferous or aesthetically unpleasing, and will result in a localised, temporary reduction in air quality. Modelling of nitrogen dioxide (NO_2) emissions from MODU power generation for an offshore project (BP, 2013) indicates that, although emissions will result in a temporary

	increase in ambient NO_2 concentration, any exposure from these operations would be expected to be below Australian Ambient Air Quality National Environmental Protection (Air Quality) Measures (NEPM) standards. Flaring during wellbore clean-up and flowback is planned, with a total volume of 80 MMScf. The same modelling undertaken by BP (2013) looked at emissions from flaring during drilling operations, concluding that any exposure would be below NEPM standards. Given the slow release rates and volumes associated with venting and flaring, it is not expected to generate exposures significant enough to result in impacts to any identified environmental receptors. Consequently, the potential impacts and risks from atmospheric emissions are considered to be **Minor (2)** as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions. **Contribution to the global GHG effect** While these emissions add to the GHG load in the atmosphere, which adds to global warming potential, they are relatively small on a global scale, and temporary, representing an insignificant contribution to overall GHG emissions (DoEE, 2017). Any exposure from these operations would be expected to be insignificant, therefore no further evaluation of this aspect has been undertaken.
ALARP Decision Context	**A**
Summary of Control Measures	
• Use reduced sulphur content fuel • All vessels to comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) • Adherence to MARPOL Annex VI (Prevention of Air Pollution from Ships) requirements • Adherence to MARPOL Annex VI (Chapter III Regulation 16 and Appendix IV – Requirements for Control of Emissions from Ships – Shipboard Incineration) requirements • Control cold venting of gas	

Likelihood	**Remote (E).**	**Residual Risk**	Low

6.7 Planned Discharge – Drilling Cuttings and Fluid

Table 6-7 provides a summary of the environmental impact assessment (EIA) for Planned Discharge – Drilling Cuttings and Fluid.

Table 6-7 Planned Discharge – Drilling Cuttings and Fluid EIA

Cause of Aspect	Drilling activities will result in planned discharges of drill cuttings and adhered drilling fluids. In addition, A bulk discharge of approximately 2200 bbls ($352m^3$) of drilling fluids (per well) will occur from the MODU at the end of drilling at each well.
Summary of impact(s)	A planned discharge of drill cuttings and fluids has the potential to result in effects to ecological and social receptors through: • Increased turbidity of the water column; • Smothering of seabed habitat, flora and fauna resulting in the alteration of seabed substrate; and • Potential chemical toxicity and oxygen depletion impacts to flora and fauna in the water column and sediment.

Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Pelagic fish species Plankton	**Increased turbidity in the water column** Planned discharge of cuttings and adhered fluids from the surface will occur intermittently during drilling. Neff (2005) states that although the total volumes of muds and cuttings discharged to the ocean during drilling a well are large, the impacts in the water column environment are minimal, because discharges of small amounts of materials are intermittent. When cuttings are discharged to the ocean, the larger particles, representing about 90% of the mass of the mud solids, form a plume that settles quickly to the bottom (or until the plume entrains enough seawater to reach neutral buoyancy). About 10% of the mass of the mud solids form another plume in the upper water column that drifts with prevailing currents away from the discharge point and is diluted rapidly in the receiving waters (Neff, 2005; 2010). Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Assuming that solids control equipment reduces residual on solids to below 10% leaving the material discharged comprising 90% solid cuttings, and based upon dilutions identified by Hinwood et al. (1994) and Neff (2005), turbidity in the water column is expected to be reduced to below 10 mg/L (9 ppm) within 100 m of release. Considering the relatively short-lived nature of the intermittent plumes, and that concentrations of suspended solids rapidly dissipate with the prevailing currents, the potential impacts on larvae, or other marine fauna (pelagic fish, cetaceans, seabirds), is expected to be minimal. Thus, there is the potential for localised, short-term impact on species resulting in a **Negligible (1)** consequence.
• Soft sediment • Marine invertebrates	**Smothering and Alteration of Seabed Substrate** The seabed within the operational area is predominantly sands with shell/rubble patches, and with sparse epibiotic (e.g. sponges) coverage. There has been extensive demersal fishing activity in the general area, and therefore seabed biota is likely to be modified from the associated trawling and netting activities. Hinwood et al. (1994) explain that the main environmental disturbance from discharging drilling cuttings and fluids is associated with the smothering and burial of sessile benthic and epibenthic fauna. Many studies have shown that the effects on seabed fauna and flora from the discharge of drilling cuttings with water based muds are subtle, although the presence of drill-fluids in the seabed close to the drilling location (<500 m) can usually be detected chemically. In general, research suggests that any smothering impacts within the operational area will be limited to 500 m from the well site, and full recovery is expected. Given the inert nature of the drill cuttings and the limited volume being discharged from riserless drilling, the impacts to benthic habitats are expected to be limited. Consequently, the potential impacts and risks from smothering and alteration of seabed substrate are considered to be **Minor (2)** as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.
Surface waters: • pelagic fish	**Potential Chemical Toxicity** Neff (2005) discusses that, in well-mixed ocean waters, drilling muds and cuttings are

• plankton Lower water column and benthos: • demersal fish species • plankton • marine invertebrates • soft sediments	diluted by 100-fold within 10 m of the discharge and by 1000-fold after a transport time of about 10 minutes at a distance of about 100 m from discharge. Because of the rapid dilution of the drilling mud and cuttings plume in the water column, "harm to communities of water column plants and animals is unlikely and has never been demonstrated" (Neff, 2005). The Cooper Energy Offshore Environmental Chemical Selection Process defines the process for assessment of the offshore operational use and discharge of chemicals from Cooper Energy facilities. All chemicals planned for use and discharge must be assessed prior to use. Due to the inert nature of its components, WBM have been shown to have little or no toxicity to marine organisms (Jones et al., 1996). Neff (2010) explains that the lack of toxicity and low bioaccumulation potential of the drilling muds means that the effects of the discharges are highly localised and are not expected to spread through the food web. Consequently, the potential impacts and risks from chemical toxicity are considered to be **Minor (2)** as this type of event may result in localised short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.
ALARP Decision Context	**B** Alternate control measures considered, but not selected as cost outweighs benefit, includes: • Cuttings Reinjection • Contain and transfer cuttings to shore for treatment • Riserless Mud Recovery (RMR) System • Water based drilling fluids and treated drilled cuttings discharge made via a caisson submerged at an appropriate depth to ensure suitable dispersion of the effluent • Slim hole / coil tubing drilling • Additional equipment such as cuttings driers, thermal desorption and thermomechanical cleaning

Summary of Control Measures			
• Development of and adherence to Chemical Assessment Process • Use of water based drill fluids only • Solids control equipment / operator			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.8 Planned Discharge – Cement

Table 6-8 provides a summary of the environmental impact assessment (EIA) for Planned Discharge – Cement.

Table 6-8 Planned Discharge – Cement EIA/ERA

Cause of Aspect	Drilling activities use cement and will result in planned discharges of cement.
Summary of impact(s)	Planned discharge of cement has the potential to result in effects to marine fauna through: • Increased turbidity of the water column from surface discharges; • Smothering of benthic habitat and fauna by seabed discharges resulting in the alteration of benthic substrate; and • Potential toxicity impacts to fauna.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Pelagic fish species Plankton	**Increased turbidity of the water column from surface discharges** Cementing fluids are not routinely discharged to the marine environment; however, volumes of a cement/water mix of up to approximately 26 m^3 per well (i.e. 52 m^3 total for the program), may be released in surface waters during equipment washing. The cement particles will disperse under action of waves and currents, and eventually settle out of the water column; the initial discharge will generate a downwards plume, increasing the initial mixing of receiving waters. Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Modelling of the release of 18 m^3 of cement wash water by de Campos *et al.* (2017) indicate an ultimate average deposition of 0.05 mg/m^2 of material on the seabed; with particulate matter deposited within the three-day simulation period. Given the low concentration of the deposition of the material, it is therefore expected that the in-water suspended solids (i.e. turbidity) created by the discharge is not likely to be high for an extended period of time, or over a wide area; even when scaling this volume up to the expected discharge (26 m^3) for activities under this EP. Based upon the estimated discharge volumes identified for this program, and the potential impact thresholds as identified by McKinnon (2006), a discharge of cement from the surface is expected to result in a very short exposure of increased turbidity such that potential impacts would be expected to be localised (i.e. within 150m) and short-term (a few hours), and consequences are considered to be **Negligible (1).**
Soft sediment habitat	**Smothering and Alteration of Benthic Substrate from seabed discharges** Studies indicate that cement from upper hole sections displaced to the seabed may affect the seabed around the well to a radius of approximately 10 m-50 m of the well resulting in the potential for disturbance of 0.007 km^2 per well. Once cement overspill from cementing activities hardens, the area directly adjacent to the well (10-50m) will be altered, resulting in the destruction of seabed habitat within the footprint of the discharge. This impact on soft sediment communities is not expected to affect the diversity or ecosystem function in this area and thus is only considered a

	localised impact. It is expected that cement discharges may result in a localised alteration of seabed substrate within a habitat that is considered to homogenous and not overly sensitive. Given the relatively small footprint associated with the subsea release of cement, this impact is considered to result in localised impact to habitat with a **Negligible (1)** consequence.
Demersal fish species Plankton Benthic habitats and associated benthic infauna	**Potential Toxicity** The potential for toxicity is associated with chemicals that are added to the dry cement mix and as such, toxicity associated with the discharge of cement is limited to the subsea release of cement (not surface discharge of dry cement). Terrens *et al.* (1998) suggests that once cement has hardened, the chemical constituents are locked into the hardened cement. As such the extent of this hazard is limited to the waters directly adjacent to the displaced subsea cement (expected to be in the order of 10-50 m of the wellhead as discussed above). Given that it is expected that cement will harden within a couple of hours, and exposure to in water concentrations are expected to be limited due to the rapid dispersion and dilution, the potential for acute or chronic effects although possible will be limited such that potential impacts will result in a limited local degradation of the environment with a **Negligible (1)** consequence.
ALARP Decision Context	**A**
Summary of Control Measures	
• Development of and adherence to Chemical Assessment Process • Development of and adherence to drilling and cementing procedures • No overboard discharge of unmixed cement	

Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.9 Planned Discharge – Cooling Water and Brine

Table 6-9 provides a summary of the EIA / ERA for Planned Discharge – Cooling Water and Brine.

Table 6-9 Planned Discharge – Cooling Water and Brine EIA / ERA

Cause of Aspect	Seawater is used as a heat exchange medium for cooling machinery engines on vessels. Upon discharge, it will be warmer than the surrounding ambient water and may contain low concentrations of residual biocide if used to control biofouling. Concentrated brine is a waste stream created through the vessels desalination equipment for potable water generation. Brine will also be used, and subsequently discharged, during wellbore clean-up.
Summary of impact(s)	Planned discharge of cooling and brine waters has the potential to result in chronic effects to fauna through: • increased water temperature • increased water salinity • potential chemical toxicity in the water column.
Consequence Evaluation	

Receptor(s)	Description of Potential Environmental Impact
Transient marine fauna, including whales, sharks, fish, and reptiles	**Increased Temperature** Modelling of continuous wastewater discharges (including cooling water) found that discharge water temperature decreases quickly as it mixes with the receiving waters (WEL, 2014). Marine mammals and fish passing through the area will be able to actively avoid entrainment in any heated plume (Langford, 1990), and reptiles and sharks would be expected to behave similarly. Studies of organisms at 15, 20 and 25°C allowed them to tolerate temperature increments of 8-9°C without damage (UNEP, 1985). Given the open nature of the receiving environment, the short duration of the activity, and the lack of sensitive environmental receptors, the impact of increased temperature is expected to be **Negligible (1)**. **Potential Chemical Toxicity** Scale inhibitors and biocide used in the heat exchange and desalination process to avoid fouling of pipework are inherently safe at the low dosages used; they are usually consumed in the inhibition process, so there is little or no residual chemical concentration remaining upon discharge. Larger pelagic species are mobile; at worst, it is expected that they would be subjected to very low levels of chemicals for a very short time as they swim near the discharge plume. As transient species, they are not expected to experience any chronic or acute effects. Any impacts from chemical discharge will be localised and short-term. Given the open nature of the receiving environment, the intermittent nature of the activity, and the lack of sensitive environmental receptors, the impact of potential chemical toxicity is expected to be **Minor (2).**
Pelagic Fish Plankton	**Increased salinity** Brine water will sink through the water column where it will be rapidly mixed with receiving waters and dispersed by ocean currents. As such, any potential impacts are expected to be limited to the source of the discharge where concentrations are highest. Changes in salinity can affect the ecophysiology of marine organisms. Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20% to 30% (Walker and McComb, 1990). However, larval stages, which are crucial transition periods for marine species, are known to be more susceptible to impacts of increased salinity (Neuparth, Costa & Costa 2002). Pelagic species are mobile; it is expected that at worst, they would be subjected to slightly elevated salinity levels (~10-15% higher than seawater) for a very short period which they are expected to be able to tolerate. As such, transient species are not expected to experience chronic or acute effects. Given the open nature of the receiving environment, the short duration of the activity, and the lack of sensitive environmental receptors, the impact of increased salinity is expected to be **Negligible (1)**.
ALARP Decision Context	**A**
Summary of Control Measures	
• Planned Maintenance Schedule • Development of and adherence to Chemical Assessment Process	

Likelihood	Remote (E).	Residual Risk	Low

6.10 Planned Discharge - Treated Bilge

Table 6-10 provides a summary of the EIA / ERA for Planned Discharge - Treated Bilge.

Table 6-10 Planned Discharge - Treated Bilge EIA / ERA

Cause of Aspect	Bilge water consists of water, oily fluids, lubricants, cleaning fluids, and other similar wastes that have accumulated in the lowest part of the vessel / MODU typically from closed deck drainage and machinery spaces. Bilge water is treated onboard the vessel or MODU using the oil water separator (OWS) to reduce any oily residue to below regulated level, before being discharged at surface.		
Summary of impact(s)	A discharge of this material has the potential to result in chronic effects to plankton through potential toxicity in the water column.		
Consequence Evaluation			
Receptor(s)	**Description of Potential Environmental Impact**		
Fish embryo, larvae, and other plankton Species which rely on plankton as a food source	OSPAR (2014) indicates that the predicted no effect concentration (PNEC) for marine organisms exposed to dispersed oil is 70.5 ppb. A discharge of treated bilge is non-continuous and infrequent. Modelling by Shell (2010) indicates that upon discharge, hydrocarbon and other chemical concentrations are rapidly diluted and expected to be below PNEC within a relatively short period of time. Given the nature of this discharge, marine fauna most susceptible to toxic impacts are mainly limited to less mobile fish embryo, larvae, and other plankton. There is potential for short-term impacts to species that rely on plankton as a food source. Any impact to prey species would be temporary as the duration of exposure would be limited, and fish larvae and other plankton are expected to rapidly recover as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP, 1985). Consequently, the potential impacts and risks from planned discharge of treated bilge are considered to be localised and short-term, and have been rated as **Minor (2)**.		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Bilge discharges from vessels comply with MARPOL Annex I bilge discharge requirements • MARPOL-approved oil water separator • Planned Maintenance Schedule			
Likelihood	**Remote (E).**	**Residual Risk**	Low

6.11 Planned Discharge - Sewage and Food Waste

Table 6-11 provides a summary of the EIA / ERA for

Planned Discharge - Sewage and Food Waste.

Table 6-11:

Planned Discharge - Sewage and Food Waste EIA / ERA

Cause of Aspect	The use of ablution, laundry and galley facilities by personnel will result in the surface discharge of sewage and grey water. The generation of food waste from feeding personnel will result in the discharge of food waste from the galley.
Summary of impact(s)	A discharge of food waste, sewage and greywater has the potential to result in impacts to marine fauna from: • Temporary and localised reduction in water quality (nutrients and biological oxygen demand [BOD]) • Changing predator / prey dynamics from increased scavenging behaviours
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Transient marine fauna, including whales, sharks, fish and reptiles	**Temporary and localised reduction in water quality (nutrients and biological oxygen demand [BOD])** Monitoring of sewage discharges for another offshore project (WEL, 2014), determined that a 10 m^3 sewage discharge (over the course of an activity) reduced to ~1% of its original concentration within 50 m of the discharge location. Studies into the effects of nutrient enrichment from offshore sewage discharges indicate that the influence of nutrients in open marine areas is much less significant than that experienced in enclosed areas (McIntyre and Johnson, 1975) and suggest that zooplankton composition and distribution in areas associated with sewage dumping grounds are not affected. In addition, regardless of receptor sensitivity to BOD, Black et al. (1994) state that BOD of treated effluent is not expected to lead to oxygen depletion in the receiving waters. Consequently, the potential impacts and risks from the planned discharge of sewage and greywater have been evaluated as **Minor (2)**, given this type of event may result in localised short-term impacts to a species of conservation value (seabirds; Pygmy Blue Whale) through impacting their foraging habitat.
Plankton Large pelagic fauna (e.g. marine mammals, fish and seabirds)	**Changing predator / prey dynamics from increased scavenging behaviours** The overboard discharge of sewage and macerated food waste creates a localised and temporary food source for scavenging marine fauna or seabirds whose numbers may temporarily increase as a result, thus increasing the food source for predatory species. The rapid consumption of this food waste by scavenging fauna, and physical and microbial breakdown, ensures that the impacts of food waste discharges are insignificant and temporary, and receptors that may potentially be in the water column are not impacted. Plankton are not affected by sewage discharges, and thus impacts to food source and any predator-prey dynamics is not expected to occur. Consequently, the potential impacts and risks from the planned discharge of sewage and greywater have been evaluated as **Minor (2)**, given this type of event may result in localised short-term impacts to a species of conservation value (seabirds; Pygmy Blue Whale) through impacting their foraging habitat.
ALARP Decision Context	**A**
Summary of Control Measures	

• MARPOL-approved sewage treatment plant (STP) • Food waste macerated (MARPOL Annex V) • Planned Maintenance Schedule			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.12 Planned Discharge - Ballast water and Biofouling

Table 6-12 provides a summary of the EIA / ERA for Planned Discharge - Ballast water and Biofouling.

Table 6-12 Planned Discharge - Ballast water and Biofouling EIA / ERA

Cause of Aspect	The operation of the MODU and vessels may result in the discharge of ballast water within the operational area. The operation of the MODU and vessels also have the potential to result in biofouling, resulting in the same hazard. Consequently, both biofouling and ballast water discharge are evaluated below.
Summary of impact(s)	Planned discharge of ballast water, or biofouling, has the potential to introduce a marine pest (IMP).
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Benthic Habitat	IMP are likely to have little or no natural competition or predators, thus potentially outcompeting native species for food or space, preying on native species, or changing the nature of the environment. Marine pest species can also deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion. Marine pests can damage marine and industrial infrastructure, such as encrusting jetties and marinas or blocking industrial water intake pipes. By building up on vessel hulls, they can slow the vessels down and increase fuel consumption. The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibiotic communities (typically sponges). Areas of higher value or sensitivity are located further afield (e.g. it is approximately 37 km to Point Hicks Marine National Park, 40 km to Beware Reef Marine Sanctuary, and 105 km to the East Gippsland AMP). Once established, some pests can be difficult to eradicate (Hewitt *et al.*, 2002) and therefore there is the potential for a long-term or persistent change in habitat structure. Successful colonisation in the recipient region would be difficult given the nature of the benthic habitats near the operational area, and lack of light due to deep waters. If an IMP was introduced, and if it did colonise an area, it is expected that any colony would remain fragmented and isolated, and only within the vicinity of the wells. Therefore, there is the potential for a localised, but irreversible, impact to habitat resulting in a **Moderate (4)** consequence.

ALARP Decision Context	**B** Additional control measures considered but not adopted: • Only use vessels / MODUs that are currently operating in Commonwealth Waters to reduce the potential for introducing IMPs. This control measure is considered to have costs (limited vessel availability leading to delays in schedule and incurring additional expenses) which outweigh the benefits.
Summary of Control Measures	

• Maritime Arrivals Reporting System (MARS)
• Adherence to Australian Ballast Water Management Requirements (version 7; DAWR, 2017), including:
  ○ Ballast Water Management Plan
  ○ Report ballast water discharges
  ○ Maintain a ballast water record system
• Anti-fouling certificate
• Biofouling management plan
• Biofouling record book	

Likelihood	**Possible (C)**	**Residual Risk**	Medium

6.13 Operational Discharges - Subsea

Table 6-13 provides a summary of the EIA / ERA for Operational Discharges - Subsea.

Table 6-13 Operational Discharges - Subsea EIA / ERA

Cause of Aspect	Fluids planned to be discharged subsea include: • Control Fluid • Sulfamic Acid • Gas • Debris from tree cap removal
Summary of impact(s)	A planned discharge of various fluids during well activities has the potential result in chronic and acute impacts to marine fauna via localised and temporary decrease in water quality.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Soft sediment, infauna communities, and sparse epibiotic communities Transient marine fauna, including whales, sharks, fish, and reptiles	**Chemical Discharge** All chemicals used and discharged will be assessed using the Cooper Energy Offshore Environmental Chemical Assessment Process which uses the CHARM OCNS ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges. Little to no impact is expected on benthic fauna at the release location given the low toxicity, low bioaccumulation and biodegradability characteristics of the proposed chemical discharges, and the dispersion characteristics of the release. For seabed invertebrates present near the wellhead, it is possible that low-level concentrations of chemical may be present on a short-term and episodic basis, however given the low toxicity of the chemicals, the low frequency and short-term nature of the exposure, **Negligible (1)** impacts are expected. For mobile demersal and pelagic species which may be present at the wellheads during the activity, given the localised and short-term nature of the discharge, the low toxicity

	and low-frequency nature of the discharge and the species mobility which limits exposure, the environmental impact is expected to have a **Negligible (1)** impact to these species. **Gas** The main concern regarding a gas (methane) release is the possibility that the action of methane-consuming microbes (methanotrophic bacteria) could exhaust oxygen in the water column. As gas is positively buoyant, upon release it will rise through the water column causing the small volume to rapidly disperse and dilute. Consequently, receptors exposed would be limited to transient marine fauna. Based upon the expected volumes (in the order of 0.0001 m^3), exposure to transient marine fauna is not expected to occur at concentrations that could feasibly result in an impact. Thus, this release has not been discussed further. **Metal Shavings, Grit and Flocculant** The wellheads will be cut with an abrasive cutter utilising high pressure water and abrasive sorted grit particles below seabed level within the well head surface casing. The metal shavings generated, and abrasive grit, are discharged at the cut point below seabed and are expected to either settle to the lowest point within the well (associated with the additional cement plug) or below seabed level after passing through the conductor pipe. A small volume will enter the seabed at the cutting depth, once the grit cuts through the outer conductor pipe. Given the benthic habitat within proximity of the operational area in homogenous of the general area; comprising soft sediment communities, the small volume of grit expected to enter the seabed is not expected to result in an impact to those communities. Thus, this release has not been discussed further.
ALARP Decision Context	**A**
Summary of Control Measures	
• Development of and adherence to Chemical Assessment Process	

Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.14 Operational Discharges - Surface

Table 6-14 provides a summary of the EIA / ERA for Operational Discharge - Surface.

Table 6-14: Operational Discharge - Surface EIA/ERA

Cause of Aspect	Fluids planned to be discharged at the surface include Carrier fluid (lower completion) – gravel pack slurry, gel and breaker, and brine; Carrier fluid (upper completion) - Weighted and viscous fluid clean-up pills, cleanup brine, and inhibited seawater sweeps; water based mud; and well bore content (cement spacer, clean up pill).
Summary of impact(s)	A planned discharge of fluid during drilling and well abandonment activities has the potential result in chronic and acute impacts to marine fauna via: potential toxicity.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Whales, sharks, fish and plankton	All chemicals used and discharged will be assessed using Cooper Energy's Offshore Environmental Chemical Assessment Process which uses the CHARM OCNS ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential

	impacts to the environment and acceptability of planned discharges. Based upon the offshore location of the activity with no identified obstructions and open ocean currents, potential exposures are expected to be limited to the operational area. Given the infrequent nature of the discharge, it is expected that any exposure will be limited in duration with rapid dilution and dispersion experienced. Impacts from toxicity are most likely to be limited to those organisms that would get entrained in the plume (such as plankton and fish larvae). Consequently, the potential impacts and risks from the operational discharges at the surface are considered to be **Negligible (1)**.
ALARP Decision Context	**A**
Summary of Control Measures	
• Development of and adherence to Chemical Assessment Process	

Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.15 Accidental Release - Waste

Table 6-15 provides a summary of the EIA / ERA for Accidental Release - Waste.

Table 6-15 Accidental Release - Waste EIA / ERA

Cause of Aspect	The handling and storage of materials and waste on board MODUs and vessels has the potential for accidental over-boarding of hazardous/non-hazardous materials and waste.
Summary of impact(s)	The potential environmental impacts associated with the accidental release of waste are: • Marine pollution (litter and a temporary and localised reduction in water quality); • Injury and entanglement of marine fauna and seabirds; and • Smothering or pollution of benthic habitats.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Plankton and pelagic fish Benthic Habitats	**Hazardous Materials and Waste** Hazardous materials and wastes released to the sea cause pollution and contamination, with either direct or indirect effects on marine organisms. For example, chemical spills can impact on marine life from plankton to pelagic fish communities, causing physiological damage through ingestion or absorption through the skin. Impacts from an accidental release would be limited to the immediate area surrounding the release, prior to the dilution of the chemical with the surrounding seawater. In an open ocean environment such as the operational area, it is expected that any minor release would be rapidly diluted and dispersed, and thus temporary and localised. Solid hazardous materials, such as paint cans containing paint residue, batteries and so forth, would settle on the seabed if dropped overboard. Over time, this may result in the leaching of hazardous materials to the seabed, which is likely to result in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. Given the size of materials release it is expected that only very localised impacts to benthic habitats within the operational area would be affected and unlikely to contribute to a significant loss of benthic habitat or species diversity.

Marine Fauna Seabirds Benthic Habitats	**Non-hazardous Materials and Waste** Discharged overboard, non-hazardous wastes can cause smothering of benthic habitats as well as injury or death to marine fauna or seabirds through ingestion or entanglement (e.g., plastics caught around the necks of seals or ingested by seabirds and fish). If dropped objects such as bins are not retrievable by ROV, these items may permanently smother very small areas of seabed, resulting in the loss of benthic habitat. However, as with most subsea infrastructure, the items themselves are likely to become colonised by benthic fauna over time (e.g., sponges) and become a focal area for sea life, so the net environmental impact is likely to be neutral. This would affect extremely localised areas of seabed and would be unlikely to contribute to the loss of benthic habitat or species diversity. Given the restricted exposures and limited quantity of marine pollution expected from this program, it is expected that any impacts from marine pollution may have a **Minor (2)** impact resulting from a localised short-term impact to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
ALARP Decision Context	**A**
Summary of Control Measures	

• Adherence to MARPOL Annex V, including:
  ○ Garbage / waste management plan
  ○ Garbage record book
• Waste management training / induction	

Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.16 Accidental Release – Loss of Containment (Minor)

Table 6-16 provides a summary of the EIA / ERA for Accidental Release – Loss of Containment (Minor).

Table 6-16 Accidental Release – Loss of Containment (Minor) EIA / ERA

Cause of Aspect	The operation of the MODU and support vessels includes handling, use and transfer of hazardous materials, and consequently the following pathways were identified as potentially leading to a loss of containment event: • Use, handling and transfer of hazardous materials and chemicals on board • Hydraulic line failure from equipment • Transfer of hazardous materials and chemicals between the MODU and Vessel (refuelling)
Summary of impact(s)	A minor loss of containment (LOC) has the potential result in chronic and acute impacts to marine fauna via: potential toxicity
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Marine Fauna Pelagic species	A loss of 50 m^3 of diesel or chemicals upon release would be expected to result in changes to water quality in both surface waters and the pelagic environment. As evaluated in Section 6.17, the potential impacts associated with a larger loss of diesel fuel were determined to be **Minor (2)**, thus impacts from these types of events are not expected to be any larger (and thus have not been considered further).

ALARP Decision Context	**A**		
Summary of Control Measures			
• Bulk transfer process • Hoses and connections • Planned Maintenance Schedule • Development and adherence to vessel SMPEP (or equivalent) • Accidental release / waste management training / induction			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.17 Accidental Release – Loss of Containment (Vessel Collision)

Table 6-17 provides a summary of the EIA / ERA for the Accidental Release – Loss of Containment (Vessel Collision).

Table 6-17 Accidental Release – LOC (Vessel Collision EIA / ERA

Cause of Aspect	A loss of control event resulting in the release of marine diesel oil (MDO) has the potential to be caused by a collision between a support vessel and the MODU or a third-party vessel, rupturing the diesel storage tank.
Summary of impact(s)	The LOC (vessel collision) event has the potential to expose the environment to surface and in-water hydrocarbon, with the potential to directly or indirectly result in: • Toxicity or physical oiling to marine habitats or fauna; • Reduction in intrinsic value / visual aesthetics; • Damage to commercial businesses. Results of stochastic oil spill modelling for the surface release of MDO have predicted: • Surface exposure above environmental impact thresholds were predicted within 38 km of the release location, and be present for 1-2 days after release; • Surface exposure above the visible impact thresholds were predicted within 152 km of the release location, and be visible for up to 170 hours (~7 days) after release; • In-water (entrained) exposure above environmental impact thresholds were predicted in the surface (0-10 m) layer up to 265 km northeast from the release location, with some patches observed in the nearshore area; • No in-water (dissolved) exposure above environmental impact thresholds; • No shoreline contact was predicted.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Coral	In-water (entrained) hydrocarbon exposure has the potential to cause lethal or sublethal (e.g. reduced growth rates, tissue decomposition etc) impacts to corals. However, the nearshore shallow (0-10 m depth layer) areas predicted to be exposed to in-water concentrations above the impact threshold is patchy. Given the lack of hard coral reef formations, and the sporadic cover of soft corals in mixed reef communities, any potential impacts will likely be limited to isolated corals. Consequently, the potential impacts to corals from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.

Macroalgae	In-water (entrained) hydrocarbon exposure has the potential to cause physiological changes (e.g. changes to enzyme systems, rates of photosynthesis etc) to macroalgae, but are typically able to recover rapidly, even from heavy oiling. Macroalgae may be present within reef and hard substrate areas within the area predicted to be exposed; noting however, that the area predicted to be exposed to in-water concentrations above the impact threshold in the nearshore area is patchy. Consequently, the potential impacts to macroalgae from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.
Seagrass	In-water (entrained) hydrocarbon exposure has the potential to cause sub-lethal impacts to seagrass. Seagrass may be present within the area predicted to be exposed; noting however, that the area predicted to be exposed to in-water concentrations above the impact threshold in the nearshore area is patchy. Consequently, the potential impacts to seagrass from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning
Plankton	In-water (entrained) hydrocarbon exposure has the potential to result in toxic effects to plankton; plankton risk exposure via ingestion, inhalation and dermal contact. The area predicted to be exposed to in-water concentrations above the impact threshold occurs within the 0-10 m surface layer where plankton are generally more abundant. Higher abundance of plankton may also occur within the Upwelling East of Eden KEF. However, MDO weathers rapidly with the entrained component naturally biodegrades. Once background water quality conditions have re-established, the plankton community is expected to recover. Consequently, the potential impacts to plankton from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Marine Invertebrates	In-water (entrained) hydrocarbon exposure has the potential to result in acute and chronic effects to marine invertebrates. No exposure to benthic invertebrates was predicted from oil spill modelling; however pelagic species may be exposed as temporary patches of entrained MDO may be present within 0-10 m depth layer. Consequently, the potential impacts and risks to marine invertebrates from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
Seabirds and Shorebirds	Surface hydrocarbon exposure has the potential to expose birds that come into contact with the water surface, causing acute or chronic toxicity. There are foraging BIAs for some species of petrel and albatross that occur within the area predicted to exposed. However, the extent of area predicted to be exposed to surface concentrations >10 mg/m^2 is localised (<38 km) and temporary (1-2 days); therefore, contact with considered unlikely. Consequently, the potential impacts and risks to seabirds and shorebirds from surface exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

Fish and Sharks	In-water (entrained) hydrocarbon exposure has the potential to physically affect fish exposed for an extended duration. No exposure to demersal species is likely, however those pelagic species using the surface waters may be exposed as temporary patches of entrained MDO were predicted within the 0-10m depth layers. Impacts on eggs and larvae 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. Consequently, the potential impacts and risks to fish and sharks from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
Marine Turtles	Surface hydrocarbon exposure has the potential to expose marine turtles that come into contact with the water surface; ingested oil can harm internal organs and digestive function, and oil on their bodies can cause skin irritation and affect breathing. No areas identified as critical habitat or BIAs are present within the area predicted to be exposed; therefore, presence in the area is expected to be minimal. Consequently, the potential impacts and risks to marine turtles from surface exposure are considered to be **Negligible (1)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
Pinnipeds	Surface hydrocarbon exposure has the potential to expose pinnipeds that come into contact with the water surface; oils can result in skin and eye irritations and disruption thermal regulation for pinnipeds. No areas identified as critical habitat or BIAs are present within the area predicted to be exposed; therefore, presence in the area is expected to be minimal. Consequently, the potential impacts and risks to pinnipeds from surface exposure are considered to be **Negligible (1)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. In-water (entrained) hydrocarbon exposure has the potential to result in sub-lethal impacts to pinnipeds via ingestion of the oil or oil-affected prey. However, given the temporary exposure to in-water hydrocarbons above the impact level, this is considered unlikely to occur. Consequently, the potential impacts and risks to pinnipeds from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
Cetaceans	Surface hydrocarbon exposure has the potential to expose cetaceans that come into contact with the water surface; however, physical contact with MDO is unlikely to lead to any long-term impacts. A foraging BIA for the Pygmy Blue Whale and distribution BIA for the Southern Right Whale occurs within the area predicted to be exposed. However, the extent of area predicted to be exposed to surface concentrations >10 mg/m^2 is localised (<38 km) and temporary (1-2 days); therefore, contact with considered unlikely. Consequently, the potential impacts and risks to pinnipeds from surface exposure are considered to be **Negligible (1)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. In-water (entrained) hydrocarbon exposure has the potential to result in toxicity effects (e.g. via ingestion of the oil or oil-affected prey); however, this is typically associated with 'fresh' hydrocarbon and the risk of impact declines with the MDO weathering. Given the temporary exposure to in-water hydrocarbons above the impact level, these toxicity effects are considered unlikely to occur. Consequently, the potential impacts and risks to cetaceans from in-water exposure are considered to be **Negligible (1)**, as they could be

	expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
State Parks and Reserves	In-water (entrained) hydrocarbon exposure may occur within the vicinity of the Point Hicks Marine National Park and the Beware Reef Marine Sanctuary. A major conservation value for these marine protected areas is the high biodiversity, particularly fish, invertebrates, and benthic flora (e.g. sponges, soft orals, macroalgae). Beware Reef is also a known haul-out site for pinnipeds. However, any impact is expected to the localised and temporary, given the rapid weathering of MDO. Consequently, the potential impacts and risks to State Parks and Reserves from in-water hydrocarbon exposure are considered to be **Minor (2)**, as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Commercial and Recreational Fishing	In-water (entrained) hydrocarbon exposure may potentially result in the contamination or acute impacts to fish species; noting 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. Actual or potential contamination of seafood can impact seafood markets long after any actual risk to seafood from a spill has subsided which can have economic impacts to the industry. However, exposure is expected to minimal given the predicted spatial and temporal extent of hydrocarbons above the impact threshold. Any 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 1-2 days after release; therefore physical displacement to fishing vessels is unlikely to be a significant impact. Consequently, the potential impacts and risks are considered to be **Minor (2)** as this type of event may result in a localised short-term impact, with no significant impact to third-parties.
Recreation and Tourism	Visible surface hydrocarbon exposure (e.g. a rainbow sheen) has the potential to reduce the visual amenity of an area, and therefore impact marine-based recreation and tourism activities. However, due to rapid weathering of the MDO, visible sheens on the water surface are only predicted to occur for up to 7 days after release. Consequently, the potential impacts and risks to recreation and tourism from surface and shoreline hydrocarbon exposure are considered to be **Minor (2)** as this type of event may result in a localised short-term impact, with no significant impact to third-parties. In-water (entrained) hydrocarbon exposure may potentially impact recreation and tourism industry indirectly via any related impacts to presence of marine fauna (e.g. whales), particular habitats, and recreational fishing. Given the assessment for other receptors, the potential impacts and risks to recreation and tourism from in-water hydrocarbon exposure is considered to be **Minor (2)**.
Heritage	Visible surface hydrocarbon exposure (e.g. a rainbow sheen) has the potential to reduce the visual amenity of an area, and therefore impact areas of cultural heritage along the coast. However, due to rapid weathering of the MDO, visible sheens on the water surface are only predicted to occur for up to 7 days after release. Consequently, the potential impacts and risks to heritage values from surface and shoreline hydrocarbon exposure are considered to be **Minor (2)** as this type of event may result in a localised short-term impact, with no significant impact to third-parties.
ALARP Decision Context	**A**

Summary of Control Measures			
• Adherence to AMSA Marine Order Part 3 (Seagoing Qualifications) • Adherence to AMSA Marine Order Part 30 (Prevention of Collisions) • Development and adherence to vessel SMPEP (or equivalent) • Development and adherence to Cooper Energy's OPEP • Development and adherence to Cooper Energy's OSMP • Use of pre-start notifications including Notice to Mariners, as required under the *Navigation Act 2014*			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

6.18 Accidental Release – Loss of Containment (Loss of Well Control)

Table 6-18 provides a summary of the EIA / ERA for the Accidental Release – Loss of Containment (Loss of Well Control).

Table 6-18 Accidental Release – Loss of Well Control (Loss of Well Control) EIA / ERA

Cause of Aspect	A loss of well control (LOWC) event has the potential to be caused by drilling and abandonment activities.
Summary of impact(s)	The LOWC event has the potential to expose the environment to in-water hydrocarbon, with the potential to directly or indirectly result in: • Reduction in intrinsic value / visual aesthetics; • Damage to commercial businesses. The Sole reservoir is 'dry gas', therefore any releases from well control incidents do not carry a liquid hydrocarbon spill risk. The area affected by a LOWC gas release is likely to be localised around the wellhead (across all depths of the water column). Given the estimated release rates from the Sole reservoir, exceedance of the Lower Explosive Limit (LEL) safety limit is not considered a risk in this scenario. A key concern associated with a gas (methane) release in the marine environment is the possibility that methane-consuming microbes (methano-trophic bacteria) may exhaust oxygen in the water column.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Plankton Marine Invertebrates Marine Reptiles Fish and Sharks Pinnipeds Cetaceans Commercial Fisheries	Gas released at the seabed will rapidly dissipate through the water column with only temporary and minor water quality reduction. The rapid rise of gas to surface in a LOWC event will release gas to the atmosphere rather than being trapped at depth in the water column. Low-oxygen conditions caused by methane-consuming microbes, could threaten small marine organisms (e.g. plankton, fish larvae, and other creatures that can't roam large distances), that provide a vital link in the marine food chain. A small portion of gas may remain in the waters occupied by and surrounding the gas plume, however, 'trapping' of the gas and significant oxygen depletion (and subsequent impacts to marine life) is not expected to occur given the surrounding waters are generally well mixed. Consequently, the potential impacts and risks to marine fauna from a LOWC event are considered to be **Negligible (1)**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.
ALARP Decision Context	**B**

Summary of Control Measures			
• Adherence to the Cooper Energy Well Engineering Standards and Well Management System • Adherence to the Cooper Energy WOMP • Development and adherence to the Cooper Energy well program • Planned Maintenance Schedule • Development and adherence to the Cooper Energy OPEP and FSP • Development and adherence to the Cooper Energy OSMP			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

7.0 Ongoing Monitoring of Environmental Performance

Cooper Energy retains responsibility as the Titleholder ensuring that the Sole-3 & -4 drilling and Sole-2 well abandonment activities are implemented in accordance with the performance outcomes outlined in the EP.

The systems in place to ensure that environmental performance and the standards in the EP are met are summarised in this section.

7.1 Cooper Energy's Health Safety Environment and Community Management System (HSEC MS)

Cooper Energy's Health Safety Environment and Community Management System (HSEC MS) is the corporate system which provides the framework for the delivery of Cooper Energy's values, policies, standards and practices related to health, safety, environment and community. The HSEC MS applies to all:

- Workplaces, sites and activities operated by Cooper Energy and under Cooper Energy's management or control;
- Exploration, construction and development activities under Cooper Energy management or control; and
- Cooper Energy employees, contractors and visitors on Cooper Energy sites, in offices and on activities such as offshore inspections, construction and development projects.

All personnel are expected to be familiar with, trained in, and comply with, the requirements of the HSEC MS.

7.2 Environmental Performance Monitoring & Reporting

7.2.1 Emissions and Discharges

For MODU / vessel-based activities Cooper Energy will collect and retain records of emissions and discharges. These emissions and discharges include treated bilge, sewage, food scraps, incinerator (waste), ballast water discharge, fuel use, chemical discharges, spills and accidental waste discharges.

A summary of these results will be reported in the EP performance report submitted to NOPSEMA.

7.2.2 Audit and Inspection

Environmental performance of the activities will be audited and reviewed in accordance with Cooper Energy's HSEC MS. These reviews are undertaken to ensure that:

- Environmental performance standards to achieve the environmental performance outcomes are being implemented, reviewed and where necessary amended;
- Potential non-compliances and opportunities for continuous improvement are identified; and
- All environmental monitoring requirements are being met.

The following arrangements review the environmental performance of the activity:

- Due-diligence pre-activity inspection/audit of the MODU / vessel will be carried out prior to the work commencing to verify that procedures and equipment for managing routine discharges and emissions are in place to enable compliance with the EP; and
- Campaign inspections of the MODU / vessel by the Cooper Energy Site Representative to continually verify vessel activities are in compliance with the EP.

- Independent of vessel-based inspection/audit activities, Cooper Energy shall undertake a compliance audit of the commitments contained in the EP and assess the effectiveness of the implementation strategy.

Results from the environmental inspections and audits will be summarised in the annual EP performance report submitted to NOPSEMA.

7.2.3 Management of Non-conformance

In response to any EP non-compliances, corrective actions will be issued in accordance with the Cooper Energy 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.

Cooper Energy will carry forward any non-compliance items for consideration in future operations and drilling and completion activities to assist with continuous improvement in environmental management controls and performance outcomes.

7.3 Management of Change (MoC)

The *Cooper Energy MoC Standard Instruction* describes the requirements for dealing with managing change.

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; and
    - Authorised in the existing management plans, procedures, work instructions or maintenance plans.
- Proposed changes to activities, assets, equipment, processes or procedures that have the potential to impact on the environment or interface with 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; and
- Changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences).

For any MoC with identified environmental impacts or risks, an impact/risk assessment will be undertaken to consider implications of the proposed change on the environmental impacts/risks and the adopted control measures.

Additional controls identified as part of the MoC will be effective in reducing the environmental impact and risk to a level which is ALARP and acceptable; and will meet the nominated EPOs and EPSs set out in the accepted EP for the activity.

7.3.1 Revisions to the EP

If 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.

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. Section 17(5) of 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.

8.0 Emergency Response Arrangements

Cooper Energy manages emergencies from offshore Victoria activities in accordance with the Cooper Emergency Management Plan (CEMP). Within that document the following environmental incidents are recognised as emergencies together with the appropriate notification requirements. Relevant environmental emergencies, as they apply to the impacts and risks identified in this EP include the following:

- IMS introduction (notifiable to DELWP);
- Wildlife affected by an oil spill (notifiable to DELWP); and
- Marine pollution incidents (notifiable to Port of Portland, DEDJTR [Level 2] and AMSA).

Further emergency response arrangements as it relates to oil spill emergencies is detailed below.

8.1 Oil Spill Response Strategies

There are 2 credible spill scenarios for this activity that have been assessed in the EP:

1. LOC - Vessel collision resulting in a ruptured tank and spill of MDO (MDO spill)
2. LOC - Loss of well control (LOWC)

By conducting an Operational and Net Benefit Assessment, Cooper Energy has identified the following response strategies as being appropriate for a response to these events (Table 8-1). These are discussed in the Sections 8.1.1 to 8.1.5, and their impacts evaluated in Section 8.2.

Table 8-1 Suitability of Response Options for MDO and Sole Dry Gas

Response Option	Description	LOC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	LOC – LOWC (Sole Dry Gas)	Viable Response?	Strategic Net Benefit?
Source Control	Limit flow of hydrocarbons to environment.	Achieved by vessel SMPEP/SOPEP.	✓	✓	<u>For wellhead issues:</u> In accordance with the Source Control Plan. This plan provides a response to release incidents from wellheads	✓	✓
Monitor & Evaluate	Direct observation 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 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 utilised 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 (well blowout) 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 dry gas spill incidents to understand the possible impacts.	✓	✓
Dispersant Application	Breakdown surface spill & draw droplets into upper layers of water column.	MDO, while having a small persistent fraction, spreads rapidly to thin layers. Insufficient time to respond while suitable surface thicknesses are present.	**X**	**X**	The Sole reservoir is ‘dry gas’, therefore any releases from well control incidents do not carry a liquid hydrocarbon spill risk.	**X**	**X**

Response Option	Description	LOC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	LOC – LOWC (Sole Dry Gas)	Viable Response?	Strategic Net Benefit?
	Increases biodegradation and weathering and provides benefit to sea-surface /air breathing animals.	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.					
Contain & 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 following a 250 m^3 spill. There is insufficient mobilisation time to capture residues. In general, this method only recovers approximately 10-15% of total spill residue, creates significant levels of waste, requires significant manpower and suitable weather conditions (calm) to be deployed.	**X**	**X**	The Sole reservoir is 'dry gas', therefore any releases from well control incidents do not carry a liquid hydrocarbon spill risk, and there is no surface exposure above the actionable threshold.	**X**	**X**
Protect & Deflect	Booms and skimmers deployed to protect environmental sensitivities.	Modelling does not predict any shoreline contact above the actionable threshold.	**X**	**X**	As the Sole reservoir is 'dry gas', there is no liquid hydrocarbon spill risk, and the plume is predicted within 50 m of the release point only. No shoreline contact is predicted.	**x**	**X**
Shoreline	Shoreline clean-up	Modelling does not predict any	**X**	**X**	As the Sole reservoir is 'dry gas', there is	**X**	**X**

Response Option	Description	LOC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	LOC – LOWC (Sole Dry Gas)	Viable Response?	Strategic Net Benefit?
Clean-up	is a last response strategy due to the potential environmental impact.	shoreline contact above the actionable threshold.			no liquid hydrocarbon spill risk, and the plume is predicted within 50 m of the release point only. No shoreline contact is predicted.		
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 DELWP.	Given limited size and rapid spreading of the MDO spill, large scale wildlife response is not expected. However, there is the potential that individual birds could become oiled in the vicinity of the spill. OWR is both a viable and prudent response option for this spill type.	✓	✓	As the Sole reservoir is 'dry gas', there is no liquid hydrocarbon spill risk. Therefore, there is no potential for oiled wildlife.	X	X

8.1.1 Spill Response: Source control

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

- closing water tight doors
- checking bulkheads;
- determining whether vessel separation will increase spillage;
- isolating penetrated tanks;
- tank lightering, etc.

Source control relies heavily upon the activation of the vessels SOPEP / SMPEP (or equivalent).

Well-related source control activities may include:

- ROV intervention utilising specialist ROV tooling;
- Well capping; or
- Relief well installation.

8.1.2 Spill Response: Monitor and Evaluate

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. Monitor and evaluate will apply to all marine spills.

Operational monitoring includes the following:

- Aerial observation;
- Vessel-based observation;
- Computer-based tools:
  - Oil spill trajectory modelling;
  - Vector analysis (manual calculation); and
  - Automated Data Inquiry for Oil Spills (ADIOS) (a spill weathering model).
- Utilisation of satellite tracking drifter buoys.

8.1.3 Spill Response: 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); and
- Tertiary: Recovery, field stabilisation, transport, veterinary examination, triage, stabilisation, cleaning, rehabilitation, release.

In the event of a Level 2 or 3 hydrocarbon spill, the impacts on wildlife are determined by the types of fauna present, the type of oil spilled and the extent of exposure.

8.2 Risk Assessment of Oil Spill Response Strategies

The potential impacts and risks associated with performing the response strategies described in Section 8.1 have been covered under the aspects evaluated in this EP (Sections 6.1 to 6.18). Relevant control measures will be adopted in the event of an incident.

8.3 Emergency (Oil Spill) Response Arrangements and Capability

The Cooper Energy implementation strategy for this activity includes an Emergency Response Plan (ERP)/Oil Pollution Emergency Plan (OPEP), which include details of the arrangements for testing the response arrangements contained within these plans.

Cooper Energy has in place a Cooper Emergency Management Plan (CEMP) and Offshore Victoria OPEP (VIC-ER-EMP-0001) for Offshore Victorian assets that will be implemented as part of emergency response escalation where hydrocarbons have been released offshore.

A Sole Drilling and Well Abandonment Activity First Strike Plan (FSP) has been developed to specifically address the risks of this activity and subsequent response strategy which links to the accepted Offshore Victoria OPEP.

8.3.1 Oil Spill Response Capability

Cooper Energy ensures that adequate oil spill response capability is maintained by specifying response preparation controls in the Environment Plan. For the response strategies described in Section 8.1 the controls (both environmental performance and standards) are summarised in Table 8-2.

Table 8-2 Preparation Controls for Response Capabilities

Response Strategy	PREPARATION CONTROLS	
	Environmental Performance Outcomes	Environmental Performance Standards
Source Control	Cooper Energy maintains capability to implement its Offshore VSCP (VIC-DC-EMP-0001)	*Well Response Resources* Cooper Energy maintains appropriate agreements (or contractor pre-qualifications) to maintain source control capabilities.
		Cooper Energy conducts an annual source control desktop exercise.
Monitor and evaluate	Cooper Energy maintains capability to implement operational monitoring in a Level 2 or 3 spill event.	*Agreements* Cooper Energy maintains appropriate agreements (or contractor pre-qualifications) to maintain operational response capabilities.
		Oil Spill Tracking Buoys MODU carries an oil spill tracking buoy and instructions for deployment.
Oiled Wildlife Response	Cooper Energy maintains capability to support oiled wildlife management in a Level 2 or 3 spill event.	Cooper Energy maintains appropriate agreements to maintain OWR response capabilities.

8.3.2 Testing Oil Spill Response Arrangements

In accordance with the Commonwealth OPGGS(E)R Regulation 14 (8C) and in accordance with Cooper's HSEC management system, the OPEP will be tested:

- Prior to the commencement of a drilling campaign;
- When there is a significant amendment to the OPEP;
- Not later than 12 months after the most recent test; and
- In accordance with the schedule outlined in Table 8-3.

Table 8-3 OPEP Exercise Schedule (Victorian Operations)

SCOPE	OBJECTIVES	FREQUENCY
Emergency Contact Verification	1. Test emergency contact information;	Bi-annual
Level 2/3 Spill Response (Desktop) (Infrastructure)	1. Alert and call-out of response teams to respective incident control centres (ICC).	Annual *This will be tested on CHN infrastructure*
	2. Cooper Energy Emergency Management Team (EMT) to activate first-strike response operation (desk-top only); confirm external support resources are available to respond; and develop and implement an Incident Action Plan (IAP) for the next operational period	
	3. Test Cooper Energy crisis management arrangements including activation of the Cooper Energy crisis management team (CEMT) to support the Cooper Energy EMT during a significant oil spill event.	
	4. For Cooper Energy infrastructure scenarios (pipeline rupture) test Cooper Energy's interface with State response arrangements	
	5. For blowout scenario, test interface between source control team and oil spill response team (scenario interjects only)	
Level 2/3 Spill Response (Desktop) (IMR Vessel)	1. Covered by Objective 1 & 2 above	On IMR Inspection (if IMR activity occurs at a frequency greater than one year)
	2. For vessel-based inspection, maintenance and repair (IMR) scenarios, test interface between the vessel SMPEP, OPEP, NATPLAN and Victorian Maritime Emergency (non-search and Rescue) Plan.	
Discussion Exercise	1. Ensure consistent, effective approach to managing emergencies between Cooper Energy and State authorities	Every 2 years

8.4 Operational and Scientific Monitoring Plan (OSMP)

The Offshore Victoria Operational and Scientific Monitoring Program (OSMP) contains detail regarding the triggers for commencing operational and scientific monitoring, who will conduct the monitoring and what will be monitored. This document supports the Offshore Victoria OPEP by:

- Detailing operational monitoring (Type I) requirements to be implemented in a spill to inform spill response activities; and
- Scientific monitoring (Type II) to quantify the nature of extent, severity and persistence of environmental impacts from a spill event and inform on appropriate remediation activities.

9.0 Stakeholder Consultation

Cooper Energy has undertaken stakeholder engagement in preparation of the Sole-3 & 4 Drilling and Sole-2 Well Abandonment EP.

Determining the stakeholders for the Sole-3 & 4 Drilling and Sole-2 Well Abandonment activity involved the following:

- Reviewing existing stakeholders identified as relevant and contained within the Cooper Energy stakeholder register (Gippsland Basin);
- Reviewing previous Sole Development Project consultation records (for both Cooper and previous titleholder Santos);
- Conversing with existing stakeholders to identify potential new stakeholders;
- Reviewing Commonwealth and State fisheries jurisdictions and fishing effort in the region; and
- Determining the Titleholders of nearby exploration permits and production licences through the National Offshore Petroleum Titles Administrator (NOPTA) website.

Stakeholders identified and contacted for this activity, grouped by the categories listed under OPGGS(E)R Regulation 11A, are listed in Table 9-1.

Table 9-1 Stakeholders for the Sole-3 & 4 Drilling and Sole-2 Well Abandonment activity

Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant	
Australian Fisheries Management Authority (AFMA)	Australian Hydrological Service (AHS)
Australian Border Control	Australian Maritime Safety Authority (AMSA)
Department of Agriculture and Water Resources (DAWR)	Department of Communications
Department of Defence (DoD)	Department of Environment and Energy (DoEE) - Marine Protected Areas Branch
Department of Innovation, Industry and Science	Geoscience Australia
Marine Border Command	National Native Title Tribunal (NNTT)
Each Department or agency of a State or the Northern Territory to which the activities to be carried out under the EP may be relevant	
DEDJTR – Earth Resources Regulation (ERR)	DEDJTR – Victorian Fishery Authority
DEDJTR - Transport Victoria - Marine Pollution Team	DELWP - Marine National Parks and Marine Parks
DELWP -Victorian Coastal Council	DELWP - Wildlife Emergencies and Biodiversity Regulation
NSW Department of Primary Industries (Fisheries)	Transport Safety Victoria (Maritime Safety)
The Department of the responsible State Minister, or the responsible Northern Territory Minister	
DEDJTR – Earth Resources Regulation (ERR)	
A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP	

Fisheries:	
Abalone Council Australia	Abalone Victoria (Central Zone) (AVCZ)
Australian Southern Bluefin Tuna Industry Association	Commonwealth Fisheries Authority
Eastern Zone Abalone Industry Association	East Gippsland Estuarine Fishermen's Association
Eastern Victorian Rock Lobster Industry Association	Eastern Zone Abalone Industry Association
Port Franklin Fishermen's Association	Lakes Entrance Fishermen's Society Co-operative Limited (LEFCOL)
San Remo Fishing Cooperative	Seafood Industry Victoria (SIV)
South-east Fishing Trawl Industry Association (SETFIA)	Southern Rock Lobster Ltd
Southern Shark Industry Alliance	Sustainable Shark Fishing Inc. (SSF)
Victorian Recreational Fishers Association (VRFish)	Victorian Rock Lobster Association (VRLA)
Victorian Scallop Fisherman's Association	Victorian Fish & Food Marketing Association
Victorian Bays & Inlets Fisheries Association	
Oil spill preparedness and response agencies:	
Australian Marine Oil Spill Centre (AMOSC)	DEDJTR – Marine Pollution Branch
Parks Victoria	Department of Environment, Land, Water and Planning (DELWP)
Nearby Petroleum Titleholders:	
Bass Strait Oil	ESSO Australia
Lattice Energy (Origin)	Oil Basins Limited
Origin Energy	
Other entities:	
Aboriginal Affairs Victoria	Australian Oceanographic Services P/L
Native Title Services Victoria	Southern Cross Cables
Victorian Fish and Food Marketing Association	GLaWAC
Any other person or organisation that the Titleholder considers relevant	
Community interests:	
Scuba Divers Federation of Victoria (SDFV)	

9.1 Consultation Approach

9.1.1 Initial Consultation

Sole Development Project

An extensive program of stakeholder engagement commenced in August 2015 (as Santos) to support the Sole Development Project, covering onshore, State and Commonwealth waters.

Engagement included public open forums and information sessions in Marlo.

Although open to anyone, feedback from the forums focussed on nearshore and onshore activities and so outside the scope of this EP.

A series of information sheets were developed and presented to stakeholders including:

- Orbost (Patricia Baleen) Gas Plant – Summer 2016
- Orbost (Patricia Baleen) Gas Plant – Development of the Sole Gas Field – Fishing Industry Update – January 2016
- Orbost (Patricia Baleen) Gas Plant – Summer 2017

Although much of the consultation to date has focussed on the onshore portion of works (Orbost Gas Plant) and nearshore horizontal directional drilling (HDD) activities, stakeholders in the region have been aware of the offshore activities for numerous years.

2018 Offshore Drilling Campaign Brochure

A 2018 Offshore Campaign Stakeholder Information Brochure outlining upcoming Cooper Energy activities in the Otway and Gippsland Basins, including Sole-3 & 4 Drilling and Sole-2 Well Abandonment activities, was disseminated to stakeholders in September 2017. The brochure provided information on the location, timing and nature of the proposed activities, potential risks and impacts, and contact details should stakeholders wish to seek further information or have an objection.

Distribution of Survey Information via Fishing Associations

To ensure broader communications with new and existing commercial fishers; entities or individuals holding commercial fishing licences have been informed of the activities via government and private associations such as AFMA, SIV, VFA and SETFIA.

Cooper Energy Website

The 2018 Offshore Campaign Stakeholder Information Brochure has been made available on the Cooper website (http://www.cooperenergy.com.au/) for all interested members of the public to access. Information prepared for future project milestones will also be made available on the website.

9.1.2 Summary of Stakeholder Consultation

Stakeholder engagement has involved a combination of email exchanges and phone conversations.

A summary of stakeholder responses, Cooper Energy's assessment of any objections or claims and response or proposed response, are provided in Table 9.2. It should be noted that most of responses are generic and relate equally to other activities that may occur as part of Cooper Energy's 2018 Offshore Campaign.

9.2 Ongoing Consultation

Consultation with relevant stakeholders will be ongoing. Cooper Energy will comply with requests by stakeholders for additional information or updates during the activity itself. In addition, stakeholders will be notified of any changes to scope of the EP that may affect their interests or activities as soon as reasonably practicable, but before the activity commences.

Prior to the activity commencing, Cooper Energy will provide relevant stakeholder's further information including:

- Confirmation on the timing and duration;
- Name and call sign of any associated vessels (if known);
- A description of the activities which are being undertaken;
- A request to provide feedback on the activities;

- The opportunity for face-to-face meetings; and
- Contact details of where any claims, objection or concerns may be directed.

As part of this process, Cooper Energy shall check that identified stakeholders are still relevant and correct, and identify new stakeholders (via organisational bodies such as AFMA, AMSA, SIV, SETFIA, lessons learnt etc.).

Cooper Energy will follow-up with stakeholders providing notifications approximately one week prior to activity commencement (or as requested by the individual stakeholder) and a demobilisation notification within 10 days of completion of the activity (or at a period requested by stakeholder).

Activity notification may be a stand-alone notice or part of another Campaign Brochure (or equivalent).

Table 9-2: Stakeholder Feedback and Cooper Energy Assessment of Claims/Objections

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
Aboriginal Affairs Victoria	Your message was received. Thank You.	No claims or objections to be assessed.	Not applicable
	Thanked COE for the information and that it will be passed on to our major projects senior officer (Dan Cummins) for consideration. If he determines a cause for response he will get back to you.	No claims or objections to be assessed.	responded with thanks and offer of further information if required.
Australian Fisheries Management Authority	AFMA provided overview of fisheries out of Lakes Entrance. COE provided overview of activities. Noted that CFA is the peak fishing industry body for commonwealth. SETFIA has close links to CFA but other associations do not. AFMA to supply contacts for smaller organisations. ABARES report should be reviewed for fishery status reports. AFMA website provides overlays of fishing zones and acreages.	No claims or objections to be assessed.	Santos/Cooper have used ABARES reports for identification of fisheries and in EP. Smaller associations have been contacted and presented information. AFMA website reviewed.
	Brodie MacDonald replied with thanks	No claims or objections to be assessed.	Not Applicable
	Requested that all correspondence be via the generic etroleum@afma.gov.au address and it will then be disseminated to relevant managers.	No claims or objection to be assessed. All emails to only go via generic petroleum email address.	COE confirmed that the information was sent to the appropriate fishing industry contacts as outlined in the link. requested confirmation then that any information about upcoming activities only be emailed to the 'petroleum' address and not to individual Fishery Managers.
Australian Hydrographic Services	requested to provide finalised information at least three weeks prior to commencement of any works to allow for publication of notices to mariners.	No claims or objections to be assessed.	COE confirmed information would be provided to AHS at least 3 weeks prior to activities commencing
Australian Maritime Safety Authority	22/9/2017: Thanked COE for providing information on PSZ, NtM and AUSCOAST warnings. Provided updated data traffic plots for Otway and Gippsland basins. Identified where greater traffic may be encountered. Noted that vessels entering and exiting the Traffic Separation Scheme (TSS) slightly encroach on BMG and Sole. Requested JRCC be contacted 24-48 hours before activity commences with vessel details etc to promulgate AUSCOAST warning. Requested AHS be contacted at least 4 weeks prior to activities for NtM (via hydro email) and to update charts (via datacentre email).	22/9/2017: No claims or objections to be assessed. COE acknowledge increased traffic in areas	23/9/2017: COE acknowledged increased traffic in the areas and that the TSS slightly encroaches on BMG and Sole. COE acknowledge the timeframes and requirements for notification to AMSA in relation to the Auscoast warnings and NtM as well as any petroleum safety zones. This information will be carried through into EP and future correspondence requirements.
Department of Environment, Land Water and Planning	20/9/2017: Replied with thanks	20/9/2017: No claims or objections to be assessed.	No response required

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
(DELWP)	19/9/2017: Thanked COE for the update. Requested confirmation that the 'single point of contact' is for general communications rather than statutory reporting obligations, and that legal arrangements for the transfer of Victorian land based pipelines will continue as is and the current contacts will not be affected	19/9/2017: COE acknowledge confusion regarding point of contact and provided clarity as requested	19/9/2017: COE confirmed that the parties involved in reporting etc. will not change but If any changes do occur, DELWP will be notified immediately and amend and resubmit documentation as required.
AMOSC	19/9/2017: AMOSC does not distribute member information amongst the membership group. We will however, be very interested in receiving a draft copy of the OPEP to confirm with Cooper AMOSC's resources and processes and comment on the same.	20/9/2017: Cooper apologized for not removing the sentence regarding distribution from the covering email. No issue with comments provided	20/9: Responded stating that OPEP is being finalised and will be forwarded to AMOSC for review in the near future. 29/9: First Strike Plans were developed for Sole to supplement the already AMOSC reviewed OPEP. AMOSC reviewed the FSP and provided feedback 28/9 which has been incorporated. 3/10/2017: OPEP and First strike plans resent to AMOSC for their information only.
Department of the Environment and Energy	19/9/2017 - Generic response: Requested all information be via NOPSEMA. Provided links to further guidance material.	COE acknowledge the advice from DOE.	19/9/2017: COE will no longer send information to DOE offshore petroleum email address. No response necessary as its a generic response email from DOE. Remove from stakeholder register.
DEDJTR Victorian Fishery Authority (VFA)	General discussion of project and fisheries in the region. Discussed privacy issues that FV have under the Act, that means FV cannot provide Santos with any information that might identify fishers. Agreement reached that FV could send out information (e.g. a letter and brochure) to the potentially affected licence holders on Santos' behalf.	No claims or objections to be assessed.	Information was sent to FV on 31/10/206 for dissemination to fishers (Summer 2016 Brochure)
	4/10/2017: Response to BMG notice. Stuart requested all info be sent to Bill Lussier. 10/10/2017: VFA confirmed that all correspondence to now go via Bill Lussier and that all VFA emails are now VFA and not ecodev	No claims or objections to be assessed.	4/10/2017: COE acknowledged request and will update database 9/10/2017: COE reverted back to VFA to request whether ALL correspondence now goes to Bill and whether they were using new email addresses. 10/102017: COE will ensure all correspondence goes to Bill Lussier and that the VFA emails will be used.
Geoscience Australia	19/9/2017: Out of office reply, but that she has access to emails	No claims or objections to be assessed.	No response required
Australian Oceanographic Services Pty Ltd (Dr Andrew Levings)	22/9/2017: Dr. Levings outlined his experience in O&G, fishing, energy transmission and provision of services and requested opportunity to talk that day. 23/9/2017: Agreed talks can wait. Dr. Levings talked with COE management and service boat owners regarding their vessels being used for future support activities. 5/10: Dr Levings discussed vessels he has available for possible work with COE management. 31/10: COE stakeholder liaison called Dr Levings to confirm conversation of 5/10/17. Confirmed he has 2 boats that are in survey with all appropriate systems in place and experienced personnel.	no adverse claim or objection to assess. COE acknowledge possible use of vessels	22/9/2017: COE acknowledged Dr. Levings but stated that the COE liaison would be out of the country until the 12th and requested that the discussion be delayed. 23/9/2017: COE agreed that use of fishing vessels where possible has merit as builds good relations. Confirmed will be in touch on return. 5/10/2017: COE stated they would consider the use of the vessels if they were appropriate. 31/10/2017: COE to assess the possibility and opportunity of using the local boats where possible. Dr Levings will be contacted if his services/ vessels are required.

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
Department of Agriculture and Water Resources - MNCC	20/9/2017: Auto reply outlining requirements for vessels entering Australian waters to enter info in the the MARS system including: • Pre-Arrival Report (PAR) – 96 and 12 hours prior to arrival in Australia. • Ballast Water Report (BWR) – no later than 12 hours prior to arrival in Australia if the vessel is fitted with ballast tanks. Ballast water must be managed in accordance with the Australian Ballast Water Requirements. • Non First Point of Entry Application (NFP) submitted no less than 10 working days prior to arrival in Australia (if applicable). Changes in health of crew to be reported Links to information provided	No claims or objections to be assessed.	20/9/2017: No response required as automated reply. Information provided shall be included in subsequent EPs as necessary
National Native Title Tribunal	20/9/2017. email from Steve Edwards stating that there were no registered claims over the area of proposed activities. However, stated that for pipelines that crossed the coast that it may impacts on interests of two groups. Stated: The proposed activities will take place within the Representative Aboriginal Torres Strait Islander Body Area of the Native Title Services Victoria Ltd. You may wish to, if you have not already consult with that body. It is not appropriate for the Tribunal to comment further. 5/10/2017 - NNTT confirmed contact details for NTSV and also provided a link to geospatial maps outlining RATSIB areas	No claims or objections to be assessed. Unlikely to be affected by offshore drilling activities at Sole	5/10/2017: COE acknowledged that no registered native title claims or determined native title claims appear to overlap the proposed offshore areas and that where a new pipeline crosses the coast and becomes onshore that native title holders may be impacted. Confirmed that relevant parties will be contacted as required. Acknowledged that the Native Title Services Victoria Ltd have not been contacted and requested NNTT confirm the contact details for the group. COE also acknowledge that the Tribunal cannot comment any further on the activities. NTSV sent flyer on 9/10/17. 5/10/17 - COE thanked NNTT for the assistance and that the maps were reviewed.
Parks Victoria	19/9/2017: automated response email	No claims or objections to be assessed.	No response required

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
South-East Trawl Fishing Industry Association	General introduction of the Sole Project. Reviewed unresolved issues between O&G and Geoscience Aust and fishing industry. Snagged fishing gear is expensive to replace. Concern about the cumulative impact of adding wellheads and exclusion zones and reducing areas available to fishing. Was noted that safety zone for Baska reduced to 300m Santos asked whether they can incorporate 'non-protruding' anodes as part of pipeline design It was clarified that there would be no seismic. NPP phase would not be shared with fishers as waste of time. Fishing industry want to be involved in future decommissioning and abandonment activities. General discussion on the complexity of fishing arrangements and identifying who fishes where, when and how. There is considerable fishing along the 39 degrees 12 line Fishermen do not understand NtM The industry should be prepared for its infrastructure to be fished over and wellheads etc. should be designed to be snag free Request to use local vessels where possible FIS to be run in 2016 and 2018 SETFIA outlined services they can provide including identification of fishers, reports on fishing, and communication services	Santos/Cooper identify the SETFIA and LEFCOL as relevant stakeholders Santos commissioned SETFIA to undertake a Fishing Study for the Sole Development Project identifying who fishes in the area, methods of fishing used and detailing the communications service SETFIA can provide. Where possible infrastructure will be designed to be fished over. However certain pieces such as well heads by design protrude and for this and safety reasons are within PSZ. Assessment of claims and objections is required as the activity will be undertaken within the 6 months prior to the FIS and in close proximity. The planned activity is proposed to be completed before the FIS commences in August. The closest FIS shots line is 12.3 km from Sole-2, and therefore outside of the 2-4 km radius where sound exposure could impact upon finfish. Behavioural effects in fish in response to sound exposure, such as startle response, are temporary, and any impacts to fish from the activity are not expected to continue once the activity is complete. Given that much of the area within the FIS is overlapped by areas of heavy shipping, which are likely to have a greater impact on finfish than the presence of the MODU and associated support vessels, and that the FIS will commence after completion of the activity, Cooper Energy has determined that the offshore activities will not negatively impact the FIS.	Cooper recognise the cumulative impact from multiple exclusion zones and once in operation will assess possibility of reducing zones. Pipeline has been designed to be over-fished and designs are being further progressed. Fishery groups will be kept informed. Santos/Cooper advised that decommissioning and abandonment is not part of this stage of the project, but that fisheries would be consulted for any such future changes. Cooper have modified start date of pipeline activities to commence outside FIS.
	SETFIA and LEFCOL meeting to discuss proposed Sole offshore pipeline design improvements and learnings from Patricia Baleen pipeline and HDD installation in 2002-3. The timing of the proposed 2018 Fishing Independent Survey was also discussed. Only potential project interaction would be if the well was being drilled while the survey was being undertaken - Even if there would be no impact at 8 km, the perception would still need to be managed	Cooper have assessed potential impacts from drilling activities on fish behaviour and determined minimal impact at the distance.	Marlo fishing community have been involved via community information sessions etc. VRFish have been included in notices. Pipeline is to avoid Marlo Reef. Pipeline will not introduce new snag points and is designed to be fished over Use of SMS for communications. agreed that it was too early to discuss timing in detail and that Santos would keep in touch as things become clearer. Based on current schedule, drilling will be completed prior to survey and so perception of impacting on fish is being managed.

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
	PB to be person responsible to ensure that SB kept informed at an operational level. Commitment that at the April meeting Santos will provide vessel information, pipeline contractor information etc. SB to brief Brad Duncan LEFCOL about meeting, and invite to the next one.	No claims or objections to be assessed.	Commitments made to continue to engage with SETFIA and LEFCOL keeping them in the loop and up to date with any key project decisions / changes. This is a part of the ongoing stakeholder consultation plan.
	Project update provided. Indicative timing that pipelay will start after 1st Sept to avoid FIS. Confirmed use of SMS messaging for information dissemination. COE to provide contractor and vessel info to SETFIA. Drilling schedule discussed and likely commence circa Feb 2018 and that Cooper drilling be in touch. Campaign to use 8-pt mooring and 500 m exclusion zone and anchors out to 1.5km Discussed possibility of a person assisting with updating plotters with finalised Sole 3 location, but this is to be reviewed at a later date.	No claims or objections to be assessed.	COE provided contractor and vessel info to SETFIA as requested (see SETFIA-04a) as well as update on project Commitments made to continue to engage with SETFIA and LEFCOL keeping them in the loop and up to date with any key project decisions / changes. This is a part of the ongoing stakeholder consultation plan.
	No response received in relation to emailed brochure 26/9/2017: Generic email sent to all O&G stakeholders outlining the upcoming Fish Survey and request to not undertake any activities between Feb and mid-Sept 2018 and then again between Feb and mid-Sept 2018. Noted that an earlier request was sent out asking that no seismic be undertaken but that SETFIA has received 2 notices re non-seismic activities 28/9/2017: Confirmed may be available 9/10/2017: SETFIA stated the outcome was not what they were after. They will decide whether to proceed with the FIS shot(s) in question for that survey, but suspect not. Simon is concerned that he is unable to engage as he is now only part time and he can't think of an instance where the time SETFIA invests in oil/gas engagement has seen a proponent change plans.	Assessment of claims and objections is required as the activity will be within the 6 months prior to the FIS and in close proximity. Initial notice only asked that seismic not be undertaken. COE are not undertaking seismic activities. Cooper have assessed that the offshore activities will not negatively impact the FIS.	28/9/2017: COE acknowledged the email stating that an official response was being drafted. Requested confirmation of meeting date for the Mon or Tues 30/9/2017: Meeting invite sent 5/10/2017: Official response addressing claims and objections emailed. COE acknowledged: importance of FIS and potential impacts of seismic, but that our activities are not seismic and that any noise emissions would be similar to those currently generated by existing O&G operations or transiting vessels in the region. Provided supporting information on likely produced sound levels of the activities and that the noise from the vessels is greater than from drilling itself. Based on studies it is likely received levels will be less than 120dB within only 2-4 km from the activity, while seismic may only reach such levels 35 km away. As such, the activities cannot be compared to each other as stated in the SETFIA letter. It is anticipated that the drilling program will be completed before the FIS commences in August and pipelay activities will commence in nearshore waters adjacent to the Orbost Gas Plant between September and November 2018, and so likely not impact the FIS. 9/10/2017: Meeting confirmed for Tuesday 17th to discuss the issues raised 11/10/2017: COE replied with thanks and that the issues would be discussed in the meeting on the 17th.

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
	COE introduced new Stakeholder Liaison. SETFIA pleased that COE have single POC. Confirmed FIS July and Aug 2018. COE provided overview of offshore activities as outlined in Sept brochure and that small 1-day survey to occur in state waters. Overview of upcoming GVI provided. COE again confirmed pipeline to be trawlable. Discussion regarding SETFIA letter objecting to offshore campaign. SETFIA confirmed main concerns are seismic and not COE SoW and that they had no concerns with the proposed activities. SETFIA pleased that pipelay not to commence until after 1st Sept to be after FIS. Appreciated that FIS had been taken into account during planning. SETFIA queried possible IMS and COE confirmed appropriate controls will be in place. Communications still to be via SMS. Just needs simple specific info. Discussions regarding community involvement, jobs for local industry and possible research program co-funding. Queries if COE person to move to Lakes Entrance SETFIA and other fishers do not like open forums but prefer smaller, pointed discussions. Stated only complaint had been from D Barrett but that he was more upset from earlier negative engagement with Geoscience Australia (See Dallas Barret SOL004 this table) General discussion on quotas and costs etc.	No claims or objections to be assessed.	17/10/2017: COE will continue to keep SETFIA informed of all activities and send SMS as required for notifications. COE requested information on possible co-funding research programs from SETFIA. No information provided to date. COE will likely not have a person at Lakes Entrance, but regular visits will occur. This will be made known to SETFIA. Draft minutes of meeting sent to SETFIA.
Seafood Industry Victoria	General overview of Sole Project provided. SIV outlined who they represent. SIV need to communicate with its members by post as only about half of them have an email address. Scallop dredges most likely to be impacted (State waters) SIV confirmed they are happy to send out information (e.g. a letter and brochure) to all 300 SIV members on Santos' behalf.	No claims or objections to be assessed.	SIV provided with envelopes and brochures to be mailed out to members (2016 Summer brochure)
	19/9/2017: Out of office reply. Alternate email address being Johnathon Davey at johnd@siv.com.au in my absence.	email was already also sent to johnd and so not further action is required.	No action required
	19/9/2017: John Davey responded requesting when feedback is required as they would like to discuss this and sit down and work through an appropriate approach to consulting with the fishing industry of Victoria.	No assessment required	19/9/2017: COE responded stating first EP to be submitted within 1 month. Reminded SIV that consultation is ongoing and understood that they need time to discuss the approach with their members. 9/10/2017: Follow up email sent to see if SIV had any response or required a meeting 11/10/2017: Meeting organised for Monday 16th September

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
	16/10/17: Confirmed SIV represented all commercial fishers, including LEFCOL, in State and was the best means of contacting all fishers. COE can send out info via Quarterly Profish magazine for fee SIV always on road and may be opportunity for COE to join in meetings Discussion was held regarding ongoing consultation and the monitoring of feedback. Cooper stated that on a regular basis they could provide SIV with an overview of feedback (i.e. every quarter or whenever there was a change in impact etc) stated he would try and get an updated list of contacts for each fishing group they represented. One of SIVs concerns were exclusion zones that reduced a fisher's useable area. Requested whether it was possible to reach agreement in terms of what operations could occur within exclusion zones and/or petroleum safety zones. I.e. if there is infrastructure on the seabed, trawling may be precluded, but some non-trawl operations could occur. 30/10/17: Email with minutes and apology for tardiness. Provided overview of current activities.	Cooper acknowledge that fishers would like to reduce exclusion zones and petroleum safety zones and will discuss internally. Cooper acknowledge that they must be more accountable for feedback and SIV would like to be made aware.	Most discussion points addressed during meeting. COE to review the possibility of sending information in the Profish magazine For operations phase COE to review reducing exclusion zones noting that some PSZ are gazetted and cannot be changed. During construction, 500m is required for safety. Any changes will be recorded in relevant EP and made known to SIV.
Southern Cross Cable Network	19/9/2017: Thank you for the information and notice, we will share this with our members in the Submarine Cable community and advise you of any issues or concerns.	no assessment required Unlikely to be affected by activities at Sole	20/9/2017: COE sent thanks and offer for more info if required.
Southern Shark Industry Alliance	20/9/2017: Auto reply	no assessment required	no action required SSIA members are contacted also via SETFIA and SIV
Marine Border Control	10/10/2017: MBC confirmed that they are the catch all for oil and gas industry and will forward all information to the relevant parties within MBC	no assessment required	no action required 11/10/2017: COE replied with thanks
Department of Communications and the Arts Submarine Cables Team	10/10/2017: The department had no comments on the proposals noting that there are three submarine cables across Bass Strait connecting Victoria and Tasmania, but they do not appear to be in the vicinity of the activity areas	no assessment required	no action required 11/10/2017: COE replied with thanks and questioned whether the department still wanted to receive updates since their assets were not in the vicinity
Department of Defence	20/10/2017: Defence has reviewed the proposed activities and has no objections.	no assessment required	COE will continue to send DoD notices
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	27/10/2017: Confirmed that activities unlikely to impact SBT migration or fishing and ranching operations that mainly occur in central and eastern GAB but would like to keep receiving notices	no assessment required	COE will continue to send ASBTIA notices

Stakeholder and relevance	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection
Dallas Barrett	9/9/2017: Prawn fisherman objected to losing fishing grounds at the HDD site stating the following: • He had not been consulted. • He protested about the risk of damaging his nets on pipelines with growth on them in the future. • He was not allowed to fish over the existing PB lines. • He was not aware of any restriction and the existing line could be fished over • that frond mats washing up from previous works	COE acknowledge the fisherman as a relevant stakeholder although outside scope of this EP as related to HDD.	COE responded with the following: • Sole pipeline now and in the future is over trawlable, but a recommendation is to avoid the area in the short term. • the pipeline has a 3LPP coating and marine growth is reduced and there are no major snagging items on the line • COE have had consultation with the fishing industry with LEFCOL/SETFIA and community meetings to advise of our plans. • There is no restriction over the PB lines and could be fished over • lessons learnt have resulted in non-use of frond mats for future works
Commonwealth Fisheries Australia (CFA)	Meeting to introduce the Sole Project and discuss CFA's role in the fishing industry. CFA suggested Santos contacted LEFCOL and Seafood Industry Victoria (SIV) to target licenced fishers in the area of the Sole Development.	No claim or objections ot be assessed	LEFCOL and SIV have been contacted. CFA continues to receive copies of all notices

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11.0 Acronyms and Units

11.1 Acronyms

Acronym	Description
ADIOS	Automated Data Inquiry for Oil Spills
AFMA	Australian Fisheries Management Authority
AHS	Australasian Hydrographic Society
AHTS	Anchor Handling, Tow and Support
ALARP	As Low As Reasonably Practical
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment Conservation Council
API	American Petroleum Institute
APIA	Australian Pipe Industry Association
APPEA	Australian Petroleum Producer & Exploration Association
APPEA	Australian Petroleum Production and Exploration Association
AQIS	Australian Quarantine and Inspection Service
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASTM	American Society for Testing and Materials
AVCZ	Central Zone Abalone Association
BAOAC	Bonn Agreement Oil Appearance Code
BIA	Biologically Important Areas
BOD	Biological Oxygen Demand
BOM	Bureau of Meteorology
BOP	Blowout Preventer
CAMBA	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
CBTA	Competency Based Training Assessment
CEE	Consulting Environmental Engineers
CEMP	Cooper Energy Management Plan
CFSR	Climate Forecast System Reanalysis
CHN	Casino Henry and Netherby
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora

Acronym	Description
CMP	Commonwealth Marine Parks
CMA	Commonwealth Marine Area
CoEP	Code of Environmental Practice
DAFF	Department of Agriculture, Fisheries and Forestry
DDR	Daily Drilling Report
DAWR	Department of Agriculture, Water and Resources
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DEE	Department of Environmental Engineering
DELWP	Department of Environment, Land, Water and Planning
DIF	Frill in Fluids
DIIS	Department of Innovation, Industry and Science
DoD	Department of Defence
DoE	Department of Environment
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities Annual Report
DSV	Diving support vessel
EIA	Environmental Impact Assessment
EIAPP	Engine International Air Pollution Prevention
EMBA	Environment that May Be Affected
EMP	Emergency Management Plan
EMS	Environmental Management System
EMT	Emergency Management Team
EP	Environment Plan
EPA	Environment Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
EPO	Environmental Performance Outcomes
EPS	Environmental Performance Standards
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
ERR	Earth Resources Regulation
ESD	Ecologically Sustainable Development
FFG	Flora and Fauna Guarantee

Acronym	Description
FSP	First Strike Plan
GAB	Great Australian Bight
GEMS	Diamond's Global Excellence Management System
GHG	Global Greenhouse Gas
HCFC	Hydrochlorofluorocarbon
HSEC	Health, Safety, Environmental and Community
HSEC-MS	Health, Safety, Environmental and Community Management System Management System
HSEQ	Health, Safety, Environmental and Quality
HXT	Subsea Horizontal Tree
IADC	International Association of Drilling Contractors
IAP	Incident Action Plan
IAPP	International Air Pollution Prevention
IC	Incident Controller
ICC	Incident Control Centres
IEE	International Energy Efficiency
IMCRA	Integrated Marine and Costal Regionalisation of Australia
IMPs	Invasive Marine Pests
IMR	Inspection, maintenance and repair
ISV	Installation Support Vessel
IOGP	International Association of Oil and Gas Producers
IOPP	International Oil Pollution Prevention
IPIECA	Global oil and gas industry association for environmental and social issues
ISM	International Safety Management
ISO	International Organisation for Standardisation
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
IWCF	International Well Control Forum
IWOCS	Installation Workover and Control System
JAMBA	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
JHA	Job Hazard Assessments

Acronym	Description
JRCC	Joint Rescue Coordination Centre
JSA	Job Safety Analysis
KEF	Key Ecological Features
LMRP	Lower marine riser package
LOC	Loss of Containment
LOWC	Loss of Well Control
LWD	Logging Whilst Drilling
MAA	Mutual Assistance Agreement
MARPOL	International Convention for the Prevention of Pollution from Ships
MARS	Maritime Arrivals Reporting System
MBC	Maritime Border Command
MC	Measurement Criteria
MDO	Marine Diesel Oil
MFO	Marine Fauna Observation
MNES	Matters of National Environmental Significance
MO	Marine Orders
MoC	Management of Change
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum of Understanding
NCEP	National Centre for Environmental Prediction
NEBA	Net Environmental Benefit Analysis
NEPM	National Environmental Protection (Air Quality) Measures
NES	National Ecological Significance
NMFS	National Marine Fisheries Service
NNTT	National Native Title Authority
NOAA	National Oceanic and Atmospheric Administration
NOEC	No observed effect concentrations
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NP	National Park
OCNS	Offshore Chemical Notification System
ODME	Oil Detection Monitoring Equipment

Acronym	Description
OEM	Original Equipment Manufacturer
OGUK (formally UKOOA)	Offshore Oil and Gas Medicals and Assessments
OIM	Offshore Installations Manager
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage
OPGGS(E)R)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OPRC	International Convention on Oil Pollution Preparedness, Response and Cooperation
OSMP	Operational and Scientific Monitoring Program
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
OWR	Oiled wildlife Response
OWS	Oily Water Separator
PLONOR	Posing Little Or No Risk to the environment
PMS	Planned Maintenance System
PNEC	Predicted No Effect Concentration
POB	Persons on Board
POWBONS	Pollution of Waters by Oil and Noxious Substances Act
PPE	Personal Protective Equipment
PSZ	Petroleum Safety Zone
PTS	Permanent Threshold Shift
PTW	Permit to Work
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RCP	Risk Control Practices
RMS	Root Mean Squared
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle/S
SARDI	South Australian Research and Development Institute
SCAT	Shoreline Clean-Up Assessment Technique
SDFV	Scuba Divers Federation of Victoria
SEEMP	Ship Energy Efficiency Management Plan
SEMS	Diamond's Safety and Environmental Management System

Acronym	Description
SETFIA	South-east Fishing Trawl Industry Association
SIMAP	Spill Impact Mapping Analysis Program
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SPL	Sound Pressure Level
SSF	Sustainable Shark Fishing Inc.
SSTs	Subsea Trees
SSTT	Sub-Sea Test Tree
STP	Sewage Treatment Plan
TEC	Threatened Ecological Communities
TPCs	Third Party Contractors
UAV	Unmanned Aerial Vehicles
UNEP	United Nations Environmental Programme
VADA	Victorian Abalone Divers Association
VRFish	Victorian Recreational Fishers Association
VRLA	Victorian Rock Lobster Association
VSCP	Offshore Victoria Source Control Plan
VSP	Vertical Seismic Profiling
WADA	Western Abalone Divers Association
WBM	Water Based Muds

11.2 Units

Unit	Description
‘	Minutes
“	Seconds
µg/m3	Micrograms per Cubic Metre
bbl	Barrel
cP	Centipoise
dB	Decibel
hrs	Hours

Unit	Description
kg	Kilograms
kg/m^3	Kilograms per Cubic Meter
kHz	Kilohertz
km	Kilometres
km^2	Kilometres Squared
L	Litres
m	metres
mm	Millimetres
$m.s.^{-1}$	Metres Per Second
m^2	Metres Squared
m^3	Metres Cubed
m^3/h	Metres Cubed per Hour
MMscfd	Million standard cubic feet per day
^{o}	Degrees
^oC	Degrees Celsius
ppb	Parts per Billion
ppm	Parts Per Million
µPa	Micro Pascals