Sole Development Project

Pipeline and Subsea Infrastructure Installation Environment Plan Summary

CONTROLLED DOCUMENT

(SOL-EN-EP-0008)

Revision 1– August 2018

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Document Revision and Amendment

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Approvals

This Document has been approved by Cooper Energy for the Sole Development Project in Bass Strait, Victoria.

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Distribution List

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Acronyms and Abbreviations

Acronym	Description
ADIOS	Automated Data Inquiry for Oil Spills
AHS	Australia Hydrological Service
ALARP	As low as reasonably practicable
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute
AUV	Autonomous underwater vehicles
AVCZ	Abalone Victoria (Central Zone)
BIA	Biologically Important Areas
BMG	Basker Manta Gummy
BOD	Biological oxygen demand
CEMP	Cooper Emergency Management Plan
COE	Cooper Energy
DAWR	Department of Agriculture, Fisheries and Forestry
DEDJTR	Department of Economic Development, Jobs Transport & Resources
DELWP	Department of Environment, Land, Water and Planning
DoEE	Department of Environment and Energy
DP	Dynamic Positioning
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EIA	Environmental Impact Assessment
EMBA	Environment that May be Affected
EP	Environmental Plan
ERA	Environmental Risk Assessment
ERR	Earth Resources Regulation
ESD	Ecologically Sustainable Development
FCGT	Flooding, cleaning, gauging and testing
FIS	Filtered inhibited seawater
GHG	Global Greenhouse Gas
HDD	Horizontal directional drilling
HSEC	Health, Safety, Environment and Community

Acronym	Description
IMCRA	Integrated Marine and Costal Regionalisation of Australia
IMR	Inspection, maintenance and repair
IPIECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Federation
LEFCOL	Lakes Entrance Fishermen's Society Co-operative Limited
LOC	Loss of Containment
LOWC	Loss of Well Control
MARPOL	International Convention for the Prevention of Pollution from Ships
MARS	Maritime Arrivals Reporting System
MBES	Multibeam echo sounder
MDO	Marine Diesel Oil
MEG	Mono-ethylene Glycol
MNES	Matters of National Environmental Significance
MoC	Management of Change
MS	Management System
NES	National Environmental Significance
NNTT	National Native Title Tribunal
NOAA	National Oceanic and Atmospheric Administration
NOEC	No observed effect concentrations
NOPSEMA	National Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administration
OGP	Orbost Gas Plant
OGUK	Oil and Gas United Kingdom
OPEP	Oil Pollution Emergency Plan
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage Environmental Regulations
OSMP	Operational and Scientific Monitoring Plan
OWR	Oiled Wildlife Response
PLEM	Pipeline end manifold
PLR	Pig launcher receivers
PMS	Planned Maintenance System
PNEC	Predicted no effect concentration

Acronym	Description
PTS	Permanent Threshold Shift
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RMS	Root Mean Square
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle
SA	South Australia
SDFV	Scuba Divers Federation of Victoria
SETFIA	South-East Trawl Fishing Industry Association
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
SSS	Side scan sonar
SUTU	Subsea umbilical termination unit
SUTU	Subsea umbilical termination unit
TEC	Threatened Ecological Community
UNEP	United Nations Environment Programme
US	United States
VRLA	Victorian Rock Lobster Association
WOMP	Well Operations Management Plan

Units

Unit	Description
‘	Minutes
“	Seconds
cP	Centipoise
dB	Decibel
hrs	Hours

Unit	Description
kHz	Kilohertz
km	Kilometres
km^2	Kilometres Squared
L	Litres
m	metres
m^2	Metres Squared
m^3	Metres Cubed
m^3/h	Metres Cubed per Hour
MMscfd	Million standard cubic feet per day
°	Degrees
°C	Degrees Celsius
ppb	Parts per Billion
µPa	Micro Pascals

1 Introduction

Cooper Energy is the titleholder of Pipeline Licences VIC/PL006401(V) and VIC/PL43, and Production Licence VIC/L32 in which the Sole production pipeline, umbilical and associated subsea infrastructure is to be installed. The Environment Plan (EP) relates to the installation of infrastructure associated with the Sole Development in both State and Commonwealth waters. These activities are summarised in Section 2 and include all pipeline-related installation activities up to and including pre-commissioning and subsequent suspension of the subsea infrastructure.

The Sole Development Project proposed by Cooper Energy (Sole) Pty Ltd (Cooper Energy), comprises the following:

- The drilling of up to two subsea production wells in the Sole field, located approximately 40 km offshore in the Gippsland Basin (Figure 1-1); and
- A proposed subsea tie-back via a 65 km production pipeline and umbilical from the subsea wells to the existing Orbost Gas Plant (OGP), where the feed gas will be processed and exported to the Eastern Gas Pipeline.

The Orbost Gas Plant is situated on Lot 2 PS528613, 73 Ewings Marsh Road in Corringle and is owned and operated by APA Group. The site is located approximately 12 km south of Orbost. The existing gas plant site occupies approximately 5.2 hectares (ha) of land within the 129 ha Cooper Energy property.

- To date, Cooper Energy has successfully installed the Sole production pipeline shore-crossing via horizontal directional drilling (HDD) and is currently drilling and completing the two Sole subsea production wells.

Activities covered by the EP are anticipated to commence September 2018 and take approximately 6-months to complete. The EP will remain in force to cover the suspension phase until commissioning activities commence in Q1 2019.

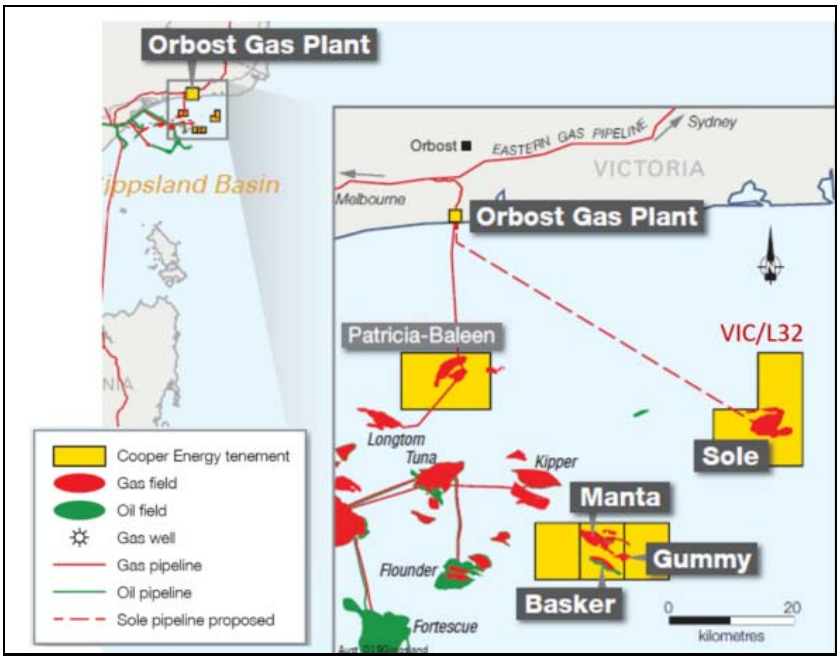

Figure 1-1: Location of VIC/L32

1.1 Titleholder Details

VIC/PL006401, VIC/PL43 and VIC/L32 titleholder's nominated liaison person is:

Ian MacDougal (General Manager Operations), Cooper Energy Limited

Address: Level 8, 70 Franklin Street, Adelaide, SA, 5000

Phone: (08) 8100 4900

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2 Location of the Activity

2.1 Overview

2.1.1 Location

The Sole gas field is located in Production Licence VIC/L32, in the eastern section of the Gippsland Basin depicted in Figure 1-1. Gas from the field will be extracted via two production wells and transported from the Sole drill centre at water depth of 124 m, to the Orbost Gas Plant via a 65 km 12" production pipeline, with communication and services to the offshore wells provided by a control umbilical.

The key coordinates associated with the Sole production pipeline, and associated subsea infrastructure proposed to be installed under the Plan are provided in Table 2-1.

Table 2-1: Sole Subsea Infrastructure Locations (Surface Locations) (GDA94)

Locations	Latitude	Longitude	Indicative Water Depth (m)
HDD tail end	-37° 48' 31.24"	148° 26' 14.66"	14.7
Turning Point (TP1)	-37° 52' 7.13"	148° 26' 17.343"	42
PLEM	-38° 6' 18.18"	149° 00' 35.57"	124
Subsea umbilical termination unit (SUTU)	-38° 6' 18.95"	149° 00' 34.98"	124
Sole-3	38° 06' 01.184"	149° 00' 30.801"	124
Sole-4	38° 06' 00.066"	149° 00' 31.673"	124

2.1.2 Operational Area

The "operational area" for the activities is the area where Sole production pipeline activities will take place and will be managed under the Plan. This operational area has been defined as a 1 km corridor centred over the production pipeline route (i.e. 500 m either side of the pipeline) and associated subsea infrastructure.

The transit of various vessels within the scope of the plan (referred to as installation vessels from here-on in) outside of the operational area is considered outside the scope of the Plan. These activities are managed under the Commonwealth *Navigation Act 2012*.

2.2 Sole Hydrocarbon System Overview

The hydrocarbon system associated with the Sole Development Project comprises two production wells which are proposed to be connected to the production pipeline via a pipeline end manifold (PLEM) and tie-in spools.

Communication and services for the offshore wells will be provided by a control umbilical planned to be installed adjacent to the production pipeline with the umbilical connected to a subsea umbilical termination unit (SUTU) prior to connecting the wells with electrical and hydraulic jumpers.

2.3 Sole Reservoir Properties

The hydrocarbon targeted within the Sole reservoir is a dry gas reservoir with very limited condensate observed or recovered during the well test 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
Boiling Point Curve (% mass)	Volatiles (<180oC)	99.99
	Semi-volatile (180-265oC)	0.01
	Low Volatility (265-380oC)	-
	Residual (>380oC)	-
Group		I

(Source: EXPRO, 2002 and SOLE-6000-SPC-0001. Function Specification for Well Completion System Equipment, 11 Jul 2016)

2.3.1 Flow Rate

The production pipeline is designed for a maximum flow rate of 67.5 MMscfd but will be empty of hydrocarbons during the scope of the activity.

As wells will be drilled and completed prior to conducting the activities under the Plan, a worst-case credible flow rate is based on flow from the 7” (178mm) production tubing which is expected to be significantly less than the 280 MMscfd flow rate calculated for a loss of well control event during the production drilling program (for a larger hole diameter 8-1/2”x9-3/4” with no lower completion in hole).

2.3.2 Time Frame

Activities covered under the Plan are anticipated to commence in the second half of 2018.

Pipelay activities covered under the Plan, are expected to take approximately 6 months, excluding weather and operational delays. During this period any of the activities described in the Plan may be undertaken, with normal operations conducted 24-hours a day.

2.4 Sole Pipe / Umbilical Installation Activities

A description is provided in the following subsections of the main steps required to install the Sole production pipeline and umbilical, along with the subsea structures and tie-ins.

2.4.1 Site Survey

A non-invasive site survey may be undertaken at various stages throughout this activity including prior to pipelay, prior to and post hydrotesting. Site surveys may comprise visual ROV, multibeam echo sounder (MBES) or side scan sonar (SSS) dependant on survey requirements. It is anticipated that each survey would last in the order of 4-5 days subject to weather conditions, with surveys not continually required but undertaken as required (such as pre-lay / post lay) throughout the activity.

2.4.2 Sole Production Pipeline

During installation of the Sole Development HDD shore crossing, a 12” diameter pipeline was installed from the Orbost Gas Plant to the HDD exit point with a 520 m tail. Upon completion, the production pipeline was filled with inhibited potable water to enable hydrotesting of the shore crossing to be completed. Once successfully tested, the pipeline was depressurised and inhibited potable water was left within the pipeline to protect it against corrosion and marine growth. These activities have been conducted under a previously accepted joint Victorian state agency EP / EMP (OL-EN-EMP-0002).

The production pipeline is planned to be installed from the HDD tail End to the offshore production wells. In the event that the HDD tail End has been buried prior to pipelay installation, the tail end may be uncovered using water jetting or other abrasive techniques. This will enable the end of the shore crossing to be exposed.

Once exposed, divers will connect the production pipeline to a downline. An air compressor operated from the installation vessel will then displace the pig from the HDD tail to the Orbost Gas Plant (offshore to onshore), where fluids will be captured within an onshore break-tank and disposed of by disposal trucks (outside the scope of the EP). Once dewatered, divers will install a temporary plug to prevent seawater ingress prior to HDD tail recovery. Stability anchors will then be disconnected, and the production pipeline will be recovered to the installation vessel via recovery rigging attached by ROV where pipelay activities will then commence. Stability anchors will be recovered before the completion of the program.

The Sole production pipeline will be installed using a traditional reel installation method. Reel installation involves long pipe segments being welded, tested and coated onshore and then spooled onto a large, usually vertically oriented pipe reel. Once the installation vessel is in position, the pipe is unspooled, straightened and then lowered to the seabed as the installation vessel moves forward. Cathodic protection / sacrificial anodes are installed along the pipeline every 24 joints. Currently Cooper Energy plan to spool three sections of pipe approximately 20 km in length for each trip.

Any free span that exceeds pipeline design parameters will be mitigated via inclusion of a free span support (which may comprise concrete mattresses / grout bags / log mattresses), thus no additional seabed disturbance outside of the operational area is required. The pipeline is designed to be self-weighted and not require secondary stabilisation such as anchors.

Anchoring is expected to be limited to dive / support vessels and only required during HDD dewatering activities (in Victorian state waters only), whilst the installation vessels are expected to operate on Dynamic Positioning (DP).

2.4.3 Sole Umbilical

During installation of the Sole Development HDD shore crossing, a 9.4” diameter pipe to hold the umbilical was installed, and a wire pulled through the casing from the Orbost Gas plant to the HDD exit point offshore.

The installation vessel will recover the guide wire and the umbilical will be slowly fed through the shore crossing from a carousel onboard the installation vessel. The umbilical will then be terminated at the SUTU. Connection of the umbilical to the SUTU will be assisted by a Remotely Operated Vehicle (ROV) deployed from the installation vessel. Some umbilical control fluid release is expected when mechanical hydraulic couplers are connected.

The umbilical will be buried to remove the potential for interaction with other marine users and prevent any stability issues, and will run parallel to the production pipeline route, at an offset

distance of approximately 50 m. The umbilical will be buried using either jetting or trenching / cutting techniques as described below.

Specialist trenching equipment, which may comprise a mechanical cutting machine, will enable the umbilicals to be lowered into a narrow (< 1 m wide) trench to a minimum depth of 0.5 m below the seabed. The umbilical falls into the excavated trench/relatively light fluidised seabed material, which is backfilled over time by sediment deposit carried by subsea currents and wave motion.

Should jetting techniques be used, equipment such as jetting sleds (or similar) may be deployed and supported by ROV. Jetting uses high pressure water and air or water to create a trench by fluidizing the seabed which is then dispersed into the water column. The umbilical falls into the excavated trench/relatively light fluidised seabed material, which is backfilled over time by sediment deposit carried by subsea currents and wave motion. In areas of harder soil materials, the jetting equipment will be substituted by a mechanical cutter.

2.5 Manifold, SUTU, Tie-in Spool and Flying Lead Installation

The production pipeline will be recovered to surface where it will be cut to the required length and the PLEM attached. The production pipeline and PLEM will then be lowered through the water via an onboard winch or crane onto the pre-set mudmat foundations.

Mudmat foundations, SUTU, tie-in spools and pig launcher receivers (PLR) will be lifted off the installation vessel by the on-board crane and lowered to its final position on the seabed. Prior to a PLR being installed on the PLEM, the high-pressure cap will need to be removed resulting in a minor release of preservation fluids. Prior to installation activities, ROVs may prepare the seabed (via installation of cornier markers or transponders) and during installation monitor and assist with the set-down. Hydraulic shackles will be used to release the structures from the lifting tackle and on each occasion a small amount of hydraulic fluid may be released to the environment.

The PLEM, SUTU, tie-in spools and PLR will either be filled with inhibited water or with a MEG/MEG-gel. During tie-in / installation operations, end caps will be removed and small volumes of this preservation fluid (inhibited water / MEG) will be released to the environment.

Flying leads will be lowered to the seabed via subsea installation frames. An ROV will then fly the lead to its connection point whilst a second ROV monitors the installation frame to ensure leads do not get tangled.

During this activity temporary laydown of tooling and infrastructure may be required, in which case, any temporary laydown will occur within the defined operational area.

2.6 Mechanical Completion

Mechanical completion comprises:

- Flooding, cleaning, gauging and testing (FCGT);
- Leak tests of spools to confirm tie-in integrity;
- Leak test of the entire subsea system; and
- Umbilical integrity tests post tie-in.

Upon completion of installation activities for the production pipeline, they will be flooded, gauged, cleaned, and hydrotested to verify pipeline integrity.

Upon completion of the leak test, approximately 700 m^3 will be released in a controlled manner through PLEM. The maximum discharge rate is between 2-4 m^3 / minute. This rate is limited by

the cross-sectional area of the outlet ports on the PLEM. The pipeline will then be left full of inhibited seawater at ambient pressure until it is dewatered.

Similarly, each of the tie-in spools are subject to similar activities that will also result in minor discharges.

2.7 Pre-commissioning (Pipeline Dewatering)

Prior to operations commencing, the production pipeline will be dewatered. Dewatering pig trains typically comprise between one and ten pigs; Cooper Energy propose to use five pigs for this activity. Between the pigs, treated potable water or MEG based slugs may be used to remove salts and / or debris from the pipeline bore; and MEG slugs may be used to remove the last traces of water from the pipelines.

The dewatering pig trains are planned to be driven by nitrogen or air for the production pipeline. Pigs will be driven from the onshore pig launcher to the offshore pig launcher, receiver (connected to the PLEM). Due to the volume required to de-water the pipeline, a nitrogen membrane spread will be utilised to eliminate dependence on cryogenic nitrogen logistics and supply (the operation of this activity is outside the scope of the EP given it will occur onshore).

Based upon the volume of the pipeline (at ambient pressure) the volume of fluid that needs to be removed is in the order of 7,000 m^3 which includes contingency volumes in the order of 460 m^3. Pigging is expected to occur over a period of 1-2 days, which is based on minimum pig speeds of 0.5 m/s, and anticipated dewatering rates of 2-4 m^3/minute During this time, approximately 7,000 m^3 of FIS and will be discharged through the PLEM at a discharge point approximately 3 m above the seabed in approximately 124 m water depth.

The fluid types and volumes proposed to be discharged during dewatering activities are detailed in Table 2-3. The pipeline will be left filled with Nitrogen until commissioning / operations commence (outside the scope of the EP).

Table 2-3: Sole Pipeline Dewatering Release

Fluid source	Fluid type	Indicative volume (m^3)
Pipeline Dewater	FIS	7000
Pig-train slug 1	Potable water	25
Pig-train slug 2	Potable water	25
Pig-train slug 3	MEG	25
Pig-train slug 4	MEG	25

2.8 Inspection Maintenance and Repairs (prior to Operations)

IMR of subsea infrastructure may be undertaken to ensure that the integrity of the hydrocarbon system is maintained at or above acceptable standards. IMR activities may occur at any time once the infrastructure is successfully installed, and thus is included in the Plan to enable IMR activities to be conducted prior to operations commencing.

However, it should be noted that no IMR activities are planned for the suspended phase of the EP.

2.8.1 Inspections

Inspections provide assurance that assets are being maintained and operated according to design, as well as proactively identifying maintenance or repair activities that may be required. Inspection generally involves the use of a vessel travelling along the route of the subsea system using an ROV. An appropriate level of conservatism has been incorporated (including activity frequency) to enable risk evaluations to be undertaken.

No inspections are planned to be undertaken during the suspension phase of the activity under the plan.

2.8.2 Maintenance and Repairs

Maintenance and repair activities may need to be conducted during the suspension phase of the project to:

- Prevent deterioration and/or failure of infrastructure; and
- Maintain reliability and performance of infrastructure.

No maintenance or repair activities are planned to be undertaken under the plan. Support Operations

2.8.3 Installation Vessels

Given the variety of activities covered by the Plan, a number of different vessels may be required to conduct the activities under the Plan. The types of vessels that may be used include:

- Installation vessels;
- Support vessels;
- Dive support vessels; and
- Small inspection, maintenance and repair vessel.

The installation vessel will be serviced by support vessels and helicopters as required. Helicopter flight frequency is expected to be twice per week (on average) and will primarily be used for passenger transfers/crew changes and minor supplies. Support vessels will supply the installation vessel with equipment and supplies as required. All vessels undertake routine discharges of waste streams that include sewage, greywater, food waste, brine (from freshwater makers), ballast water, and cooling water.

Diving support vessels will enable air diving activities to be conducted which will support nearshore activities such as HDD shore-crossing de-watering. These vessels may operate on anchors, though due to the nature of the vessels, anchoring (i.e. small number / sized anchors) will result in minimal impacts and only within State waters.

ROV activities will be conducted off various installation vessels. With the exception of the dive support vessel, all vessels are expected to operate on DP.

3 Description of the Environment

3.1 Regional Setting

The Sole gas field is in the eastern section of the Gippsland Basin within the South-east Marine Bioregion, on the Twofold Shelf (meso-scale IMCRA region). The gas field is approximately 55 km southeast of Marlo, and 40 km southwest of Point Hicks in Victoria.

The Sole gas field and subsequent production wells located in the Production Licence VIC/L32, are situated in the Commonwealth waters of Bass Strait approximately 36 km from the Victorian Coast (Sydenham Inlet) and approximately 35 km northeast of the Basker Manta Gummy (BMG) oil and gas field). This Production Licence covers an area of approximately 201 km^2.

The climate of the operational area is characterised as cool temperate, with cool wet winters and cool summers. The conditions are primarily influenced by weather patterns originating in the Southern Ocean. The area is adjacent to the Bass Strait which is located on the northern edge of the westerly wind belt known as the Roaring Forties. Hindcast modelled wind data from the National Centres for Environmental Predictions Climate Forecast System Reanalysis for the period 2008 to 2012 (inclusive), showed winds were typically from a westerly (west-southwest to west-northwest) direction, with average monthly wind speeds ranging from 14.1–16.5 knots (RPS, 2017)

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). The water depth of the Operation Area ranges from <15m onshore to 125m offshore. The seabed is comprised of fine to coarse sand and areas of shell (CEE Consultants, 2003).

A Sole Development – Pipeline Route geoacoustic survey was undertaken in January of 2003 to characterise the bathymetry, seabed features, shallow geology, seabed sampling, and benthic habitat along the sole pipeline route (Thales GeoSolutions (Australasia) Limited 2003). The full suite of geophysical equipment consisting of echo sounder, side scan sonar and sub-bottom profiler (Chirp) was operated simultaneously on all lines. Seabed sampling was successfully undertaken at eight locations across the survey area using the GeoCoastal 3m Vibrocorer.

Key survey findings include:

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

Habitat characterisation surveys along the nearby Patricia-Baleen pipeline route (OMV Australia, 2002) showed a sand and shell/rubble seabed, with sparse epibiotic (e.g. sponges) coverage, with no reef systems (OMV Australia, 2002). 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 in the offshore Operational Area, is predominantly sandy substrate. Some sparse epifauna (e.g. sponges) and infauna may be present.

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 (Parks Victoria, 2003).

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 (Parks Victoria, 2003).

3.2 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 the Plan, the EMBA is based on hydrocarbon exposures above impact thresholds for ecological and social receptors for the accidental release of Marine Diesel Oil (MDO) from a vessel collision. Based on previous stochastic and ADIOS modelling the EMBA is expected to extend along waters off the eastern Victoria coast (Figure 3-1).

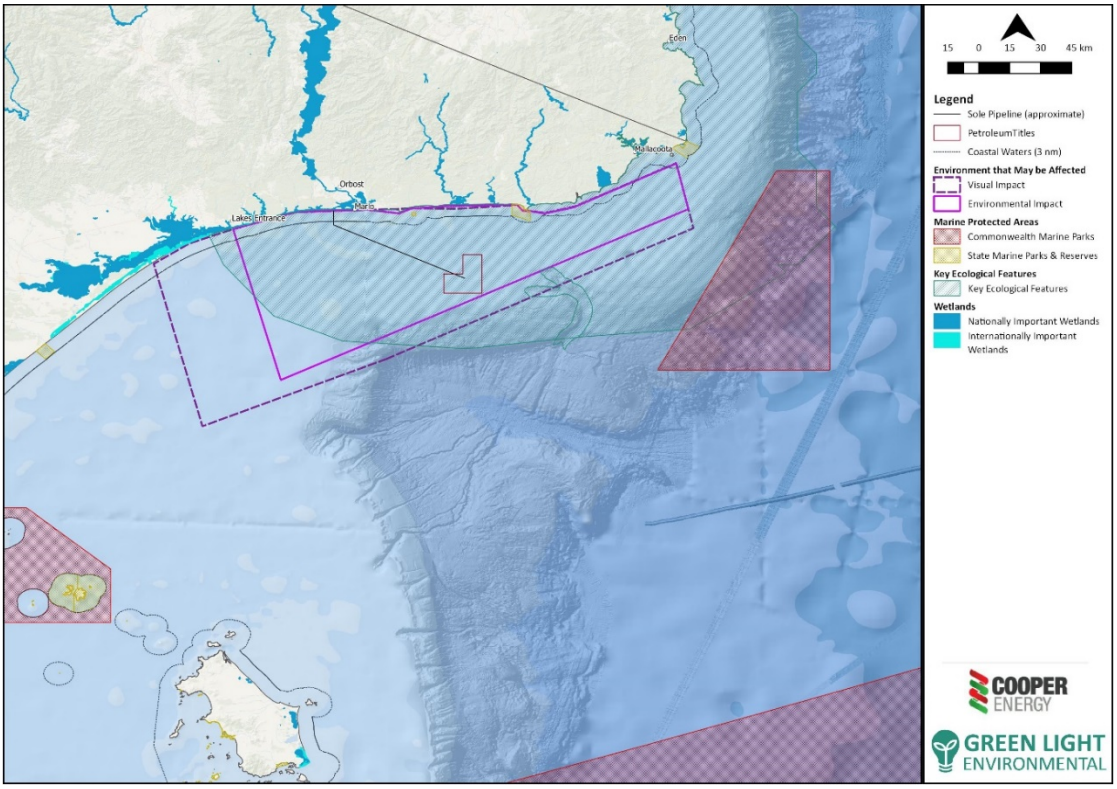


Figure 3-1: EMBA for the Sole Pipeline and Subsea Infrastructure Installation Activities

3.3 Ecological and Social Receptors

The following tables show the presence of ecological (Table 3-1) and social (Table 3-2) receptors that may occur within the operational area and EMBA. 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 3-1: Presence of Ecological Receptors within the Operational Area and the EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
Habitat	Shoreline	Rocky	• Foraging habitat (e.g. birds) • Nesting or Breeding habitat (e.g. birds, pinnipeds) • Haul-out sites (e.g. pinnipeds)	–	Not present.	✓	The coastal environment within the EMBA is comprised predominately of sandy shores with sections of rocky outcrops. Each of these shoreline types has the potential to support different flora and fauna assemblage due to the different physical factors (e.g. waves, tides, light etc.) influencing the habitat; for example: • Australian fur-seals are also known to use rocky shores for haul-out and/breeding; • Birds species may use sandy or rocky areas for roosting and breeding sites; • Rocky coasts can provide a hard substrate for sessile invertebrate species (e.g. barnacles, sponges etc) to attach to; • Artificial structures (e.g. groynes, jetties) while built for other purposes (e.g. shoreline protection, recreational activities) can also provide a hard substrate for sessile invertebrates to attach to.
		Sandy	• Foraging habitat (e.g. birds) • Nesting or Breeding habitat (e.g. birds, pinnipeds, turtles) • Haul-out sites (e.g. pinnipeds)	–		✓	
		Artificial structure	• Community engagement • Economic benefit	–		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
	Mangroves (Dominant Habitat)[1]	Intertidal/subtitle habitat, mangrove communities	• Nursery habitat (e.g. crustaceans, fish) • Breeding habitat (e.g. fish)	-	Not present (not identified in MNES Search for Operational Area with 2km buffer)	✓	Mangroves have been recorded in all Australian states except Tasmania. Mangrove habitat nearshore along the Victorian coast are distributed in South Gippsland around the French Island National Park and coast around Port Welshpool. Dominant mangrove habitat from the NISB Habitat Classification Scheme are not present in the EMBA.
	Saltmarsh (Dominant Habitat)	• Upper intertidal zone, Saltmarsh habitat, habitat for fish and benthic communities	• Nursery habitat (e.g. crustaceans, fish) • Breeding habitat (e.g. fish)	-	Not present (not identified in MNES Search for Operational Area with 2km buffer)	✓	Saltmarsh habitat are widespread along the Australian coast and mostly occur in the upper intertidal zone. Saltmarsh dominated habitat with greater than 10% coverage of saltmarsh occurs in in and behind the sand dunes of Ninety Mile Beach in Gippsland (Boon *et al.* 2011). In the broader region outside of the EMBA, it occurs at western Port Phillip Bay, northern Western Port, within the Corner Inlet-Nooramunga. Saltmarsh environments are much more common in northern Australia (e.g. Queensland), compared to the temperate and southern coasts (i.e. New South Wales, Victoria, Tasmania) (Boon *et al.* 2011).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
	TEC: Subtropical and Temperate Coastal Saltmarsh	• Upper intertidal zone, Saltmarsh habitat, habitat for fish and benthic communities	• Nursery habitat (e.g. crustaceans, fish) • Breeding habitat (e.g. fish)	-	Although identified by the matters of NES search as having the potential to be present, the operational area does not include the onshore environment and thus TEC: Subtropical and Temperate Coastal Saltmarsh is not expected to be present within the operational area.	✓	Community likely to occur within area. The 'Subtropical and Temperate Coastal Saltmarsh' is listed as a vulnerable Threatened Ecological Community (TEC) under the EPBC Act, and it's known distribution includes the southern and eastern coasts of Australia. Ecological community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes and shrubs (TSSC, 2013a). TEC environments are much more common in northern Australia (e.g. Queensland), compared to the temperate and southern coasts (i.e. New South Wales, Victoria, Tasmania) (Boon *et al.* 2011).
	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Rainforest and coastal vine thickets	• provides habitat for flora and fauna, • coastal buffer against erosion	-	Although identified by the matters of NES search as having the potential to be present, the operational area does not include the onshore environment and thus this is not expected to be present within the operational area.	✓	The 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' is listed as a critically endangered TEC under the EPBC Act. The ecological community is a complex of rainforest and coastal vine thickets on the east coast of Australia, including the area from Cape York Peninsula to the Gippsland Lakes in Victoria.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
	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 and inshore soft sediment habitat. The benthic habitat within the operational area is expected to include predominantly sandy substrate with occasional low-relief reef in nearshore waters. 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.	✓	Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The Gippsland Basin is composed of a series of large sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment. 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)	✓	Seagrass generally grows in soft sediments within intertidal and shallow subtidal waters where there is sufficient light. The nearshore habitat of the operational area may have patchy seagrass meadows.	✓	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. Species may include *Amphibolis antartica*, *Halophila australis*, *Heterozostera tasmanica*, *Posidonia australis*, *P. angustifolia*, and *Zostera muelleri*.
	Algae	Macroalgae	• Nursery habitat (e.g.	✓	The operational area includes nearshore intertidal zone in near the	✓	Benthic microalgae are ubiquitous in aquatic areas where sunlight reaches

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
			crustaceans, fish) • Food source (e.g. birds, fish)		Orbost Gas Plant. Macroalgal communities may be present in the intertidal and shallow subtidal area of the operational area. The operational area is not a dominant macroalgae habitat based on the national mapping available from OzCoasts (2015b) identify that the operational area is not a dominant macroalgae habitat.		the sediment surface. Macroalgae communities are generally found on intertidal and shallow subtidal rocky substrates. They are not common as a dominant habitat type in East Gippsland, but do occur in mixed reef environments. Species may include Bull Kelp and other brown algae species.
	TEC: Giant kelp marine forests of SE Australia	Kelp	• Primary producer habitat • Nursery habitat (e.g. crustaceans, fish) • Food source (e.g. birds, fish)	-	Not present	-	The 'Giant Kelp Marine Forests of South East Australia' is listed as an endangered TEC under the EPBC Act and may occur within the EMBA. The ecological community is characterised by a closed to semi-closed surface or subsurface canopy of *Macrocystis pyrifera*. This ecological community occurs on rocky substrate; some patches may occur in Victoria or northern Tasmania.
	Coral	Hard and soft coral communities	• Nursery habitat (e.g. crustaceans, fish)	–	Not present	✓	Soft corals can be found at most depths throughout the continental shelf, slope and off the slope regions, to well below the limit of light penetration. Soft

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
			• Breeding habitat (e.g. fish)				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.
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	✓	35 seabird and shorebird species (or species habitat) may occur within the operational area. Three species (Australian Fairy Tern, Little Tern, and Flesh-footed Shearwater) are listed as likely to breed in the area and 10 species of albatross are listed as potentially foraging in the area; no other important behaviours were identified for other seabird or shorebird species. The operational area intersects BIAs for: Antipodean albatross, Black-browed albatross, Buller's albatross, Campbell albatross, Common diving-petrel, Indian yellow-nosed albatross, shy albatross,	✓	36 seabird and shorebird species (or species habitat) may occur within the EMBA; with breeding, foraging and roosting behaviours identified. The EMBA intersects foraging BIAs for a number of albatross (Antipodean, Wandering, Buller's, Shy, Campbell and Black-browed; Indian yellow nosed); the White-faced Petrel, Common Diving-Petrel and the Short-tailed Shearwater. Roosting and breeding for a variety of bird species, wader birds and terns, occurs in eastern Victoria.
			• Threatened Species	✓		✓	
			• Migratory Species	✓		✓	
			• BIA – Breeding	–		✓	
			• BIA – Foraging	✓		✓	
			• Behaviour – Breeding	✓		✓	
			• Behaviour – Foraging	✓		✓	
			• Behaviour – Roosting	–		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
					Wandering albatross, White-faced storm-petrel.		
	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 sediment profile of the operational area. Commercially important species (e.g. Rock Lobster, Giant Crab) may occur in the nearshore low-relief rocky reef and intertidal areas. The threatened marine invertebrate species, Tasmanian Live-bearing Seastar, is not present in the Gippsland and therefore is not expected to be present within the Operation Area.	✓	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	✓		✓	
	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	✓	One species of fish (Australian Grayling) is known to occur within the operational area.	✓	Three threatened fish species (or species habitat) may occur within the EMBA:

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities		Operational Area[1]		EMBA[2]
							• The Australian Grayling • The Black Rock Cod • Eastern Dwarf Galaxias
		Sharks and Rays	• Threatened Species	✓	Four shark species (or species habitat) may occur within the operational area, including: • Grey nurse shark • Great white shark • Mako Shark • Porbeagle Shark The operational area is within a distribution BIA for the Great White Shark. No critical habitats or behaviours were identified.	✓	Five shark species (or species habitat) may occur within the EMBA, including: • Grey nurse shark • Great white shark • Mako Shark • Porbeagle Shark • Whale Shark The Great White Shark has known aggregation areas within eastern Victoria waters; the EMBA intersects a foraging and distribution BIA for this species. In addition to the species habitat that overlaps the operational area, whale shark habitat intercepts the EMBA. Breeding behaviour is noted for the Great White Shark in the EPBC Protected Matters search, however the breeding BIA is outside of the EMBA.
			• Migratory Species	✓		✓	
			• BIA – Foraging	–		✓	
			• BIA – Distribution	✓		✓	
			• Behaviour – Breeding	–		✓	
		Pipefish, seahorse, seadragons	• Listed Marine Species	✓	28 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	Marine turtles	• Listed Marine Species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
			• Threatened Species	✓	Four marine turtle species (or species habitat) may occur within the operational area: • Loggerhead Turtle, • Green Turtle, • Leatherback Turtle, • Hawksbill Turtle Breeding habitat may occur within operational area for Loggerhead and leatherback turtles. No BIAs were identified for marine turtles.	✓	Four marine turtle species (or species habitat) may occur within the EMBA. The EMBA is recognised in the EPBC Protected Matters search, as a foraging habitat for: • Loggerhead Turtle, • Green Turtle, • Leatherback Turtle, and • Hawksbill Turtle No critical habitat or BIAs occur within the EMBA.
			• Migratory Species	✓		✓	
			• Behaviour – Breeding	–		✓	
			• Behaviour – Foraging	✓		✓	
	Marine Mammals	Seals and Sealions (Pinnipeds)	• Listed Marine Species	✓	Two species of pinniped (or species habitat) may occur within the operational area; the Long-nosed Fur-seal and the Australian Fur-seal. No BIAs were identified for pinnipeds.	✓	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), No BIAs have been identified in the area.
			• Behaviour – Breeding	–		✓	
		Whales	• Listed Marine Species	✓	22 whale species (or species habitat) may occur within the operational area. Foraging behaviours were identified for some species (Sei, Fin and Pygmy Right Whale; Pygmy Blue Whale); no other important behaviours were identified. The operational area intersects a	✓	23 whale species (or species habitat) may occur within the EMBA. Foraging behaviours were identified for some species (Sie, Fin and Pygmy Right Whales); no other important behaviours were identified. The EMBA intersects a distribution and migration BIA for the
			• Threatened Species	✓		✓	
			• Migratory Species	✓		✓	
			• BIA – Foraging	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
			• BIA – Migration	✓	migration and resting BIA for the Southern Right Whale, and a foraging BIA for the Pygmy Blue Whale.	✓	Southern Right Whale, and a foraging BIA for the Pygmy Blue Whale.
			• 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.	✓	Seven dolphin species (or species habitat) may occur within the EMBA. No important behaviours of BIAs have been identified.
			• Migratory Species	✓		✓	
	Marine pests		• Introduced marine species	✓	The introduced conical New Zealand Screw Shell (*Maoricolpus roseus*) was common in the Sole and Patricia Baleen offshore pipeline corridors, generally in water depths greater than 40 m.	✓	The introduced conical New Zealand Screw Shell (*Maoricolpus roseus*) was common in the Sole and Patricia Baleen offshore pipeline corridors, generally in water depths greater than 40 m.

Notes:
1. Combination of an EPBC Protected Matters Search along the Sole pipeline alignment and a 5 kilometre buffer, and characteristics of the Gippsland environment, have been used to describe ecological receptors that may occur within the Operational Area.
2. Combination of an EPBC Protected Matters Search for the Sole EMBA area, and characteristics of the Gippsland environment sector, have been used to describe ecological receptors that may occur within the EMBA.

Table 3-2: Presence of Social Receptors within the Operational Area and the EMBA

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
Natural System	Commonwealth Marine Area	Key Ecological Features	• High productivity • Aggregations of marine life	✓	The operational area intersects with one KEF:	✓	Two KEFs intersect with the EMBA: • Big Horseshoe Canyon: a feature at the easternmost end of the Bass

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
					• 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.		Canyon system; the hard substrates provide attachment sites for benthic flora and fauna, thus increasing structural diversity and creating sheltering habitat for benthic fishes. • Upwelling East of Eden: an area of episodic upwelling known for high productivity and aggregations of marine life, including Blue Whales, Humpback Whales, seals, sharks and seabirds.
		Australian Marine Park	• Aggregations of marine life	-	Not present	-	Not present
	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).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
							Pelagic fish diversity is also high including schools of Butterfly Perth, Silver Sweep and Banded Morwongs.
	Wetlands of International Importance	Ramsar Wetlands	• Aggregation, foraging and nursery habitat for marine life	-	Not present (MNES search)	✓	A single RAMSAR wetland is located within (or adjacent to) the EMBA: • Gippsland Lakes
		Marine and Coastal Zone Wetlands of National Importance	• Aggregation, foraging and nursery habitat for marine life	✓	• Wetlands of importance (with a coastal or marine connection) that intersect with the operational area include: • Ewing Morass • Lake Corringle	✓	Numerous wetlands of importance (with a coastal or marine connection) intersect with the EMBA. The two closest to the Sole assets are: • Ewing Morass, and; • Lake Corringle
Human System	Commercial Fisheries	Commonwealth-managed	• Economic benefit	✓	Six Commonwealth-managed fisheries have management areas that intersect the operational area. Fishing intensity data suggests that the Southern and Eastern Scalefish and Shark Fishery and the Southern Squid Jig Fishery are the two that are closest to the sole development area. Overall active fishing effort within this area is expected to be minimal given the lack of suitable benthic habitat features within the operational area.	✓	Six 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 that are closest to the sole development area.
		State-managed	• Economic benefit	✓	While a number of State-managed fisheries have management areas that	✓	A number of State-managed fisheries have management areas that intersect

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
					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. 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 (Sole well depth is approximately 125 m).		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 that the total Production Licence covers an area of approximately 201 km^2 including offshore and nearshore habitat.	✓	Most recreational fishing typically occurs in nearshore coastal waters, and within bays and estuaries; offshore (>5 km) fishing only accounts for approximately 4% of recreational fishing activity in Australia. The East Gippsland waters have a moderate fishing intensity (relative to other areas within the South-East Marine Region).
	Recreation and Tourism	Various human activities and interaction	• Community engagement • Economic benefit	✓	Marine-based recreation and tourism may occur within the operational area, but activity is expected to be minimal given the proportion of the lease area that is within nearshore waters is relatively small and the Sole wells are located >30 km offshore	✓	The Australian coast provides a diverse range of recreation and tourism opportunities, including scuba diving, charter boat cruises, and surfing. In East Gippsland, primary tourist locations include Marlo, Cape Conran, Lakes Entrance and Mallacoota. The area is

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
							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 pipeline and subsea infrastructure installation activities 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*.
		Cultural	• World Heritage Properties • Commonwealth Heritage Places	–	Not present.	–	Not present.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area[1]		EMBA[2]	
			• National Heritage Places				
		Indigenous	• Indigenous use or connection	–	Not present.	✓	The coastal area of south-east Australia was amongst the most densely populated regions of pre-colonial Australia. 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. The Gunaikurnai people have an approved non-exclusive native title area area extending from West Gippsland in Warragul, east to the Snowy River and north to the Great Dividing Range; and 200 m offshore.

Notes:

1. Combination of an EPBC Protected Matters Search along the Sole pipeline alignment and a 5 kilometre buffer, and characteristics of the Gippsland environment sector, have been used to describe ecological receptors that may occur within the Operational Area.
2. Combination of an EPBC Protected Matters Search for the Sole EMBA area, and characteristics of the Gippsland environment sector, have been used to describe ecological receptors that may occur within the EMBA.

3.4 Conservation Values within the EMBA

Table 3-3 provides details of the particular values and sensitivities present within the EMBA.

Table 3-3: 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	• Big Horseshoe Canyon • Upwelling East of Eden
State Parks and Reserves	Aggregations of marine life	• Beware Reef Marine Sanctuary • Point Hicks Marine National Park
Internationally (Ramsar) or nationally important wetlands		• Gippsland Lakes
Seabirds and Shorebirds	Threatened and/or migratory species	• Numerous threatened (36) and migratory (14) species or species habitat present (including various albatross, petrel, plover, sandpiper, shearwater and tern species)
Fish	Threatened and/or migratory species	• Three threatened fish species or species habitat present (Australian Grayling, Black Rockcod, Eastern and Dwarf Galaxias) • Three threatened (Grey Nurse Shark, Great White Shark, Whale Shark) and four migratory (Great White Shark, Shortfin Mako Shark, Porbeagle Shark, Whale Shark) shark species or species habitat present
Marine Reptiles	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	• Two pinniped species may occur and breeding habitat for the Australian fur-seal is present within the EMBA • Twenty-three listed whale species or species habitat present including five threatened species (Sie Whale, Blue Whale, Fin Whale, Southern Right Whale, Humpback Whale); and 10 migratory whale species or species habitat present. • Seven threatened or migratory dolphin species or species habitat present (including Dusky Dolphin, Killer Whale)

Notes:
1. Species and species habitat presence based on EPBC Protected Matters search report for the Sole EMBA.

4 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 installation of the Sole production pipeline and associated subsea infrastructure, 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 4-1: AS/NZS ISO 31000 – Risk Management Methodology

4.1 Impact and Risk Evaluation

4.1.1 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 with the potential to be exposed to an aspect and subsequent impacts or risks were then summarised enabling a systematic evaluation to be undertaken.

4.1.2 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; and
- The potential degree of change relative to the existing environment or to criteria of acceptability.

Consequence definitions are provided in Table 4-1.

Table 4-1: 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.

4.1.3 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 (Table 4-2). Specifically, the framework considers impact severity and several guiding factors:

- Activity type;
- Risk and uncertainty; and
- Stakeholder influence.

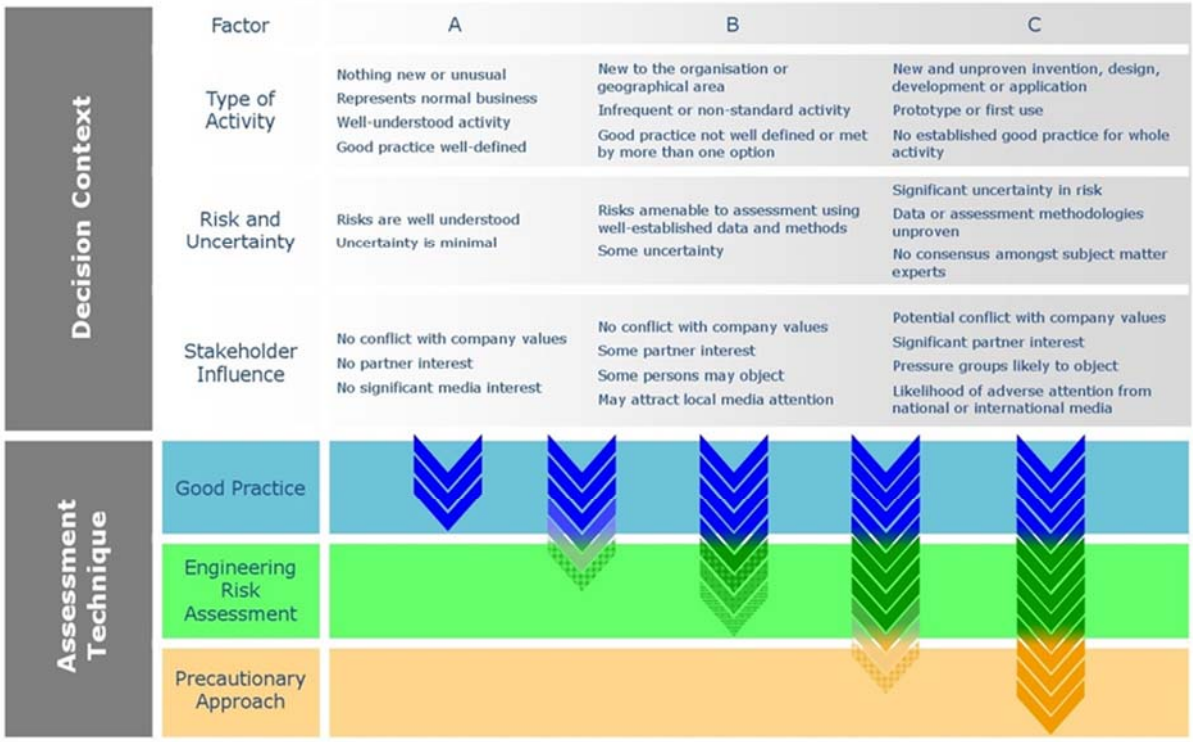
A Type A decision is made if the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. However, if good practice is not sufficiently well-defined, additional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

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. The assessment techniques considered include:

- Good practice;
- Engineering risk assessment; and
- Precautionary approach.



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

Table 4-2: ALARP Decision Support Framework

4.1.4 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 definitions are provided in Table 4-3. Likelihood levels are determined according to the Cooper Energy qualitative risk matrix (Table 4-4).

Table 4-3: 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 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).

4.1.5 Assigning residual risk rating

Based upon the identified consequence and likelihood levels, Cooper Energy use the qualitative risk matrix (Table 4-4) to rate the residual risk level.

Table 4-4: Cooper Energy Qualitative Risk Matrix

LIKELIHOOD	CONSEQUENCE				
	1.Negligible	**2.Minor**	**3.Moderate**	**4.Major**	**5.Critical**
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**

4.1.6 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 4-5 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 4-5.

Table 4-5: 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

This 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. *If there is, the project shall assess whether there is significant uncertainty in the evaluation, and if so, whether the precautionary approach should be applied*

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.

The EP assessment methodology ensures that potential impacts and risks are ALARP, 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. Consequently, this principal is not considered separately for each acceptability evaluation)

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

Project to consider if there is the potential to affect biological diversity and ecological integrity)

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

Not relevant to the EP).

4.2 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 through the environmental performance outcomes, standards and measurement criteria that are described for each environmental hazard. Additional aspects of monitoring and review are described in the Implementation Strategy and 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.

5 Risk and Impact Evaluation

To meet the requirements of the Regulations, the impacts and risks associated with the petroleum activity appropriate to the nature and scale of each impact and risk and details the control measures that are used to reduce the risks to ALARP and an acceptable level are summarised in this section.

5.1 Physical Interaction (Collision with Marine Fauna)

Table 5-1 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Physical Interaction (Collision with Marine Fauna).

Table 5-1: Physical Interaction (Collision with Marine Fauna) EIA / ERA

Cause of Aspect	The movement and physical presence of installation vessels within the operational area has the potential to result in collision with marine fauna in State and Commonwealth waters.
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	Megafauna are the species most at risk from this hazard and thus are the focus of this evaluation. 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. The EMBA overlaps with the Humpback Whale BIA, however the operational area does not overlap and the encounter of vessels with migrating Humpback Whales is considered unlikely. Whilst the operational area also overlaps with the Great White Shark BIA, they spend most of their time below the surface, travel along the east coast and are highly migratory. Vessel strike is not identified as a key threat in the Recovery Plan for the Great White Shark (DSEWPaC 2013). Thus, the risk of vessel collision to Great White Sharks is not assessed further. The key foraging areas for Pygmy Blue Whales are in the Bonney upwelling off Portland Victoria and canyons off Kangaroo Island in South Australia, which are more than 600 km west of the operation area. Pygmy Blue Whales forage off the continental shelf in deep waters in Australian waters between January and April (DoE, 2015d). Whilst Pygmy Blue Whales may occur in the operational area, potential encounters are expected to be infrequent and temporary and restricted to offshore waters. For the Southern Right Whale, while the operational area is within a distribution BIA, it does not intersect with known aggregation areas. The only recognised aggregation ground for Southern Right Whales in eastern Australia is Logan's Beach in Warrnambool (DSEWPaC 2012), which is over 600m west of the operational area. Southern right whales migrate from southern feeding grounds to the Australian coastline in the winter months between May and November, to breed, mate and rest,

	with peak abundance in August. Southern right whales may be migrating through the operational area in low numbers during winter months. Marine turtles and pinnipeds may have a presence within the operational area, but no important behaviour (e.g. foraging or breeding) is associated with these offshore waters. As such, any presence is likely to be of a transient nature only. 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 near a vessel, while others are curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson et al. 1995). Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs (Whale and Dolphin Conservation Society, 2006). Laist *et al.* (2001) identified that larger vessels with reduced manoeuvrability moving more than 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels travelling faster than 14 knots. Vessels typically used to support these activities do not have the same limitations on manoeuvrability and would not be moving at these speeds when conducting activities within the scope of the Plan, inside the operational area. Vessel speed for the Sole pipeline and subsea infrastructure installation activities will be much less these speeds with site survey speeds and pipelay speeds expected to be in the order of 0.5 - 5 knots respectively. The risk of collision with marine fauna is considered low. The duration of fauna exposure to vessel strike is limited to the duration of works under the Plan expected to be approximately 6 months. In the unlikely event that a fauna strike occurred and resulted in death, the impact would be at the individual level and it is not expected that it would have a detrimental effect on the overall population. Consequently, the potential impacts and risks from fauna strike in State and Commonwealth waters are **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. • Incident reporting	

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

5.2 Physical Interaction (Other Marine Users)

Table 5-2 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Physical Interaction (Other Marine Users).

Table 5-2: Physical Interaction (Other Marine Users) EIA / ERA

Cause of Aspect	The movement of installation and support vessels within the operational area, and the physical presence of the vessels has the potential to result in interactions with other marine users. The Sole pipeline and subsea infrastructure installation activities will result in installation of a 65 km pipeline on the seafloor that could result in interactions with other marine users. The risk of interaction of marine users with the pipeline is limited to potential snagging of fishing gear with subsea infrastructure on the seafloor. The EP assesses the risk associated with possible interaction of other marine users with the proposed activities.
Summary of impact(s)	Interaction with other marine users has the potential to result in: • Disruption to commercial activities.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Commonwealth Fisheries Other Marine Users	Several commercial fisheries have management areas that overlap the operational area associated with the Plan. Fisheries which may have an active presence in the operational area include the Scallop, Small Pelagic Fishery, Southern and Eastern Scale fish and Shark Fishery, skipjack tuna, Southern Bluefin Tuna Fishery, Victorian wrasse and snapper fishery; squid jig fisheries. Fishing intensity plots for the other State or Commonwealth fisheries indicate low or no active presence in the area. The south-eastern coast is one of Australia's busiest in terms of shipping activity and volumes. However, the Sole pipeline and subsea infrastructure installation activities do not coincide with major routes; with higher volumes of traffic located to the south of the operational area. The number of recreational and commercial marine users in the operational area is expected to be low considering the small operational area, the limited presence at each depth range and most of work being completed offshore. Therefore, it is expected that relatively small numbers of vessels would be encountered within the operational area. Based upon the temporary nature of this activity the most credible impact to other marine users would be the minor deviation of commercial vessels around the installation vessel. Although only a single installation vessel is planned to be onsite at any one time, should two installation vessels be operating within the operational area at the same time, (one for the pipeline and one for the subsea structures or umbilical) the maximum exclusion area will be approximately 1.6 km^2 based upon a 500 m safety zone being in place around each of the vessels. Once pipelay installation is complete, there is a risk of marine users snagging equipment on the pipeline. The South-East Trawl Fishing Industry Association (SETFIA) and a licenced Prawn Fisherman raised a concern that snagging could occur over the pipeline and although most fisheries that may overlap with the operational area do not use bottom trawling methods and thus will not set gear on the seafloor, there is a small

	chance that interaction with infrastructure could occur. SETFIA noted that snagged fishing gear is expensive to replace. Based on the above assessment, any potential impacts to marine users in State or Commonwealth waters would be **Minor (2)**, with localised short-term impacts to potential impacts to external stakeholders.
ALARP Decision Context	**A**

Summary of Control Measures			
• Notices to mariners • Pre-start notifications • Ongoing consultation • Vessel crew and navigational equipment • Over trawlable pipeline design			
Likelihood	**Remote (E)**	**Residual Risk**	Low

5.3 Seabed Disturbance

Table 5-3 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Seabed Disturbance.

Table 5-3: Seabed Disturbance EIA / ERA

Cause of Aspect	The following activities were identified as having the potential to result in seabed disturbance: • Recovery of HDD tail via jetting / excavation • Installation of subsea infrastructure (and temporary laydown if required) • Anchoring of support vessel (Dive vessel only within State waters) • Burial of umbilical (jetting / trenching / cutting) • Pipeline stabilisation (None planned but possible from IMR)
Summary of impact(s)	Seabed disturbance has the potential to impact on receptors, including benthic habitats and assemblages and demersal fish, through: • 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	**Alteration of benthic habitat** Anchoring is limited to the dive support vessel anchoring overnight and during diving operations in State waters only. Any seabed disturbance will be limited to the immediate vicinity of the vessel anchor, and thus the extent of potential impact is localised. Anchoring is common practice for recreational and commercial marine. The

	area of benthic habitat expected to be disturbed by planned activities at each anchoring location is approximately 30 m^2 per anchor and 100 m^2 per anchor for chain disturbance. Any temporary laydown / storage of subsea infrastructure within the operational area is expected to be short term in duration with any impacts localised to the small area directly related to the footprint of that infrastructure. The potential risk of impact to the benthic habitat from anchoring associated with the Sole pipeline and subsea infrastructure installation activities is considered low. The pipelay may cause localised disturbance to benthic habitat along the 65 km pipeline. In addition to this, any pipeline stabilisation / free span rectification activities are expected to occur directly adjacent to the pipeline and thus are not expected to result in a significantly larger footprint than that of the pipeline. Studies on the seabed characteristics along the proposed pipeline show that the area is featureless and characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibiotic communities. However, due to the similarity of surrounding habitat, and lack of sensitive benthic habitats, it is expected that recovery is likely and that there will be no significant impact to the regional environment. There are minimal pressures on this value and the damage would only occur within a small area. As such, it is expected that any alteration to benthic habitat would rapidly recover following any disturbance. The potential impact to alteration of the benthic environment from pipelay activities would be localised and temporary in nature and has been determined as **Negligible (1).** **Localised and temporary increase in turbidity near the seabed** Benthic habitat may be disturbed through the temporary increase in turbidity near the seafloor because of seabed disturbance associated with Sole pipeline and subsea infrastructure installation activities including: jetting, trenching, cutting or excavation, which may cause sediment to suspend in the water column and/or settle on benthic habitat. Anchoring of the support vessel in State waters will only occur in predominantly featureless soft sediment and shell/rubble seabed, and the turbidity associated with anchoring of one support vessel is considered negligible and thus is not considered further. A turbidity study completed by Chevron as part of the Wheatstone Project in north Western Australia showed that a turbidity plume from trenching associated with pipeline installation may be evident up to 70m from the trench area depending on environmental conditions (Chevron Australia 2010i and 2010j cited in Chevron 2014). The results of the survey found that turbidity levels may exceed 80 Formazin Turbidity Units (FTU) (compared to the maximum background turbidity level of 5 FTU), 50 m from the trench area. However, the average turbidity level 50 m from the trench area was recorded at approximately 15 FTU. Within two hours of ceasing trenching operations, the turbidity level had returned to background or very close to background level (Chevron Australia 2010i and 2010j cited in Chevron 2014). Turbidity measurements were undertaken during the construction of a submarine pipeline from Pallarenda Beach to Magnetic Island through the Great Barrier Reef in Queensland, Australia. This pipeline construction used techniques such as backhoes and excavators for intertidal areas, lay barge for subtidal pipelay, and jetting. The environment through which the pipeline passes is described as '…sandy beach, seagrass meadows, silty clay sea floor, coral reef slope, reef and mudflat and

	mangrove communities.' Turbidity levels 300 m from the construction area were reported to be generally within 5 NTU of background turbidity levels (Great Barrier Reef Marine Park Authority 2009 cited in BHP Billiton 2010). Trenching is expected to progress at rate of approximately 50 – 500 m/hr, it is expected that the area adjacent to the pipeline corridor will be exposed to a low level of risk from the short-term (a few hours at any given point) turbidity. Like most environments, the Gippsland Basin experiences long-term climatic cycles as well as occasional extreme weather events. Strong currents and storm events in the Bass Strait disturb sediments and benthic communities. Disturbance of unconsolidated sediments and the associated increase in sedimentation and turbidity is expected to be restricted to the operational area and will be minor in comparison with turbidity caused by natural events. Further, the pipelay installation will proceed at around 100 -1000 m per hour (dependent on various conditions) and, once laid, will not be disturbed again. The severity of physical effects of pipelaying will fall well inside the range of natural events. No significant benthic communities, including fishery stocks are expected to be impacted from turbidity caused by pipelay activities. Given the lack of suitable habitat, commercially important species are unlikely to occur within Commonwealth waters of the operational area. In near-shore State waters, localised and temporary increase in turbidity near the seabed may occur in operational areas for the Rock Lobster and scallop fisheries. However, the increased turbidity is temporary and localised and the area of potential affect is small relative to the fisheries management areas. There has been no recent fishing effort within the eastern zone of the Giant Crab fishery in Victoria. The location of the pipeline and absence 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	
• Site specific anchor plan • Use of buoyant anchor lines to reduce chain length • Design and construction procedures • Options to conduct free span rectification / pipeline stabilisation are evaluated	

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

5.4 Light Emissions

Table 5-4 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Light Emissions .

Table 5-4: Light Emissions EIA / ERA

Cause of Aspect	Light emissions will be emitted from installation and support vessels on a 24 hour per day basis during activities conducted within the plan.

Summary of impact(s)	A change in ambient light levels has 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, fish, squid and plankton	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. Studies conducted between 1992 and 2002 in the North Sea confirmed that artificial light was the reason that birds were attracted to and accumulated around illuminated offshore infrastructure (Marquenie et al. 2008) and that lighting can attract birds from large catchment areas (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). BIAs for shorebirds and seabirds occur in State and Commonwealth waters. Whilst breeding habitat for shore birds is typically along the shoreline, foraging may occur in both nearshore and offshore waters. Although the operational area overlaps several foraging BIAs for seabirds, it is not expected that exposure to small number of individual seabirds whilst foraging would result in any impact to the individual or to the greater population. There is no evidence to suggest that artificial light sources adversely affect the migratory, feeding or breeding behaviours of cetaceans. Cetaceans predominantly utilise acoustic senses to monitor their environment rather than visual sources (Simmonds *et al.* 2004), so light is not considered to be a significant factor in cetacean behaviour or survival. Whilst four species of marine turtles may occur within the operational area, there are no identified BIAs or nesting sites for marine turtles and therefore there is likely to be no impact to turtles from artificial light associated with the Sole pipeline and subsea infrastructure installation activities. Other marine life may also be attracted to the vessel (e.g. fish, squid and plankton) that can aggregate directly under downward facing lights. These are prey species to many species of marine fauna. As most vessel lighting is directed onto deck surfaces rather than marine waters, any impacts arising from light emissions will be localised and temporary. Consequently, the potential impacts and risks from light emissions in State and Commonwealth waters 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** Artificial light can cause significant impacts on burrow-nesting petrels and shearwaters. Fledglings often become disoriented and grounded because of artificial light adjacent to rookeries as they attempt to make their first flights to sea, a phenomenon known as 'fallout' (Birdlife International, 2012). Rodrigez *at al*. (2014) investigated the effects of artificial lighting from road lighting on short-tailed shearwater fledglings. The study

	established by removing the light source from nesting areas, there was a decrease in grounded fledglings and a corresponding reduction in bird fatalities. Whilst species or species habitat may occur in the operational area for four species of petrel and one species of shearwater, the operational area only overlaps with the BIA for the white-faced storm petrel. The white-faced storm petrel is strictly pelagic outside of breeding seasons and they most commonly breed on offshore isolated islands. There are no known breeding sites for the white-faced storm petrel in the operational area or EMBA. The operational area overlaps BIAs for seven species of albatross, which are migratory seabirds. Albatross's typically feed offshore, mainly along the edge of the continental shelf and over open waters, where they catch fish and cephalopods (e.g. squid, cuttlefish) by diving into the water (DSEWPaC, 2012a). Potential impacts to fledgling or adult birds from vessel lighting during breeding season will be temporary (until installation vessels move further offshore) and localised to the small section of coast adjacent to the Sole Production pipeline shore crossing (negligible consequence). Given the temporary nature of the light sources measurable impacts to marine bird species are not expected. As outlined in above, there are no identified BIAs or nesting sites for marine turtles and therefore there is likely to be negligible impact to turtles from artificial light associated with the Sole pipeline and subsea infrastructure installation activities. Artificial light associated with Sole pipeline and subsea infrastructure installation activities is limited to support and installation vessels. Furthermore, potential disturbance from artificial light is restricted to the 6-month activity window. If birds are attracted to the artificial light, the impact is will be temporary and localised and the impact is considered **Negligible (1)**.
ALARP Decision Context	**A**
Summary of Control Measures	
• Lighting will be limited to that required for safe work/navigation.	

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

5.5 Underwater Sound Emissions

Table 5-5 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Underwater Sound Emissions.

Table 5-5: Underwater Sound Emissions EIA / ERA

Cause of Aspect	The following activities were identified as having the potential to result in underwater sound generation within State and Commonwealth waters: • Support operations (installation and support vessels); • Support operations (helicopter operations); • Site survey – MBES / SSS and ROV; and • Burial of umbilical / recovery of HDD tail: jetting/trenching. These activities with result in both continuous and pulsed sound generation.

Summary of impact(s)	The potential impacts of underwater sound emissions in the marine environment are: • Auditory impairment, Permanent Threshold Shift (PTS); • Localised and temporary behavioural disturbance or Temporary Threshold Shifts (TTS) in hearing; and • Masking of communication
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Marine mammals Marine turtles Fish and sharks Commercial Fisheries Marine Invertebrates	**Auditory Impairment, Permanent Threshold Shift (PTS) – Pulsed** Underwater sound emissions generated from Sole pipeline and subsea infrastructure installation activities are below the threshold for potential physical injury to marine fauna except for Site Survey – MBES / SSS activities which is therefore the focus of this evaluation. <u>Marine Mammals</u> The criteria set by Southall *et al.* (2007) suggests that to cause an instantaneous injury to cetaceans resulting in a permanent loss in hearing, the sound must exceed 230 dB re 1 µPa (Peak SPL). Received source levels from site surveys are estimated to drop below this threshold within very close range (<10m) of the sound source. Consequently, the extent of any potential impact exposure will be small, and the duration of activities that result in these exposures are limited to a number of one off surveys that are complete within a number of days. Any potential impacts from MBES / SSS are restricted to toothed whales (i.e. dolphins) as their audible range overlaps with high frequency sonar (>12kHz). No BIAs for dolphin species were identified within the area potentially affected indicating that any exposure is expected to be limited to a small number of transient individuals. As such, potential physical impacts to marine mammals are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. <u>Fish and Sharks</u> Popper et al. (2014) 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. Consequently, received levels above this have the potential to result in auditory impairment / or physical impacts. Based on the sound propagation estimates sound levels of 207 dB re 1uPa would be limited to within 30 m of the site survey sound source. Although no significant habitat for fish and shark species has been identified within the area that may be affected, the area overlaps a distribution BIA for the Great White Shark indicating higher numbers may be present within the area potentially affected. Based upon the extent and duration of exposure, any impacts are expected to be limited to a small number of individuals given the nature and scale of the activity. No critical habitats or behaviours were identified for any of the species with the potential to be present, and thus any impacts are not expected to result in further population or ecological impacts. As previously described, these activities are limited to a number of one off surveys that are complete within a number of days. Consequently, potential impacts to fish and sharks are evaluated as **Minor (2)** given the potential for impacts to individuals that may

	result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. Marine Invertebrates A number of existing studies offer varying effect thresholds for potential impacts to marine invertebrates from underwater noise associated with pulsed noise i.e. seismic testing; Payne *et al.* (2007) observed the righting time in lobster was not impacted by sound levels of 202 dB re 1 µPa (peak-to-peak SPL) whilst Day *et al.* (2016) observed impacts at 209 dB re 1 µPa (peak-to-peak SPL). Based on the sound propagation estimates sound levels will be below 205 dB re 1uPa within 50 m of the site survey sound source. As previously described, these activities are limited to a number of one off surveys that are complete within a number of days. Consequently, potential impacts to marine invertebrates are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species of commercial importance but not affecting local ecosystem functioning. Marine Turtles No supporting literature is available to determine levels of noise that results in threshold hearing loss for marine turtles (Popper *et al.* 2014). However, using the limited information available and based upon the impact thresholds, noise generated by site surveys is not expected to result in physical impacts to turtles outside of <30m from the MBES source The operational area is not within an identified turtle BIA and within the open water environment of the operational area, it is anticipated that turtle numbers would be low, thus any exposures greater than 207 dB re 1 µPa would only be expected to a small number of individuals. As previously described, these activities are limited to a number of one off surveys that are complete within a number of days. Consequently, potential impacts to marine turtles are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species of commercial importance but not affecting local ecosystem functioning.
Marine mammals Fish and sharks Marine invertebrates Marine turtles	**Localised and Temporary Fauna Behavioural Disturbance – Pulsed** Marine Mammals Using impact criteria set by McCauley *et al.* (2000) and the NFS (2011), received source levels from MBES / SSS surveys are estimated to drop below impact thresholds within 3-4 km of the sound source. Any potential impacts from MBES / SSS are restricted to toothed whales (i.e. dolphins) as their audible range overlaps with high frequency sonar (>12kHz). No BIAs for dolphin species were identified within the area potentially affected indicating that any exposure is expected to be limited to a small number of transient individuals. As such, potential behavioural impacts to marine mammals from MBES / SSS Site surveys are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. Fish and Sharks Using the impact threshold identified by Popper et al (2014), any impacts would be limited to an area within 500 m of the site survey sound source. Although no specific habitat has been identified within the area that may be affected, the area overlaps a

	distribution BIA for the Great White Shark. No critical habitats or behaviours were identified for any of the species with the potential to be present, and consequently, any exposures would be expected to be limited to a number of individuals with any changes in behaviour not expected to result in additional impacts of population or ecological significance. As previously described, these activities are limited to a number of one off surveys that are complete within a number of days. Consequently, potential impacts to fish and sharks are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning. Marine Turtles Using impact thresholds identified by Popper et al (2014), received source levels from MBES / SSS surveys are estimated to drop below impact thresholds within 3-4 km of the sound source. The operational area is not within an identified turtle BIA and within the open water environment of the operational area, it is anticipated that turtle numbers would be low. Even though turtles are expected to display more erratic behaviours within 3-4 km of the installation vessels during MBES / SSS site surveys, as there are no critical or sensitive behaviours expected by these species within this area, any temporary changes to behaviour are not expected to 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. As previously described, these activities are limited to a number of one off surveys that are complete within a number of days. Consequently, potential impacts to marine turtles are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species of commercial importance but not affecting local ecosystem functioning. Marine Invertebrates Impacts to marine invertebrates are not expected to be any greater then evaluated above, thus has not been evaluated again. Potential impacts to marine invertebrates are evaluated as **Minor (2)** given the potential for impacts to individuals that may result in localised short-term impacts to species of commercial importance but not affecting local ecosystem functioning.
Marine Mammals Fish and Sharks Turtles	**Localised and Temporary Fauna Behavioural Disturbance – Non-Pulsed** Marine Mammals Based upon the impact thresholds identified by McCauley (1998; 2004) indicates that continuous noise sources from vessel operations are expected to fall below 120 dB re1µPA within 4 km of the vessel, whilst sound levels from jetting activities are expected to be approximately 123 dB re 1 µPa at 160 m (Nedwell *et al.* 2003). As such, impacts from non-pulsed sound sources have the potential to occur within 4 km of the installation vessels. The operational area is located within BIAs for both the Pygmy Blue Whale and Southern Right Whale and thus there is the potential for exposing a larger number of these species during this activity. However, as continuous noise sources from this activity are not expected to be any higher than that generated by existing shipping traffic within the region impacts temporary behavioural impacts to these species are not expected to 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)** 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. Fish and Sharks For some fish, strong 'startle' responses have been observed at sound levels of 200 to 205 dB SPL $_{peak}$ (185 - 190 dB re 1µPa root mean squared (RMS), indicating that sounds at or above this level may cause fish to move away from an area (Pearson *et al.* 1992; Wardle *et al.* 2001). Other studies (McCauley *et al.* 2003; Woodside 2007) have found that low level behavioural avoidance may occur at sound levels of greater than 170 dB re 1µPa RMS (186 - 193 SPL $_{peak}$; 140 dB re 1µPa2.s SEL). The NOAA Fisheries and the US Fish and Wildlife Service have used 150 dB re 1 µPa RMS as the threshold for behavioural effects to fish species while the Canadian Science Advisory Secretariat (DFO 2004) identified that behavioural changes are associated with levels of 148 - 218 dB SPL $_{peak}$ (~ 133 - 203 dB re 1µPa RMS). Based on these results, Cooper Energy has adopted a conservative threshold level of 130 dB re 1µPa RMS at which point behavioural changes in fish may occur. Based on the noise levels, and assuming a disturbance threshold of 130 dB re 1 µPa (RMS), the distance for behavioural disturbance is conservatively set as less than 3 km from the installation vessel. Although no significant habitat for fish and shark species has been identified within the area that may be affected, the area overlaps a distribution BIA for the Great White Shark indicating higher numbers may be present within the area potentially affected. No critical habitats or behaviours were identified for any of the species with the potential to be present, and thus any impacts are not expected to result in further population or ecological impacts. 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 Turtles Electro-physical studies have indicated that the best hearing range for marine turtles is in the range of 100-700 Hz, however no definitive thresholds are known for the sensitivity to underwater sounds or the levels required to cause pathological damage (McCauley, 1994). However, based upon the impact thresholds identified, McCauley (1998; 2004) indicates that continuous noise sources from vessel operations are expected to fall below 120 dB re1µPA within 4 km of the vessel, whilst sound levels from jetting activities are expected to be approximately 123 dB re 1 µPa at 160 m (Nedwell *et al.* 2003). As such, impacts from non-pulsed sound sources have the potential to occur within 4 km of the installation vessels. The operational area is not within an identified turtle BIA and 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)** 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	**A**		
Summary of Control Measures			
• Planned maintenance system (PMS) • Adherence to EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans			
Likelihood	**Unlikely (C)**	**Residual Risk**	Low

5.6 Atmospheric Emissions

Table 5-6 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Atmospheric Emissions.

Table 5-6: Atmospheric Emissions EIA / ERA

Cause of Aspect	The following activities were identified as having the potential to result in air emissions: • Support operations (installation vessels).
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; and • Contribution to the global greenhouse gas (GHG) effect.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Seabirds	**Localised and temporary decrease in air quality** 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) such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), along with non-GHG such as sulphur oxides (SO_X) and nitrous oxides (NO_X). The quantities of atmospheric emissions generated by fuel consumption, and related impacts, will be similar to other vessels and helicopters operating in the South-East Marine Region for both petroleum and non-petroleum activities. Offshore winds will rapidly disperse and dilute atmospheric emissions once they are discharged into the environment. The impacts on air quality will be localised to the emission point, and can be expected to be reduced to background levels close to the source. Consequently, the potential impacts and risks from atmospheric emissions are considered to be **Negligible (1)** as this type of event may result in temporary localised impacts.
	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	
• Reduced sulphur content fuel • Compliance with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution	

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

5.7 Planned Discharges

The proposed activities were assessed to identify all planned discharges. These were identified as:

- Operational discharges (including tie-in, mechanical completion and pre-commissioning discharges);
- Cooling and brine water;
- Treated Bilge;
- Sewage and food wastes; and
- Ballast water and biofouling.

The impacts and risks associated with each of these discharges are evaluated in the subsections below.

5.7.1 Operational Discharges

Table 5-7 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Operational Discharges.

Table 5-7: Operational Discharges EIA / ERA

Cause of Aspect	Planned discharges are required for this activity to ensure that the integrity of the flowlines and connections is maintained. Planned releases will occur during the following activities: • Manifold, SUTU, tie-in spool and flying lead installation; • Mechanical Completion; and • Pre-commissioning (Pipeline De-watering).
Summary of impact(s)	A planned discharge from these activities has the potential to result in chronic effects to fauna through: • Potential chemical toxicity in the water column.
Consequence Evaluation	

Receptor(s)	Description of Potential Environmental Impact
Invertebrates Fish	Modelling predicts that toxicity impacts for discharges FIS and potable water are not expected outside of 680 m and 270 m from the release source respectively. This area is known to have limited values and sensitivities. The receptors most at risk from these discharges (within 680 m of the PLEM) include invertebrates and fish. Although other pelagic fauna species (such as whales, turtles and sharks and rays) may be present, they are expected to be less sensitive to temporary fluctuations in water quality due to their mobility and transitory nature. As such fish and invertebrates are the focus of this evaluation. As these discharges are non-continuous and are expected to disperse rapidly (to below impact concentrations [for FIS] within 3.5 hours Green Light Environmental 2018), both fish and invertebrates would need to be entrained within the plume for this entire duration for any sort of toxicity impacts to be experienced. Mobile demersal and pelagic fish species may be present at the PLEM during the activity. However, 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. For invertebrates present near the PLEM, it is possible that low-level concentrations of chemical may be present on a short-term and episodic basis. Even if invertebrate species were to be entrained within the plume, concentrations would be below impact levels within 3.5 hours. Consequently, given the low toxicity of the chemicals, the low frequency and short-term nature of the exposure and the lack of sensitive benthic or pelagic invertebrate features in proximity of the PLEM, **Negligible (1)** impacts are expected.
ALARP Decision Context	**A**
Summary of Control Measures	
• Cooper Energy Offshore Environment Chemical Assessment Process (*COE-MS-RCP-0042)* • Preservation fluid (FIS) to be dosed with the chemical types and concentrations detailed within (*C100380-SS7-SOL-E-0373*)	

Likelihood	Unlikely (D)	Residual Risk	Low

5.7.2 Cooling and Brine Water

Table 5-8 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Cooling and Brine Water.

Table 5-8: Cooling and Brine Water EIA / ERA

Cause of Aspect	Seawater is used as a heat exchange medium for cooling machinery engines on vessels. Seawater is drawn up from the ocean, where it is de-oxygenated and sterilised by electrolysis (by release of chlorine from the salt solution) and then circulated as coolant for various equipment through the heat exchangers (in the process transferring heat from the machinery) and is then discharged to the ocean at depth (not at surface). Upon discharge, it will be warmer than the surrounding ambient water and may contain low concentrations of residual biocide if used to control biofouling. Concentrated brine is a waste stream created through the vessels desalination equipment for potable water generation. Potable water is generated through reverse osmosis (RO) or distillation resulting in the continuous surface discharge of seawater with a slightly elevated salinity (~10-15% higher than seawater).
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; and • 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) undertaken by Woodside for its Torosa South-1 drilling program in the Scott Reef complex found that discharge water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being <1 °C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (WEL2014). The environmental receptors with the potential to be exposed to an increase in temperature are transient marine fauna, including whales, sharks, fish, and reptiles. Marine mammals and fish passing through the area will be able to actively avoid entrainment in any heated plume (Langford, 1990), and reptiles and sharks would be expected to behave similarly. Acclimation of test organisms at 15, 20 and 25ºC allowed them to tolerate temperature increments of 8-9ºC without damage (UNEP, 1983). 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. The receptors with the potential to be exposed to changes in water quality resulting in toxic effects from chemicals are transient marine fauna, including whales, sharks, fish, and reptiles found in surface waters within the operational area. These marine fauna 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

	minor impacts would occur at an individual level and would not affect the population level. 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. This is confirmed by studies that indicate effects from increased salinity on planktonic communities in areas of high mixing and dispersion are generally limited to the point of discharge only (Azis *et al.* 2003). The receptors with the potential to be exposed to an increase in salinity include pelagic fish species and plankton found in surface waters within the operational area. Changes in salinity can affect the ecophysiology of marine organisms. Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20% to 30% (Walker and McComb, 1990). However, larval stages, which are crucial transition periods for marine species, are known to be more susceptible to impacts of increased salinity (Neuparth, 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	

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

5.7.3 Treated Bilge

Table 5-9 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Treated Bilge.

Table 5-9: 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 typically from closed deck drainage and machinery spaces. Bilge water is treated onboard the vessel 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. It should be noted that this PNEC is based upon no observed effect concentrations (NOEC) after exposure to certain concentrations for an extended period that was greater than 7 days (OSPAR 2014). 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. There is potential for localised impact to plankton in close proximity to the discharge. Short-term impacts to species that rely on plankton as a food source may occur. 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	
• Adherence to AMSA Marine Order Part 91 (Marine Pollution Prevention - Oil) which gives effect to parts of MARPOL Annex I. MARPOL is the International Convention for the Prevention of Pollution from Ships • Planned maintenance system	

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

5.7.4 Sewage and Food Waste

Table 5-10 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Sewage and Food Waste.

Table 5-10: 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]); and • 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 BOD)** Monitoring of sewage discharges for another offshore project (WEL, 2014), determined that a 10 m^3 sewage discharge 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 savaging 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 communities are not affected by sewage discharges, and thus impacts to the Pygmy Blue Whale (or other fauna) food source and any predator-prey dynamics is not expected to occur. Seabirds may be exposed to discharges. However, as previous industry modelling indicates these discharges are only expected to result in a localised change in water quality within close proximity to the release location, any potential change to scavenging behaviours from seabirds is expected to be incidental. Consequently, the potential impacts and risks from the planned discharge of sewage and greywater have been evaluated as **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 System	

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

5.7.5 Ballast Water and Biofouling

Table 5-11 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Ballast Water and Biofouling.

Table 5-11: Ballast Water and Biofouling EIA / ERA

Cause of Aspect	The operation of installation vessels may result in the discharge of ballast water within the operational area. Vessel operations 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.
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. For example, the introduction of the Northern Pacific Seastar (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (DSE, 2004). Marine pests can also damage marine and industrial infrastructure, such as encrusting jetties and marinas or blocking industrial water intake pipes. By building up on vessel hulls, they can slow the vessels down and increase fuel consumption. The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibenthic communities (e.g. sponges). Areas of higher value or sensitivity are located further afield (e.g. it is approximately 50 km to Beware Reef Marine Sanctuary, 75 km to Point Hicks Marine National Park, and 130 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. In State waters, successful colonisation of IMP may occur on exposed rocky areas or on artificial structures for example. If an IMP was introduced, and if it did colonise an area, there is the potential for it to spread outside the operational area, however, the operational area is located a significant distance away from areas that have a higher sensitivity indicating that if introduced, spread outside of the operational area areas of higher sensitivity (such as marine reserves) are not expected. Consequently, if an IMP is introduced into State waters, there is the potential for localised medium-term impacts to habitat resulting in a **Moderate (3)** consequence.

ALARP Decision Context	**B**		
Summary of Control Measures			
• Maritime Arrivals Reporting System (MARS) • Contractor premobilisation inspection • Adherence to Australian Ballast Water Management Requirements (version 7; DAWR, 2017), including: o Ballast Water Management Plan o Report ballast water discharges o Maintain a ballast water record system • Anti-fouling certificate • Biofouling management plan • Biofouling record book			
Likelihood	**Possible (C)**	**Residual Risk**	Medium

5.8 Accidental Release

Each of the proposed activities was assessed to identify potential spill sources. This included identifying any activities that involved the potential use, transfer, or storage of hydrocarbons and other materials that had the potential to be accidentally lost to the environment. Following the assessment, spill sources were grouped by type to identify credible spill scenarios associated with the program; four credible spill scenarios were identified for the pipelay activities:

- Loss of containment (minor);
- Loss of containment (Patricia-Baleen – State Waters Only);
- Loss of containment (Vessel Collision); and
- Loss of containment (Loss of Well Control).

In addition to these liquid spill scenarios, an additional scenario was included - the accidental release of solid waste (hazardous or non-hazardous) due to human error or inappropriate waste storage.

5.8.1 Waste

Table 5-12 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Waste.

Table 5-12: Waste EIA / ERA

Cause of Aspect	The handling and storage of materials and waste on board the installation and support vessels have 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 (2)** 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 Mammals Fish 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 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 alter very small areas of seabed, resulting in the loss of benthic habitat. However, as with most subsea infrastructure, the items themselves are likely to become colonised by benthic fauna over time (e.g. sponges) and become a focal area for sea life, so the net environmental impact is likely to be neutral. This would affect extremely localised areas of seabed and would be unlikely to contribute to the loss of benthic habitat or species diversity. 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: o Garbage / waste management plan o Garbage record book • Waste management training / induction	

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

5.8.2 Loss of Containment (Minor)

Table 5-13 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Loss of Containment (Minor).

Table 5-13: Loss of Containment (Minor) EIA / ERA

Cause of Aspect	The operation of the installation 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 between the installation and support vessel (refuelling); and • Dropped objects (and interaction with Sole Development subsea infrastructure) resulting in a loss of various fluids including hydraulic fluids or MEG.		
Summary of impact(s)	A minor loss of containment (LOC) has the potential to 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, within Commonwealth waters upon release would be expected to result in changes to water quality in both surface waters and the pelagic environment. Based upon the volumes associated with these minor releases any impacts to surface and pelagic waters are expected to be less than those associated with a larger diesel spill resulting from a vessel collision. The potential impacts associated with a larger loss of diesel fuel were determined to be **Moderate (3)**, and as impacts from these types of events are not expected to be any larger (they have not been considered further).		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Bulk transfer process • Hoses and connections • Planned Maintenance Schedule • Accidental release / waste management training / induction • Development and adherence to vessel SMPEP (or equivalent) • Accidental release / waste management training / induction			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

5.8.3 Loss of Containment (Patricia Baleen – State Waters Only)

Table 5-14 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Loss of Containment (Patricia Baleen – State Waters Only).

Table 5-14: Loss of Containment (Patricia Baleen – State Waters Only) EIA / ERA

Cause of Aspect	The operation of the installation and support vessels includes anchoring of small dive vessels, recovering the HDD tail which in-turn results in removal and recovery of stability anchors within close proximity of existing infrastructure – the Patricia Baleen Pipeline. Consequently, the following pathways were identified as potentially leading to a loss of containment event: • Recovery of stability anchors; • Anchoring of smaller dive vessels; and • Dropped objects via transfer of equipment.
Summary of impact(s)	A minor loss of containment (LOC) has the potential to 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	As the condensate is lighter than water any material spilt would rise to the sea surface where it would rapidly evaporate. Hence impact to benthic habitats are not expected to be exposed to hydrocarbons from this event. A pipeline rupture near shore could move towards the shoreline within the few hours it takes to weather. As the condensate is not very sticky or viscous it would be expected to act in a similar way to MDO on shorelines, which tends to penetrate porous sediments quickly, however is also flushed by waves and tidal action, and therefore shoreline clean-up is usually not needed (NOAA, 2015). Given an instantaneous release of 5 m^3 of Patricia-Baleen condensate is expected to behave similarly to Longtom condensate and rapidly evaporate and disperse upon release, and due to the low numbers of receptors present in the immediate area, the consequence of a pipeline leak or rupture would be localised, short-term and recoverable **Minor (2).**
ALARP Decision Context	**A**

Summary of Control Measures			
• Navigational requirements • OPEP implementation • Accepted safety case in place			
Likelihood	**Unlikely (D)**	**Residual Risk**	Low

5.8.4 Loss of Containment (Vessel Collision)

Table 5-15 provides a summary of the environmental impact assessment (EIA) / environmental risk assessment (ERA) for Loss of Containment (Vessel Collision).

Table 5-15: Loss of Containment (Vessel Collision) EIA / ERA

Cause of Aspect	The following activities have the potential to result in a spill of marine diesel oil (MDO): • A collision between the installation and support vessel or a third-party vessel that results in tank rupture.
Summary of impact(s)	A vessel collision event has the potential to expose ecological and social receptors to different hydrocarbon expressions and concentrations. Hydrocarbon expressions include: • Surface; • In water - entrained; and • Shoreline. These exposures may result in impacts directly via: • Potential toxicity effects / physical oiling; and • Potential for reduction in intrinsic values / visual aesthetics. Or indirectly from the impacts noted above resulting in: • Potential damage to commercial businesses.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Seabirds and Shorebirds	<u>Surface Hydrocarbon Exposure</u> When first released, the MDO has higher toxicity due to the presence of volatile components. Individual birds making contact close to the spill source at the time of the spill may suffer impacts however it is unlikely that a large number of birds will be affected. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with areas where hydrocarbons concentrations are greater than 10 µm and due to physical oiling may experience lethal surface thresholds. As such, acute or chronic toxicity impacts (death or long-term poor health) to birds are possible. For an MDO spill, the number of birds would be limited due to the small area and brief period of exposure above 10 µm (exposures expected to reduce < 10 µm within 36 hours). Consequently, it is expected the potential impacts and risks to seabirds from a vessel collision (MDO) event would be **Minor (2)**. Impacts will not affect local ecosystem functioning.
Marine Turtles	<u>Surface Hydrocarbon Exposure</u> Marine turtles are vulnerable to the effects of oil at all life stages. Marine turtles can be exposed to surface oil externally (i.e. swimming through oil slicks) or internally (i.e. swallowing the oil). Ingested oil can harm internal organs and digestive function. Oil on their bodies can cause skin irritation and affect breathing. The number of marine turtles that may be exposed to MDO is expected to be low due to the lack of aggregation areas and no BIA present, and based upon the understanding that these animals are transient within the EMBA.

	Therefore, potential impact would be limited to individuals, with population impacts not anticipated. Consequently, the potential impacts and risks to marine turtles 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 Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Fur seals are particularly vulnerable to hypothermia from oiling of their fur. The number of pinnipeds that may be exposed to MDO is expected to be low due to the lack of aggregation areas within the BIA and based upon the understanding that these animals are transient within the EMBA. However, given that fur seals are particularly vulnerable to hypothermia from oiling, the potential impacts and risks to pinnipeds from a LOC event are considered to be **Moderate (3),** as they could be expected to result in medium term impacts to species of recognized conservation value but not affecting local ecosystem functioning.
Cetaceans	Surface Hydrocarbon Exposure Physical contact by individual whales of MDO is unlikely to lead to any long-term impacts. Given the mobility of whales, only a small proportion of the migrating population would surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effects. If whales are foraging at the time of the spill, a greater number of individuals may be present in the plume, however due to the short duration of the surface exposure above the impact threshold (~36 hrs), this is not likely. Consequently, the potential impacts and risks to cetaceans are considered to be **Minor (2),** as this event could result in a localised short-term impacts to species of recognized conservation value with remedial, recovery work expected to be required over months/years.
Natural Systems	Surface Hydrocarbon Exposure Relatively low concentrations of hydrocarbon are toxic to plankton. Plankton risk exposure through ingestion, inhalation and dermal contact. Plankton are numerous and widespread, and therefore, an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover (ITOPF, 2011f), allowing for seasonal influences on the assemblage characteristics. Consequently, the potential impacts to plankton are considered to be **Minor (2)**, as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Coastal Settlements	Surface Hydrocarbon Exposure Visible surface hydrocarbons have the potential to reduce the visual amenity of the area for public use and activities. Regardless any exposure is expected to be limited in duration and consequently, the potential impacts and risks to coastal settlements from a vessel collision resulting in a hydrocarbon spill are considered to be **Minor (2)** as they could be expected to result in localised short-term impacts.

Recreation and Tourism	Surface Hydrocarbon Exposure Visible surface hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Regardless any exposure is expected to be limited in duration and consequently, the potential impacts and risks to recreation and tourism from a vessel collision resulting in a hydrocarbon spill are considered to be **Minor (2)** as they could be expected to result in localised short-term impacts.
Heritage	Surface Hydrocarbon Exposure Visible surface hydrocarbons have the potential to reduce the visual amenity of known heritage sites along the coast. Consequently, the potential impacts and risks to Heritage from a vessel collision resulting in a hydrocarbon spill is considered to be **Minor (2)** as they could be expected to result in localised short-term impacts
Coral	In Water Hydrocarbon Exposure Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka, 2001). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA, 2010). However, given the lack of hard coral reef formations, and the sporadic cover of soft corals in mixed reef communities, such impacts are considered to be limited to isolated corals. Consequently, the potential impacts to corals 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 Hydrocarbon Exposure Reported toxic responses to oils have included a variety of physiological changes to enzyme systems, photosynthesis, respiration, and nucleic acid synthesis (Lewis & Pryor, 2013). A review of field studies conducted after spill events by Connell *et al.* (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly from even very heavy oiling. In the event that a TEC: Giant kelp marine forests of SE Australia is present within the area potentially affected following a spill, there is the potential to expose this important habitat to in-water hydrocarbons. However as described above, given hydrocarbons are expected to have limited impacts to macroalgae and as MDO is not sticky and expected to rapidly degrade upon release, the potential impacts to macroalgae 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 Hydrocarbon Exposure There is the potential that exposure could result in sub-lethal impacts, more so than lethal impacts, possibly because much of seagrasses' biomass is underground in their rhizomes (Zieman *et al.* 1984). Consequently, the potential impacts to seagrass 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 Hydrocarbon Exposure Relatively low concentrations of hydrocarbon are toxic to both plankton [including zooplankton and ichthyoplankton (fish eggs and larvae)]. Plankton risk exposure through ingestion, inhalation and dermal contact. Plankton are numerous and widespread, but do act as the basis for the marine food web, meaning that an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover (ITOPF, 2011f), allowing for seasonal influences on the assemblage characteristics. Consequently, the potential impacts to plankton are considered to be **Minor (2),** as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Invertebrates	In Water Hydrocarbon Exposure Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Localised impacts to larval stages may occur which could impact on population recruitment that year. Consequently, the potential impacts and risks to commercially-fished invertebrates from an MDO LOC 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 Hydrocarbon Exposure Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF, 2010). Subsurface hydrocarbons could potentially result in acute exposure to marine biota such as juvenile fish, larvae, and planktonic organisms, although impacts are not expected cause population-level impacts. There is the potential for localised and short-term impacts to fish communities; the consequences are ranked as **Minor (2).** Impacts on eggs and larvae entrained in the upper water column are not expected to be significant given the temporary period of water quality impairment, and the limited areal extent of the spill. As egg/larvae dispersal is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any oil affected populations. Impact is assessed as temporary and localised and are considered **Minor (2)**.
Pinnipeds	In Water Hydrocarbon Exposure Exposure to low/moderate effects level hydrocarbons in the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds, however given the temporary and localised nature of the spill, their widespread nature, the low-level exposure zones and rapid loss of the volatile components of MDO in choppy and windy seas (such as that of the EMBA), impacts at a population level are considered very unlikely. Impact is assessed as temporary and localised and are considered **Minor (2).**
Cetaceans	In Water Hydrocarbon Exposure

	Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon; the risk of impact declines rapidly as the MDO weathers. The potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with migration to result in exposure to a large number of individuals. However, such exposure is not anticipated to result in long-term population viability effects. A proportion of the migrating population of whales could be affected for a single migration event, which could result in temporary and localised consequences, which are ranked as **Negligible (1)**.
Commercial Fisheries and Recreational Fishing	<u>In Water Hydrocarbon Exposure</u> Any acute impacts are expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. 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 vessels is unlikely to be a significant impact. The consequence to commercial and recreational fisheries is assessed as localised and short term and ranked as **Minor (2)**.
Recreation and Tourism	<u>In Water Hydrocarbon Exposure</u> Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities. However, the relatively short duration, and distance from shore means there may be short-term and localised consequences, which are ranked as **Minor (2)**.
Natural System	<u>In Water Hydrocarbon Exposure</u> The consequence to protected marine areas is assessed as localised and short term and ranked as **Minor (2).**
Rocky Shoreline	<u>Shoreline Hydrocarbon Exposure</u> The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents etc. Exposed rocky shorelines are less sensitive than sheltered rocky shorelines. One of the main identified values of rocky shores/scarps is as habitat for invertebrates (e.g. sea anemones, sponges, sea-squirts, molluscs). Rocky areas are also utilised by some pinniped and bird species; noting that foraging and breeding/nesting typically occurs above high tide line. The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where the immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA, 1995). Consequently, the potential impacts and risks to rocky shores are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.

Sandy Shoreline	Shoreline Hydrocarbon Exposure Sandy beaches are considered to have a low sensitivity to hydrocarbon exposure. Sandy beaches provide potential foraging and breeding habitat for numerous bird and pinniped species, however these activities (except haul outs) primarily occur above the high tide line. They also provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans). Due to proximity to shore, a large offshore release may reach the shoreline prior to it completely weathering and consequently impacts due to toxicity and/or smothering of infauna may occur. Similarly, coating of seabirds and pinnipeds using the shoreline would be expected under most conditions (dependent on how far out from shore the release is). Consequently, the potential impacts and risks to sandy shores are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Mangroves	Shoreline Hydrocarbon Exposure Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen (International Petroleum Industry Environmental Conservation Association (IPIECA) 1993). Mangroves can also take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop *et al.* 1987). Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may take months to years to detect. Given the non-viscous nature of MDO and impacts are expected to be limited to the volatile component of the hydrocarbon, however given their sensitivity to hydrocarbons, the potential impacts to mangroves are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Saltmarsh	Shoreline Hydrocarbon Exposure Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are very variable. In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can take place from the underground systems. Good recovery commonly occurs within one to two years (IPIECA, 1994). Consequently, the potential impacts and risks to saltmarsh are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Invertebrates	Shoreline Hydrocarbon Exposure The impact of oil on any marine organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil.

	Acute or chronic exposure, through surface contact, and/or ingestion can result in toxicological impacts, reproductive impacts, smothering and potentially cause death. However, the presence of an exoskeleton (e.g. crustaceans) will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no exoskeleton and larval forms may be more sensitive to impacts from hydrocarbons. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, but can eventually be lost. As MDO is expected to rapidly spread out, a large portion of the coast with the potential to be exposure to hydrocarbons comprises habitats that are suitable for intertidal invertebrates could be exposed, with the potential impacts and risks to invertebrates considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Seabirds and Shorebirds	Shoreline Hydrocarbon Exposure Direct contact with hydrocarbons can foul feathers, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impair water-proofing. Oiling of birds can also suffer from damage to external tissues, including skin and eyes, as well as internal tissue irritation in their lungs and stomachs. Toxic effects may result where the oil is ingested as the bird attempts to preen its feathers, or via consumption of oil-affected prey. Consequently, the potential impacts and risks to seabirds and shorebirds from a MDO release are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Marine Mammals	Shoreline Hydrocarbon Exposure Pinnipeds have high site fidelity and can be less likely to exhibit avoidance behaviours, thus staying near established colonies and haul-out areas. Fur seals are particularly vulnerable to hypothermia from oiling of their fur and consequently, once onshore hydrocarbons pose a significant hazard to pinnipeds with biological impacts caused from ingestion possibly resulting in reduced reproduction levels. Consequently, the potential impacts and risks to pinnipeds from exposure are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Wetlands	Shoreline Hydrocarbon Exposure The impacts of hydrocarbons on wetlands are generally similar to those described for mangroves and saltmarshes. The degree of impact of oil on wetland vegetation are variable and complex, and can be both acute and chronic, ranging from short-term disruption of plant functioning to mortality. Spills reaching wetlands during the growing season will have a more severe impact than if oil reaches wetlands during the times when many plant species are dormant. Wetland habitat can be of particular importance for some species of birds and invertebrates. As such, in addition to direct impacts on plants, oil that reaches wetlands also affects these fauna utilising wetlands during their life cycle, especially benthic organisms that reside in the sediments and are a foundation of the food chain.

	Consequently, the potential impacts and risks to wetlands are considered to be **Moderate (3),** as they could be expected to result in localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.
Coastal Settlements	Shoreline Hydrocarbon Exposure Visible hydrocarbons have the potential to reduce the visual amenity of the area for coastal settlements. Given its rapid weathering and potential for tidal flushing and rapid degradation, the potential impacts and risks are considered to be **Minor (2)** as they could be expected to result in localised short-term impacts.
Recreation and Tourism	Shoreline Hydrocarbon Exposure Visible hydrocarbons have the potential to reduce the visual amenity of the area for tourism, and discourage recreational activities. Consequently, the potential impacts and risks to recreation and tourism are considered to be **Minor (2)** as they could be expected to result in localised short-term impacts.
Heritage	Shoreline Hydrocarbon Exposure Visible hydrocarbons have the potential to reduce the visual amenity of known heritage sites. Consequently, the potential impacts and risks to heritage are considered to be **Minor (2)** as they could be expected to result in localised short-term impacts.
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) • Adherence to AMSA Marine Order Part 31 (Vessel Surveys and Certification) • 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* • Ongoing consultation with relevant stakeholders • Installation vessel to use only MDO			
Likelihood	**Remote (E)**	**Residual Risk**	Low

5.8.5 Accidental Release - LOC (Loss of Well Control Event)

Table 5-16 provides a summary of the EIA / ERA for Accidental Release - LOC (Loss of Well Control Event).

Table 5-16: Accidental Release - LOC (Loss of Well Control Event) EIA / ERA

Cause of Aspect	A loss of well control has the potential to be caused by interaction with existing wells during the installation of subsea structures or via a dropped object event.
Summary of impact(s)	A LOWC event has the potential to expose environmental and social receptors to different gas expressions including: • In water (entrained only). These exposures in turn have the potential to result in potential impacts to environmental and social receptors via: • Potential for reduction in intrinsic values / visual aesthetics. Indirectly as a result of the potential impacts noted above, there is the potential to result in: • Potential damage to commercial businesses.
Consequence Evaluation	
Receptor(s)	**Description of Potential Environmental Impact**
Plankton Marine Invertebrates Marine Reptiles Fish and Sharks Pinnipeds Cetaceans Commercial Fisheries	In-water gas exposures will impact those receptors that are exposed to the water column. Gas released at the seabed will rapidly dissipate through the water column with only temporary and minor water quality reduction and little to no impact to marine fauna. This may lead to methanotrophic bacteria consuming oxygen in that 'lens' of seawater resulting in oxygen depletion. However, the breakdown of methane occurs very slowly and oxygen availability will limit the ability of bacteria to fully deplete the oxygen. Consequently, microbial breakdown of the methane may reduce oxygen concentrations to levels untenable for a range of marine creatures, and just as a lack of vertical mixing in the deep water is holding the dissolved methane at depth, that lack of mixing keeps high levels of dissolved oxygen in surface waters from replenishing oxygen levels in the deep water. Sole wells are located in shallow waters (approximately 125 m). Therefore, it is considered that the rapid rise of gas to surface in a LOWC event will release gas to the atmosphere rather than being trapped at depth in the water column. A small portion may remain in the waters occupied by and surrounding the gas plume, but this would not be expected to result in significant oxygen depletion given surrounding waters are generally well mixed. At the water depths of the Sole wellheads, thermal stratification is not normally expected (some weak thermal stratification may occur in calm summer conditions, but generally only in the middle of Bass Strait). Thus, the 'trapping' of methane in deep cold waters is unlikely to occur, and oxygen depletion (and consequent impacts to marine life) in any one layer of the water column is unlikely to occur. Given the significantly smaller release rates predicted at the Sole-3 and Sole-4 well sites, the consequence of the release is considered **Negligible (1)**.
ALARP Decision Context	**A**

Summary of Control Measures			
• NOPSEMA accepted WOMP • Well design and approval • Safety case • Adherence to AMSA Marine Order Part 3 (Seagoing qualifications) • Adherence to AMSA Marine Order Part 30 (Prevention of Collisions) • Development and adherence to the Cooper Energy OPEP and FSP • Development and adherence to the Cooper Energy OSMP			
Likelihood	**Remote (E)**	**Residual Risk**	Low

6 Emergency Response Overview

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 the 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.

6.1 Oil Spill response strategies

For the purposes of selecting appropriate response options, hydrocarbons have been grouped into oil types as defined by the ITOPF classification system:

- Group I – Sole dry gas (LOWC) (refer to Section 5.8.5)
- Group II – 500 m^3 MDO (Vessel collision) (refer to Section 5.8.4
- There are 2 credible spill scenarios for this activity that have been assessed in the EP.
- LOC - Loss of well control (LOWC)
- LOC - Vessel collision resulting in a ruptured tank and spill of MDO (MDO spill)

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 6-1).

Table 6-1: Suitability of Response Options for MDO, and Patricia Baleen/Sole 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 Offshore Victoria Source Control Plan (VIC-DC-ERP-0001). The plan provides a response to release incidents from wellheads	✓	✓
Monitor & Evaluate	Direct observation – Aerial or marine; Vector Calculations; Oil Spill Trajectory Modelling; Satellite Tracking Buoys To maintain situational awareness, all monitor and evaluate options suitable.	MDO spreads rapidly to thin layers. Aerial surveillance is considered more effective than vessel to inform spill response and identify if oil has contacted shoreline or wildlife. Vessel surveillance 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 &	MDO, while having a small persistent fraction, spreads rapidly to thin layers.	**X**	**X**	The Sole reservoir is ‘dry gas’. The area affected by a LOWC gas release 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?
	draw droplets into upper layers of water column. Increases biodegradation and weathering and provides benefit to sea-surface /air breathing animals.	Insufficient time to respond while suitable surface thicknesses are present. Dispersant application can result in punch-through where dispersant passes into the water column without breaking oil layer down if surface layers are too thin. Application can contribute to water quality degradation through chemical application without removing surface oil. Considered not to add sufficient benefits.			likely to be localised around the wellhead, with plumes predicted to surface anywhere inside a 50 m radius of the release point.		
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 for a large offshore spill, and 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', the gas plume is predicted within 50 m of the release point only with surface exposure above impact / actionable thresholds not expected.	**X**	**X**
Protect & Deflect	Booms and skimmers deployed to protect	MDO spreads rapidly to less than 10 µm and suitable thicknesses for recovery are only present for the first 36 hours for a large offshore spill, and there is	**X**	**X**	As the Sole reservoir is 'dry gas', the gas plume is predicted within 50 m of	**X**	**X**

Response Option	Description	LOC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	LOC – LOWC (Sole Dry Gas)	Viable Response?	Strategic Net Benefit?
	environmental sensitivities.	insufficient mobilisation time to capture residues prior to hydrocarbons washing ashore. In addition to this, corralling of surface hydrocarbons close to shore is not expected to be effective for MDO and as thus is not expected to provide sufficient benefit.			the release point only. No shoreline contact is predicted.		
Shoreline Clean-up	Shoreline clean-up is a last response strategy due to the potential environmental impact.	As shoreline exposure is possible depending on the spill location, and as there are various shoreline techniques that are appropriate for this type of hydrocarbon, a shoreline clean-up may be an effective technique for reducing shoreline loadings where access to shorelines is possible.	✓	✓	As the Sole reservoir is 'dry gas', the gas plume is predicted within 50 m of the release point only. No shoreline contact is predicted.	**X**	**X**
Oiled wildlife Response (OWR)	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-spill captive management.	Given limited size and rapid spreading of the 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 potential for oiled wildlife.	**X**	**X**

Response Option	Description	LOC – Vessel Collision (MDO)	Viable Response?	Strategic Net Benefit?	LOC – LOWC (Sole Dry Gas)	Viable Response?	Strategic Net Benefit?
	In Victoria, this is managed by DELWP.						

6.2 Spill Response: Source Control

Well-related source control activities may range from:

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

The potential impacts and risks associated with performing these activities is covered under the aspects evaluated in the NOPSEMA accepted Sole-3 & 4 Drilling and Sole-2 Well Abandonment Environment Plan (SOL-DC-EMP-0001, Rev 1, Section 7.2), and thus are not considered further.

Source control arrangements for LOC from vessel failures includes:

- Closing water tight doors;
- Checking bulkheads;
- Determining whether vessel separation will increase spillage;
- Isolating penetrated tanks; and
- Tank lightering, etc.

6.3 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 where the spill volume/risk reduction through dispersion and weathering processes is considered the most appropriate response. Monitor and evaluate will apply to all marine spills. Higher levels of surveillance such as vessel/aerial surveillance, oil spill trajectory modelling and deployment of satellite tracking drifter buoys will only be undertaken for Level 2/3 spills given the nature and scale of the spill risk.

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

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

6.4 Spill Response: Shoreline Assessment and Clean-up

Any shoreline operations will be undertaken in consultation with, and under the control of DEDJTR EMD, the Control Agency for Victoria and the appropriate land managers of the shoreline affected.

Shoreline clean-up consists of different manual and mechanical recovery techniques to remove oil and contaminated debris from the shoreline to reduce ongoing environmental contamination and impact. It may include the following techniques:

- Natural recovery – allowing the shoreline to self-clean (no intervention undertaken);
- Manual collection of oil and debris – the use of people power to collect oil from the shoreline;
- Mechanical collection – use of machinery to collect and remove stranded oil and contaminated material;
- Sorbents – use of sorbent padding to absorb oil;
- Vacuum recovery, flushing, washing – the use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating oil accumulated at the shoreline;
- Sediment reworking – move sediment to the surf to allow oil to be removed from the sediment and move sand by heavy machinery;
- Vegetation cutting – removing oiled vegetation; and
- Cleaning agents – application of chemicals such as dispersants to remove oil.

Shorelines within the EMBA are predominantly sandy beaches with numerous estuaries present along the Victorian Coastline.

Based upon this behaviour, the following methods may have environmental benefit:

- Manual clean-up;
- Closure of estuaries resulting in additional stranding on sandy beach; and
- Mechanical collection – use of machinery to collect and remove stranded oil and contaminated material.

6.5 Spill Response: Oiled Wildlife Response

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. A review of the species likely to be present within the EMBA identifies marine birds, shorebirds and fur-seals could be affected.

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.

6.6 Risk Assessment of Oil Spill Response Strategies

This section provides a risk assessment of the oil spill response options, based on two credible spill scenarios:

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

6.6.1 Source Control

As described in the OPEP/FSP, source control to respond to a LOWC emergency event may include drilling a relief well and deploying a capping stack. The potential impacts and risks associated with performing these activities is covered under the NOPSEMA accepted Sole-3 & 4 Drilling and Sole-2 Well Abandonment Environment Plan (SOL-DC-EMP-0001) and associated EP summary (SOL-EN-EMP-0006), and thus are not considered further.

6.6.2 Monitor and Evaluate

Cause of Aspect	The following hazards associated with operational monitoring have the potential to interfere with marine fauna: • Aircraft use for aerial surveillance (fixed wing or helicopter).		
Summary of impact(s)	The potential impacts of underwater sound emissions in the marine environment are: • Localised and temporary fauna behavioural disturbance that significantly affects migration or social behaviours; and • Auditory impairment, Permanent Threshold Shift (PTS).		
Consequence Evaluation			
Receptor(s)	**Description of Potential Environmental Impact**		
Marine mammals Marine reptiles Fish Commercial fisheries	The potential impacts associated with aircraft activities have been evaluated in Section 5.5 of the EP. Based upon the nature and scale of the activities, the evaluation is considered appropriate for any aerial or marine surveillance undertaken and thus has not been considered further.		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Consultation • See section 6.5 of the EP			
Likelihood	**Remote (E)**	**Residual Risk**	Low

6.6.3 Shoreline Assessment and Clean-up

Table 6-2 provides a summary of the EIA / ERA for Shoreline Assessment and Clean-up activities.

Table 6-2 Shoreline Assessment and Clean-up EIA / ERA

Cause of Aspect	The following hazards are associated with shoreline clean-up activities and may interfere with environmental sensitivities: • Personnel and equipment access to beaches; • Shoreline clean-up; and • Waste collection and disposal

Summary of impact(s)	The known and potential impacts of these activities are: • Damage to or loss of vegetation; • Disturbance to fauna habitat and fauna from noise, air and light emissions from response activities; • Temporary exclusion of the public from amenity beaches. Sandy beaches are the focus for the consequence evaluation as they are considered to provide an indication of the worst-case consequences from implementing shoreline response due to presence of potential sensitivities and the invasive nature of techniques (such as mechanical collection).		
Consequence Evaluation			
Receptor(s)	**Description of Potential Environmental Impact**		
Shoreline fauna and habitats Cultural heritage Recreation	The noise and general disturbance created by shoreline clean-up activities could potentially disturb the feeding, breeding, nesting or resting activities of resident and migratory fauna species that may be present (such as seabirds, penguins and fur-seals). Any erosion caused by responder access to sandy beaches, or the removal of sand, may also bury nests. In isolated instances, this is unlikely to have impacts at the population level. Based upon the low viscosity, MDO is likely to infiltrate porous shorelines (such as sandy beaches) relatively. Consequently, clean-up efforts expected to result in more of a disturbance to the coastline as mechanical recovery could be required (resulting in excavation of shorelines). If not done correctly, any excavation along the coast could increase beach erosion and limit longer term recovery. The very presence of stranded oil and clean-up operations will necessitate temporary beach closures (likely to be weeks but depends on the degree of oiling and nature of the shoreline). This means recreational activities (such as swimming, walking, fishing, boating) in affected areas will be excluded until access is again granted by local authorities. Given the prevalence of rocky shorelines in the EMBA, this is unlikely to represent a significant social or tourism drawback. Consequently, the potential impacts and risks from these activities are considered to be **Moderate (3)**.		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Maintain shoreline assessment and clean-up capability • Consultation • Use of Existing Tracks and Pathways			
Likelihood	**Remote (E)**	**Residual Risk**	Low

6.6.4 Oiled Wildlife Response

Table 6-3 provides a summary of the EIA / ERA for Oiled Wildlife Response activities.

Table 6-3 Oiled Wildlife Response EIA / ERA

Cause of Aspect	The hazards associated with OWR are: • Hazing of target fauna may deter non-target species from their normal activities (resting, feeding, breeding, etc.); • Distress, injury or death of target fauna from inappropriate handling and treatment; and • Euthanasia of target individual animals that cannot be treated or have no chance of rehabilitation.		
Summary of impact(s)	The potential impacts of this activity are disturbance, injury or death of fauna.		
Consequence Evaluation			
Receptor(s)	**Description of Potential Environmental Impact**		
Marine Megafauna	Untrained resources capturing and handling native fauna may cause distress, injury and death of the fauna. To prevent these impacts, only appropriately trained oiled wildlife responders will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species. It is preferable to have oil-affected animals that have no prospect of surviving or being successfully rehabilitated and released to the environment humanely euthanized than to allow prolonged suffering. The removal of these individuals from the environment has additional benefits in so far as they are not consumed by predators/scavengers, avoiding secondary contamination of the food-web. Hazing and exclusion of wildlife from known congregation, resting, feeding, breeding or nesting areas may have a short- or long-term impact on the survival of that group if cannot access preferred resources. These effects may be experienced by target and non-target species. For example, shoreline booming or ditches dug to contain oil may prevent penguins from reaching their burrows after they've excited the water and low helicopter passes flown regularly over a beach to deter coastal birds from feeding in an oil-affected area may also deter penguins from leaving their burrows to feed at sea, which may impact on their health. Due to the potential for localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning, the potential impacts form this activity have been identified as **Minor (2).**		
ALARP Decision Context	**A**		
Summary of Control Measures			
• Maintain shoreline assessment and clean-up capability • Consultation • Use of Existing Tracks and Pathways			
Likelihood	**Remote (E)**	**Residual Risk**	Low

7 Implementation Strategy

Cooper Energy retains full and ultimate responsibility as the Titleholder of the activity and is responsible for ensuring that the Sole Development pipeline and Subsea Infrastructure Installation 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 Management System

The HSEC MS is Cooper Energy's 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, and comply with, the requirements of the HSEC MS.

7.2 Environmental Performance Monitoring & Reporting

7.2.1 Emissions and Discharges

For Vessel Installation activities the Cooper Energy Offshore Site Representative is responsible for collecting emissions and discharges data and reporting to the Cooper Energy HSEC Lead.

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

7.2.2 Audit and Inspection

Environmental performance of the activities will be audited and reviewed in several ways in accordance with Standard 18: Audit and Assessment. These reviews are undertaken to ensure that:

- Environmental performance standards to achieve the EPOs 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:

- A premobilisation inspection will be undertaken for the installation vessels. This will include a site inspection for the two major installation vessels associated with the EP; additional vessels will be subject to site inspection depending on the outcomes of the initial site inspection, and desktop inspection which will encompass all vessels.

- Additional HSEC inspections will be undertaken throughout the campaign and may include a combination of desktop-based reviews of administrative controls including daily reports, incident reports. At least one installation vessel (site) inspection will be undertaken using the EP Commitments Register.

7.2.3 Management of Non-conformance

In response to any EP non-compliances, corrective actions will be issued by the HSEC Lead in accordance with the Cooper Energy Incident management, Non-Conformity and Corrective Action Standard Instruction (*COE-MS-STI-0020*).

Corrective actions will specify the remedial action required to fix the breach and prevent its reoccurrence and is delegated to the person deemed most appropriate to fulfil the action. The action is closed out only when verified by the appropriate Manager and signed off. This process is maintained through the Cooper Energy corrective action tracking system.

Where more immediacy is required, non-compliances will be communicated to relevant personnel and responded to as soon as possible. The results of these actions will be communicated to the offshore crew during daily toolbox meetings or at daily or weekly HSEC meetings.

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

All personnel have the authority to stop work at any time if HSEC incidents breach or threaten to breach Cooper Energy's HSEC standards and/or the EP's EPOs or EPSs or if they are not satisfied that measures are in place to avoid a repeat of the incident.

7.2.4 Management of Change

The *MoC Standard Instruction (COE-MS-STI-0013)* and the underlying MoC Procedure (*COE-MS-PCD-003*) describes the requirements for dealing with managing change.

The objective of the MoC process is to ensure that additional risks are not introduced by changes that could increase the risk of harm to people, assets or the environment. This includes:

- Deviation from established corporate processes;
- Changes to the sequence of offshore operations;
- Deviation from specified safe working practice or work instructions/procedures;
- Implementation of new systems; and
- Significant change of HSEC-critical personnel.

Environmentally relevant changes include:

- New activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have the potential to impact on the environment and have not been:
    - Assessed for environmental impact previously, in accordance with the relevant standard' 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 the impact of the proposed change and the adopted control measures.

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

7.2.5 Revisions to the EP

In the event that the proposed change introduces a significant new environmental impact or risk, results in a significant increase to an existing risk, or through a cumulative effect of a series of changes there is a significant increase in environmental impact or risk, the EP will be revised for re-submission to NOPSEMA and DEDJTR.

Note all changes to the accepted EP will be traceable via 'track-changes' within the revision document and any changes made are fully justified.

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. Regulation 17(5) of the OPGGS(E) Regulations (Cwlth) and Regulation 20(2) of the OPGGS Regulations (Vic) require that where there is a significant modification or new stage of the activity (that is, change to the spatial or temporal extent of the activity) a proposed revision of the EP will be submitted to NOPSEMA and DEDJTR.

Cooper Energy consider that the OPEP should be reviewed at least annually and in response to any exercises or other means of testing of the arrangements, or as a result of the MOC process.

7.3 Emergency (Oil Spill) Response Arrangements and Capability

The implementation strategy for the EP describes the Offshore Victoria OPEP (VIC-ER-EMP-0001) which is in place for the program and provides details of the systems and arrangements for testing the response arrangements documented within this plan.

A Sole-Development Project "First Strike Plan" (FSP) has been developed to specifically address the risks and subsequent response plan (pre-operational NEBA) as described in the EP, and in accordance with the accepted Victorian Operations OPEP.

7.3.1 Oil Spill Response Capability

Cooper Energy ensures that adequate oil spill response capability is maintained by specifying response preparation controls in the EP. For the response strategies described in Section 6.1 the environmental performance standards are summarised in Table 7-1.

Table 7-1 Preparation Controls for Response Capabilities

Response Strategy	Preparedness Environmental Performance Standards
Source Control	Cooper Energy maintains the following agreements (or contractor pre-qualifications) to maintain source control capabilities:

Response Strategy	Preparedness Environmental Performance Standards
	• Well Control Specialist (including capping stack capability). • ROV Contractors. • Subsea Engineering Company. • Well Engineering Contractor. • Cooper Energy Relief Well Readiness Form (verified every 2 months).
	Cooper Energy conducts annual source control desktop exercise.
Monitor and evaluate	Cooper Energy maintains the following agreements (or contractor pre-qualifications) to maintain operational response capabilities: • AMOSC membership (Aerial Observers, RPS-APASA Contract). • AMSA MoU. • Aviation support (pre-qualification assessment) • Marine support services
	An oil spill tracking buoy and instructions for deployment will be located offshore at all times during the campaign.
Shoreline Assessment and Clean-up	Cooper Energy maintains the following agreements to maintain shoreline assessment/clean-up response capabilities: • AMOSC membership (equipment, personnel, CORE Group. Mutual aid). • AMSA MoU (equipment, personnel). • Scientific resource support agreement (GHD or equivalent). • Waste management contract.
Oiled Wildlife Response	Cooper Energy maintains the following agreements to maintain OWR response capabilities: • AMOSC membership (equipment, personnel). • Waste management contract. • Vessel Contract. • Vessel of Opportunity listing.

7.3.2 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:

- when they are introduced;
- when they are significantly amended;
- not later than 12 months after the most recent test;
- if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan;
- if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.

Exercises are documented and any corrective actions/recommendations arising from the exercises managed in accordance with the *Incident Management, Non-Conformity and Corrective Action Standard Instruction (COE-MS-STI-0020)* and stewarded to closure by the Cooper Energy HSEC Lead.

Emergency response training records will be maintained in accordance with *HSEC MS Standard 6: Competence and Awareness*.

Where changes are required to the OPEP resulting from exercise outcomes, altered contractual arrangements, corrective actions, routine information updates (i.e. contact details change), or other items; the General Manager Projects is responsible for ensuring changes are assessed against Regulation 17 of the OPGGS(E) Regulations (Cwlth) and Regulation 20 of the OPGGS Regulations (Vic) and where necessary, the EP/OPEP submitted to NOPSEMA and DEDJTR as a formal revision.

For changes which do not trigger a formal revision, internal revisions to the OPEP will be in accordance with the *Cooper Energy Management of Change Standard Instruction (COE-MS-STI-0013)* with any change justified.

7.3.3 Operational and Scientific Monitoring Plan (OSMP)

The 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 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

8 Stakeholder Consultation

Cooper Energy has undertaken stakeholder engagement in preparation of the Sole pipeline and subsea infrastructure installation EP.

Determining the stakeholders for the Sole pipeline and subsea infrastructure installation activities 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;
- 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 8-1: Stakeholders for the Sole Development Project

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 (DIIS)	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
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)	

8.1 Provision of Sufficient Information

8.1.1 Initial Consultation

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 pipeline and subsea infrastructure installation activities, was disseminated to stakeholders on the 19th September 2017. A further brochure with similar information was disseminated in early February 2018. The brochures 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, CFA, SIV, VFA and SETFIA.

Cooper Energy Website

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

8.1.2 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. Significant changes to scope will trigger a revision of the EP.

Approximately four (4) weeks 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).

8.1.3 Assessment of Claims and Feedback

Cooper Energy assess the merit of all claims and objections (including any proposed control measures) provided by relevant stakeholders. Part of this assessment includes consideration of any evidence that is presented such as literature, scientific data, historical fishing data etc. In relation to objections or claims from commercial fishers, Cooper Energy assess the possibility of placing temporal or physical exclusions, or other control measures where there is the potential for detrimental impact to fish populations, catch rates, loss of income or increased safety risks.

If the claim has merit, where appropriate, Cooper Energy shall modify management of the activity. The assessment of merit and any resulting management of change actions shall be shared with the concerned stakeholder.

8.2 Summary of Stakeholder Consultation

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

A summary of stakeholder responses as they relate to Sole, 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 many of the responses are generic and relate equally to other activities that may occur as part of Cooper Energy's 2018 Offshore Campaign.

Table 8-2: Stakeholder Feedback and Cooper Energy Assessment of Claims/Objections

Stakeholder and relevance	Relevance to Activity	Information provided (Date, Method, Record, Number)	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection	Full text response - record number
Aboriginal Affairs Victoria	Responsible for the implementation of the Aboriginal Heritage Act 2006 and the Aboriginal Lands Act 1970. Determines RAPs. May be impacted if hydrocarbon spill only	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	Your message was received. Thank You.	No claims or objections to be assessed.	Not applicable	AAV-001
			Thanked Cooper Energy 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.	AAV-002
Australian Fisheries Management Authority	Management of Commonwealth Commercial Fisheries from 3nm to 200nm (EEZ)	11/9/2015: Initial introductory meeting and presentation on Sole Development Project	AFMA provided overview of fisheries out of Lakes Entrance. Cooper Energy 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	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.	AFMA-001

Stakeholder and relevance	Relevance to Activity	Information provided (Date, Method, Record, Number)	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection	Full text response - record number
			organisations. ABARES report should be reviewed for fishery status reports. AFMA website provides overlays of fishing zones and acreages.			
		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	Brodie MacDonald replied with thanks	No claims or objections to be assessed.	Not Applicable	AFMA-002
			20/9/2017: Requested that all correspondence be via the generic petroleum@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.	Cooper Energy 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.	AFMA-003
Australian Hydrographic Services	Commonwealth Agency responsible for Hydrographic Services such as Notice to Mariners	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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.	Cooper Energy confirmed information would be provided to AHS at least 3 weeks prior to activities commencing	AHS-001

Stakeholder and relevance	Relevance to Activity	Information provided (Date, Method, Record, Number)	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection	Full text response - record number
	Details of infrastructure placed on Navigation Charts Charting and Information Management					
Australian Maritime Safety Authority	Safety Regulator for Marine Safety and Vessel-based Oil Spill Response in Commonwealth Waters Impacts on Shipping Routes & Navigation Warnings Marine Pollution Controller in Commonwealth Waters for Vessels	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	22/9/2017: Thanked Cooper Energy 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	22/9/2017: No claims or objections to be assessed. Cooper Energy acknowledge increased traffic in areas	23/9/2017: Cooper Energy acknowledged increased traffic in the areas and that the TSS slightly encroaches on BMG and Sole. Cooper Energy 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.	AMSA-001

Stakeholder and relevance	Relevance to Activity	Information provided (Date, Method, Record, Number)	Summary of Response	Assessment of Merits to Adverse Claim / Objection	Operators Response to each Claim / Objection	Full text response - record number
			least 4 weeks prior to activities for NtM (via hydro email) and to update charts (via datacentre email).			
Department of Environment, Land Water and Planning (DELWP)	Pipeline Regulation, Regulation and Approvals Energy, Environment and Climate Change Group Wildlife Emergencies and Biodiversity Regulation	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	20/9/2017: Replied with thanks	20/9/2017: No claims or objections to be assessed.	No response required	DELWP-002
			19/9/2017: Thanked Cooper Energy 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: Cooper Energy acknowledge confusion regarding point of contact and provided clarity as requested	19/9/2017: Cooper Energy 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.	DELWP-001
AMOSC	Oil Spill Response Organisation Review and comment on Cooper Energy	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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	20/9/2017: Cooper apologized for not removing the sentence regarding distribution from the covering email.	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 wells to	AMOSC-001

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	Offshore Victorian Oil Pollution Emergency Plan (OPEP) reviewer	Cooper Energy maintains an Associate Membership with AMOSC	with Cooper AMOSC's resources and processes and comment on the same.	No issue with comments provided	supplement the already AMOSC reviewed OPEP. AMOSC reviewed the FSP and provided feedback 28/9 which has been incorporated. Cooper Energy to issue Sole pipelay OPEP for review when completed	
Department of the Environment and Energy	Commonwealth Department formally overseeing offshore petroleum activities.	Offshore Campaign Stakeholder Information brochure.	19/9/2017 - Generic response: Requested all information be via NOPSEMA. Provided links to further guidance material.	Cooper Energy acknowledge the advice from DOE.	19/9/2017: Cooper Energy 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.	DOEE-001
DEDJTR Victorian Fishery Authority (VFA)	Department of Economic Development, Jobs, Transport and Resources Peak State Fisheries body	14/10/2015: Initial introductory meeting and presentation on Sole Development Project	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	No claims or objections to be assessed.	Information was sent to FV on 31/10/206 for dissemination to fishers (Summer 2016 Brochure)	VFA-001

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	Regulator offshore to 3mn Victorian coastal Waters		could send out information (e.g. a letter and brochure) to the potentially affected licence holders on Santos' behalf.			
		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information 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: Cooper Energy acknowledged request and will update database 9/10/2017: Cooper Energy reverted back to VFA to request whether ALL correspondence now goes to Bill and whether they were using new email addresses. 10/102017: Cooper Energy will ensure all correspondence goes to Bill Lussier and that the VFA emails will be used.	VFA-002
Geoscience Australia		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	19/9/2017: Out of office reply, but that she has access to emails	No claims or objections to be assessed.	No response required	GA-001
Australian Oceanographic	Oil and Gas Fishery Liaison	19/9/2017– emailed 2018 Offshore	22/9/2017: Dr. Levings outlined his experience in O&G, fishing,	no adverse claim or objection to assess.	22/9/2017: Cooper Energy acknowledged Dr. Levings but	AOS-001 AOS-002

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Services Pty Ltd (Dr Andrew Levings)		Campaign Stakeholder Information brochure. 5/10/2017: Telephone call with Dr Levings and Cooper 31/10/2017: Telephone call with Dr Levings and Coop	energy transmission and provision of services and requested opportunity to talk that day. 23/9/2017: Agreed talks can wait. Dr. Levings talked with Cooper Energy 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 Cooper Energy management. 31/10: Cooper Energy 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.	Cooper Energy acknowledge possible use of vessels	stated that the Cooper Energy liaison would be out of the country until the 12th and requested that the discussion be delayed. 23/9/2017: Cooper Energy agreed that use of fishing vessels where possible has merit as builds good relations. Confirmed will be in touch on return. 5/10/2017: Cooper Energy stated they would consider the use of the vessels if they were appropriate. 31/10/2017: Cooper Energy to assess the possibility and opportunity of using the local boats where possible. Dr Levings will be contacted if his services/ vessels are required.	
Department of Agriculture and Water		19/9/2017– emailed 2018 Offshore Campaign	20/9/2017: Auto reply outlining requirements for vessels entering Australian waters to	No claims or objections to be assessed.	20/9/2017: No response required as automated reply. Information provided shall be	MNCC-001

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Resources - MNCC		Stakeholder Information brochure.	enter info in 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		included in subsequent EPs as necessary	
National Native Title Tribunal		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	20/9/2017. email from Steve Edwards stating that there were no registered claims over the area of proposed activities. However, stated that for	No claims or objections to be assessed.	5/10/2017: Cooper Energy acknowledged that no registered native title claims or determined native title claims appear to overlap the	NNTT-001

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			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	Unlikely to be affected by offshore drilling activities at Sole	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. Cooper Energy also acknowledge that the Tribunal cannot comment any further on the activities. NTSV sent flyer on 9/10/17. 5/10/17 - Cooper Energy thanked NNTT for the assistance and that the maps were reviewed.	
Parks Victoria	Marine Park	19/9/2017– emailed 2018 Offshore Campaign	19/9/2017: automated response email	No claims or objections to be assessed.	No response required	PV-001

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		Stakeholder Information brochure.				
Dallas Barrett	Prawn Fisherman – Lakes Entrance	9/9/2017 - Phone conversation as a result of SMS messages from SETFIA (8/9) re HDD works commencing and request to avoid area	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	Cooper Energy acknowledge the fisherman as a relevant stakeholder although outside scope of the EP as related to HDD.	Cooper Energy 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 Cooper Energy 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	DB-001

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South-East Trawl Fishing Industry Association	Peak Industry Group for Trawl Fishermen in the SE Region Interests: Activity Notifications Increased impacts that may affect upcoming FIS	15/10/2015 Meeting with SETFIA and LEFCOL	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	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	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-01

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			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	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		

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				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.		
		12/7/2016 Meeting with SETFIA and LEFCOL	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 considered an effective tool. agreed that it was too early to discuss timing in detail and that Santos would keep in	SETFIA-02 SETFIA-02a

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					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.	
		2/2/2017 Telephone call with SETFIA	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.	SETFIA-03
		22/5/2017 Meeting with SETFIA and LEFCOL	Project update provided. Indicative timing that pipelay will start after 1st Sept to avoid FIS. SB intends to use SMS messaging for information dissemination. Cooper Energy	No claims or objections to be assessed.	Cooper Energy 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	SETFIA-04 SETFIA-04a

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			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.		them in the loop and up to date with any key project decisions / changes. This is a part of the ongoing stakeholder consultation plan.	
		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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	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. Cooper Energy are not undertaking seismic activities. Cooper have assessed that the offshore	28/9/2017: Cooper Energy 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	SETFIA-05 SETFIA-05a

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			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.	activities will not negatively impact the FIS.	objections emailed. Cooper Energy 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	

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					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: Cooper Energy replied with thanks and that the issues would be discussed in the meeting on the 17th.	
		17/10/2017 Meeting with SETFIA	Cooper Energy introduced new Stakeholder Liaison. SETFIA pleased that Cooper Energy have single POC. Confirmed FIS July and Aug 2018. Cooper Energy provided overview of offshore activities as outlined in Sept brochure and that small 1-day survey to occur in State	No claims or objections to be assessed.	17/10/2017: Cooper Energy will continue to keep SETFIA informed of all activities and send SMS as required for notifications. Cooper Energy requested information on possible co-funding research programs	SETFIA-06

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			waters. Overview of upcoming GVI provided. Cooper Energy again confirmed pipeline to be trawlable. Discussion regarding SETFIA letter objecting to offshore campaign. SETFIA confirmed main concerns are seismic and not Cooper Energy 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 Cooper Energy confirmed appropriate controls will be in place. Communications still to be via SMS. Just needs simple specific info. Discussions regarding community involvement, jobs for		from SETFIA. No information provided to date. Cooper Energy will likely not have a person at Lakes Entrance, but regular visits will occur. This will be made known to SETFIA.	

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			local industry and possible research program co-funding. Queries if Cooper Energy 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.			
		6/11/2017: Draft Minutes of Meeting	9/11/2017: SETFIA supplied clarification on minutes – most notable that Not sure industry has "no issue" but I would say we are comfortable and that Cooper Energy are minimising their effects for now.	Cooper Energy acknowledge the suggestions and that SETFIA are comfortable for now. Cooper Energy will continue working closely with SETFIA	9/11/2018: Altered Minutes appropriately and reissued.	SETFIA-007 SETFIA-007att

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Seafood Industry Victoria	Peak Industry Body for Victorian seafood and fisheries	19/11/2015: Initial introductory meeting and presentation on Sole Development Project	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)	SIV-001a
		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information 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	SIV-001
			19/9/2017: Johnathon Davey responded requesting when feedback is required as they would like to discuss this and sit down and work through an appropriate approach to	No assessment required	19/9/2017: Cooper Energy 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	SIV-002

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			consulting with the fishing industry of Victoria.		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	
		16/10/2017: Meeting with SIV	16/10/17: Confirmed SIV represented all commercial fishers, including LEFCOL, in State and was the best means of contacting all fishers. Cooper Energy can send out info via Quarterly Profish magazine for fee SIV always on road and may be opportunity for Cooper Energy to join in meetings Discussion was held regarding ongoing consultation and the monitoring of feedback. Cooper stated that on a regular basis	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. 31/10/17 – Cooper Energy acknowledge changes to minutes	Most discussion points addressed during meeting. Cooper Energy to review the possibility of sending information in the Profish magazine For operations phase Cooper Energy to review reducing exclusion zones, however for safety, integrity and to protect fishers, the 500 m PSZ is preferred. During	SIV-003 SIV-003 att

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			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. 31/10/2017 – SIV suggested changes to minutes and that		construction, 500m is required for safety. Any changes will be recorded in relevant EP and made known to SIV. 31/10/17 – Cooper Energy acknowledge changes to minutes and updated and resent minutes to SIV	

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			updated contact list will be provided when complete			
		2/2/2018– emailed Feb 2018 Offshore Campaign Stakeholder Information brochure.	2/2/2018: Has this been sent more broadly to the Victorian Fishing Industry? How would you like me to ensure they are consulted?	No claim or objection to be assessed	20/2/2018: Cooper Energy confirmed that brochure had been disseminated to relevant parties.	SIV-004
		26/6/2018 – phone call	Discussion re BMG (outside scope of EP) Discussed placing Sole infrastructure into fishing plotters FIS not occurring in 2018 and unlikely to occur again (not yet confirmed).	No claim or objection to be assessed	Regardless of cancellation of 2018 FIS, Sole activities would not have affected survey as they were outside the required timeframe (Sole activities commencing after Sept 2018). No activities planned for 2020. Cooper to determine need to update plotters with Sole infrastructure.	SIV-005
Southern Cross Cable Network		19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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: Cooper Energy sent thanks and offer for more info if required.	SCC-001

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Southern Shark Industry Alliance	Peak Group for Gummy Shark fishing southern Australia	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	20/9/2017: Auto reply	no assessment required	no action required SSIA members are contacted also via SETFIA and SIV	SSI5-001
Marine Border Control	Integrated defence/customs organisation which provides security for offshore marine areas	2017.10.10 – emailed 2018 Offshore Campaign Stakeholder Information brochure.	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: Cooper Energy replied with thanks	MBC-001
Department of Communications and the Arts Submarine Cables Team	Submarine Cables Team	19/9/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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: Cooper Energy replied with thanks and questioned whether the department still wanted to receive updates since their assets were not in the vicinity	SUB-001
Department of Defence	Defence activities may overlap	19/9/2017– emailed 2018 Offshore Campaign	20/10/2017: Defence has reviewed the proposed activities and has no objections.	no assessment required	Cooper Energy will continue to send DoD notices	DOD-001

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		Stakeholder Information brochure.				
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Fishing activities within area	27/10/2017– emailed 2018 Offshore Campaign Stakeholder Information brochure.	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	Cooper Energy will continue to send ASBTIA notices	ASBTIA-001
Dallas Barrett	Prawn Fisherman – Lakes Entrance	9/9/2017 - Phone conversation as a result of SMS messages from SETFIA (8/9) re HDD works commencing and request to avoid area	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	Cooper Energy acknowledge the fisherman as a relevant stakeholder although outside scope of the EP as related to HDD.	Cooper Energy 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 Cooper Energy have had consultation with the fishing industry with LEFCOL/SETFIA	DB-001

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			that frond mats washing up from previous works		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)	Peak body	2/11/2015: Initial introductory meeting and presentation on Sole Development Project	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 to be assessed	LEFCOL and SIV have been contacted. CFA continues to receive copies of all notices	CFA-001
Transport Safety Victoria	Maritime safety	2/2/2018 – February 2018 information brochure	2/2/2018: stated that is Cooper Energy require exclusion zones or NtM for State waters to contact the department	No claim or objections to be assessed. Not within scope of the EP	Cooper Energy clarified that activities for wells were in Commonwealth waters and so did not require state NtM.	TSV-001

9 References

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