



AC/P-21 GEOTECHNICAL & GEOPHYSICAL ENVIRONMENT PLAN SUMMARY

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1. INTRODUCTION

Eni Australia Limited (Eni) proposes to undertake a geotechnical and geophysical survey in the Vulcan Sub-basin of the Bonaparte Basin off the north-western coast of Australia, approximately 687 km west of Darwin (Figure 2.1). The geotechnical and geophysical scope will be carried out to support a proposed drilling campaign at Numisia-1, located in water depth of approximately 105 m.

An Environment Plan (EP) for this geotechnical and geophysical survey was prepared in accordance with the requirements of the Offshore Petroleum & Greenhouse Gas (Environment) Regulations 2009 (OPGG(E) Regulations). The EP was reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in November 2013. This EP summary document has been prepared and submitted to NOPSEMA in accordance with Regulation 11(7) of the OPGGS(E) Regulations.


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2. LOCATION OF ACTIVITY

Eni propose to undertake the geotechnical and geophysical investigation of Permit Area AC/P-21 located, approximately 287 km north-west of the Kimberley coast and 687 km west of Darwin. The coordinates and water depth are shown in Figure 2.1 and provided in Table 2.1 below.

Table 2.1: Indicative geographical coordinates of Numisia-1 well location that will be surveyed

Well Site	Latitude	Longitude	Water Depth
Numisia-1	12° 15' 07.54" S	124° 33' 05.95" E	105 m

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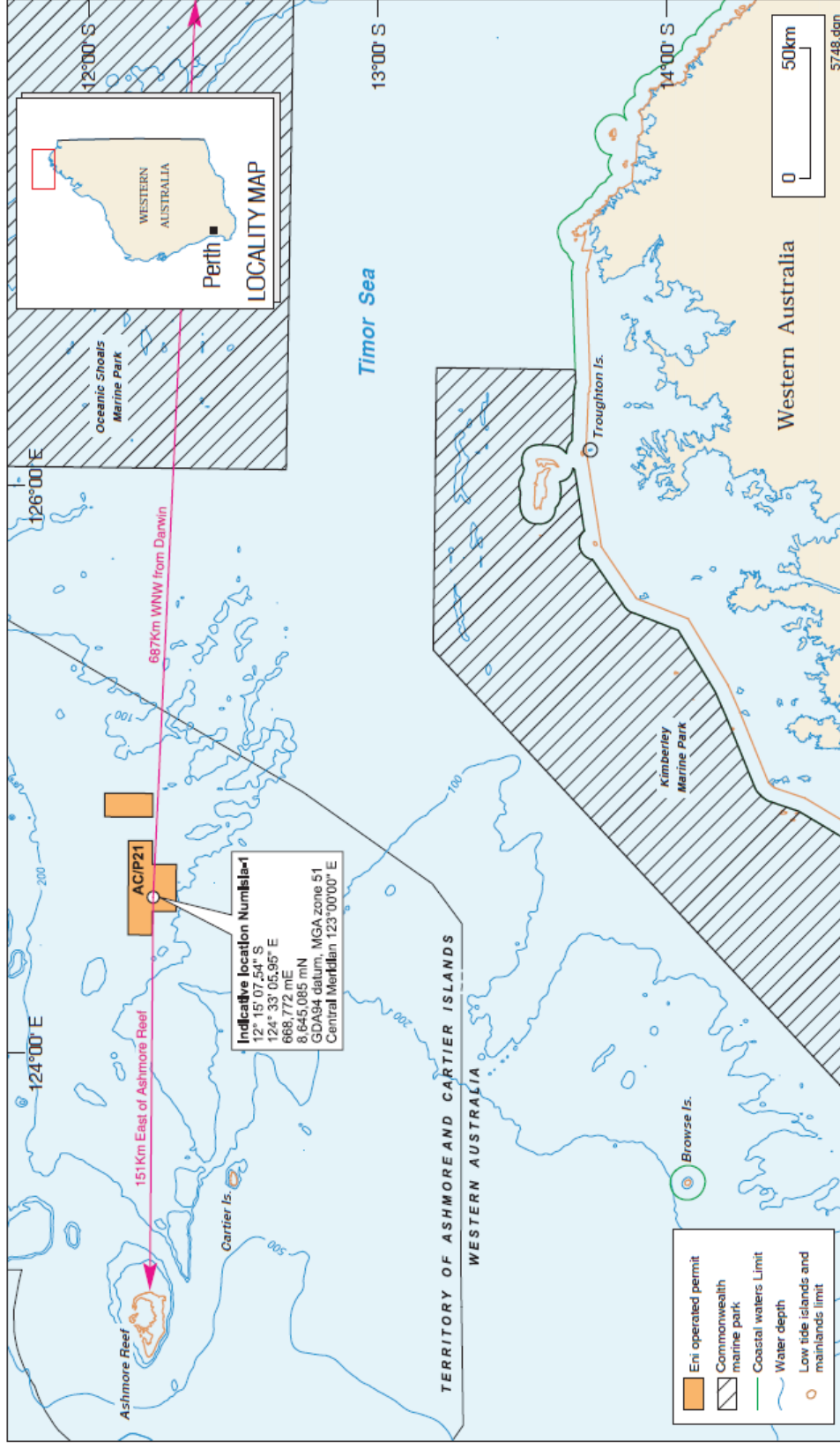



Figure 2.1: Numisia-1 AC/P-21 Permit Area and survey location map with coastal and marine features

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3. DESCRIPTION OF ACTIVITY

The surveys are expected to occur in the fourth quarter of 2013 or early 2014, subject to availability of a suitable vessel and support equipment. Table 3.1 summarises the survey durations.

Table 3.1: Survey number of days


Survey	Mobilisation	Survey	Demobilisation
• Geotechnical	• 2 days	• 3 days	• 1-2 days
• Geophysical	• 2 days	• 4 days	• 1 day

The geotechnical survey will comprise the following activities:

- drilling from a seabed mounted drill rig;
- coring;
- in-sampling via a Cone Penetration Test (CPT); and
- grab sampling.

The geophysical survey will comprise the following activities:

- sidescan sonar survey;
- multi-beam echo sounder survey;
- single-beam echo sounder survey;
- sub-bottom profiling survey (seismic reflection); and
- digital seismic data.

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4. DESCRIPTION OF RECEIVING ENVIRONMENT

4.1 Physical Environment

The Permit Area falls within the North-west Marine Region in the Timor Sea (DEWHA 2008a). The region has a tropical monsoon climate with two distinct seasons, a wet summer season from October to March, followed by a dry winter season from April to September. Average air temperatures in the region range from 22°C up to 33°C (based on Troughton Island data, BOM 2011).

Winds during the wet summer season are predominantly from the west and during the dry winter season from the south-east. The wet season is characterised by monsoonal thunderstorms and tropical cyclones bringing heavy rainfall to the region, and south-easterly trade winds bringing hot dry conditions during the dry season (DEWHA 2008a). The region is affected by cyclones at an average annual rate of 0.6 cyclones per year.

The Timor Sea experiences a mixed semidiurnal tide with a large range and correspondingly strong tidal currents (DEWHA 2008b; Przeslawski et al. 2011). Regional thermohaline currents also occur in the region. Typically when the north-west monsoon terminates in March, a strong westerly current forms off the shelf edge, called the Holloway Current (or extended Leeuwin Current; DEWHA 2008b). The Holloway Current typically persists until December, when the northwest monsoon recommences.


Due to the region being influenced by a complex system of ocean currents that change between seasons and between years, the result is generally warm, nutrient-poor surface waters with low salinity (DEWHA 2008b).

4.2 Biological Environment

The North-west Marine Region covers almost 1.07 million km² and includes a diverse range of tropical and sub-tropical marine environments, such as the Commonwealth waters surrounding and adjacent to the Rowley Shoals, shoals and pinnacles on the North West Shelf.

4.2.1 Continental Shelf

Sampling by consultants (CEE 2001) in the Permit Area found that the seabed was characterised by flat, white sediments with a sparse fauna of brittle stars, hermit crabs, solitary corals and holothuroids (sea cucumbers). Infauna (animals living within the sediments) were also sparse, comprising polychaetes, brittle stars and small crustaceans. Similarly, LeProvost, Dames and Moore (2000) describes a sparse infauna dominated by worms, bivalves and small crustaceans in the vicinity of Challis Venture (located to the east of the proposed well). No epibenthic organisms were observed. LeProvost, Dames and Moore (2000) related the low faunal abundance to the sandy nature of the seabed.

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4.2.2 Shoals

The closest areas of regional environmental significance are the sea mounts, banks, shoals and reefs associated with the edge of the continental shelf. These areas are considered of ecological significance due to their regional uniqueness and their patchy distribution in an otherwise broad area of featureless seafloor. Shoals in the region are listed below.

- Barracouta Shoals (approximately 66 km to the south-west of the proposed Numisia-1 survey location);
- Vulcan Shoal (approximately 66 km to the south of the proposed Numisia-1 survey location); and
- Eugene McDermott Shoal (approximately 91 km to the south of the proposed Numisia-1 survey location).

4.2.3 Intertidal Reefs and Islands

The most sensitive marine habitats in the region are the intertidal coral reefs and islands that occur to the west of the Permit Area: Cartier Island, Ashmore Reef and Hibernia Reef. The closest of these, Cartier Island, is located approximately 110 km west of the proposed Numisia-1 survey site.


Cartier Island, located 114 km west of the survey area, is a small oval shaped reef platform which rises steeply out of a depth of about 180 m. The island, reef and associated waters within a 4 nm radius of the island, has been declared a Marine Reserve to be managed as an International Union for Conservation of Nature Category 1A protected area. They are considered an important biological stepping stone between the reefs of Indonesia and the Philippines and those along the Western Australian coast. In particular, the area provides substantial feeding and breeding habitat for turtles.

Ashmore Reef, located 156 km west of the survey area, is an extensive 150 km² reef complex containing lagoons, large areas of drying flats, sand banks and limestone platform and three vegetated sandy cays: West Islet (32 ha), Middle Islet (13 ha) and East Islet (16 ha). The islands provide nesting grounds for thousands of seabirds and sea turtles and the lagoons contain seagrasses which support turtles and dugong. A wide range of cetaceans, including the humpback whale have been recorded near the reef, as have whale sharks. Ashmore Reef is a declared National Nature Reserve.

Given the nature of the proposed activity and distance to these locations, it is considered unlikely that there will be any impact on these intertidal reefs and islands.

4.2.4 Matters of National Environmental Significance

A review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database (Protected Matters Search Tool) (October 2013) identified a number of listed threatened and migratory species could occur in the offshore waters surrounding the permit area, including:

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- Two birds, with one listed as vulnerable;
- Seven marine mammals, including six whale and one dolphin species, with one listed as endangered (Blue Whale) and one vulnerable (Humpback Whale);
- Six turtles, with three listed as endangered (Loggerhead, Leatherback, Olive Ridley) and three listed as vulnerable (Hawksbill, Flatback, Green Turtle); and
- Three sharks, with one listed as vulnerable (Whale Shark).

A number of other matters protected under the EPBC Act, but not considered to be threatened, may also occur in Permit Area AC/P-21. These include 31 listed species of fish (predominantly pipefish and seahorses), 13 reptiles (seasnakes), dugongs, and 16 species of whales and dolphins.

4.3 Socio-economic environment

4.3.1 Commercial Fisheries

A number of State and Commonwealth commercial fisheries exist in the Timor Sea. Of those identified, only one was determined to be present and active in the vicinity of the survey location.

4.3.2 Commercial Shipping

Vessels involved in the survey will most likely travel to the Permit Area from Darwin.


There are no major commercial shipping lanes through the Permit Area AC/P-21. Traffic in the Permit Area is limited to infrequent visits by fisheries whose boats are typically 13-25 m in length. AMSA were consulted about the proposed geotechnical operations and their coordinate searches have indicated that there is no major commercial shipping in the vicinity of the survey site.

4.3.3 Tourism/Recreational Fishing

The Permit Area is located in offshore waters that are not likely to be accessed for tourism activities (recreational fishing and boating and charter boats operations), which tend to be focussed around nearshore waters, islands and coastal areas. Apart from the possibility of an occasional passing private motor vessels or yachts, there are no known tourism interests in the area.

4.3.4 Defence Activities

Boarder Protection Command patrols the waters for illegal fishing, prohibited imports and exports, quarantine threats and illegal activity in the Marine reserves. The Headquarters Northern Command is the principal military element of Boarder Protection and is located in Darwin (DEWHA 2008a). They control military operations in Northern Australia. There are two defence training areas in the North Marine Region, to the north and west of Darwin both of which are well away from the Permit Area.

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4.3.5 Petroleum Activities

The North-west Marine Region and North Marine Region are highly prospective petroleum regions and contain a number of known oil and gas fields. There have been five production areas in the Bonaparte Basin these include:

- PTTEP Australian operated FPSO facilities at the Challis-Cassini and Jabiru oil fields in the Vulcan Sub-basin. Operations commenced in 1986 and was abandoned in 2010;
- Woodside Energy Ltd operated FPSO facility at Laminaria-Corallina oil fields commencing in 1999;
- Eni operated Kitan oil field commencing in 2011;
- ConocoPhillips Australia Pty Ltd operated Bayu-Undan gas field commenced in 2004; and
- Eni operated Blacktip gas field.

Additionally there are liquefied natural gas (LNG) developments being planned in the Bonaparte Basin. These include:

- Frigate Deep, Petrel and Tern gas fields;
- Sunrise and Troubadour gas fields undertaken by Woodside and ConocoPhillips, Shell and Osaka Gas; and
- Cash-Maple and Oliver gasfield floating LNG facility by Linde Group and SBM Offshore, PTT FLNG Ltd and PTTEP Australasia.

4.4 Conservation Interests

4.4.1 National Heritage Places


There are no National Heritage Places within the Permit Area

4.4.2 Commonwealth Marine Areas

A Commonwealth Marine Area is any part of the sea, including the water, seabed, and airspace, within Australia's exclusive economic zone (EEZ) and/or over the continental shelf of Australia that is not State or Northern Territory waters. The Permit Area lies within the EEZ and Territorial Sea.

4.4.3 Marine Protected Areas

No marine protected areas were identified within or close to the Permit Area.

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5. ENVIRONMENTAL RISK ASSESSMENT

All risks were assessed using Eni's using *Risk Management and Hazard Identification* procedure (ENI-HSE-PR-001) and associated environmental risk matrix. With controls in place, all risks were ranked as Low and therefore deemed acceptable. The following table summarises key aspects associated with the proposed drilling program and the control measures that will be implemented to prevent or reduce impacts to as low as reasonably practicable (ALARP).

The environmental hazards and control measures to be applied are summarised in Table 5.1




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Table 5.1: Summary of environmental hazards and control measures to be applied


Source of risk	Potential impact	Control measure
<i>Disturbance to marine fauna</i>		
Noise/ vibration	<ul style="list-style-type: none"> Localised or temporary physiological effects or disruption to marine megafauna's behavior patterns. 	<ul style="list-style-type: none"> Awareness of vessel and survey crew during operations including pre-start inspections for cetaceans prior to surveys commencing. For all acoustic sources (other than seismic)—application of a precautionary 300 m shut down zone for marine megafauna. Compliance with EBPC Policy Statement 2.1—<i>Interaction between offshore seismic exploration and whales</i>.
Seabed disturbance	<ul style="list-style-type: none"> Localised or temporary disturbance to benthic habitats. 	<ul style="list-style-type: none"> Prior to arrival to site and deployment, available seabed information will be reviewed
Vessel movements causing injury to marine megafauna	<ul style="list-style-type: none"> Injury or death of marine fauna from vessel strikes. 	<p><i>All opportunistic sightings of whales will be recorded by the Eni offshore representative and forwarded to SEWPaC.</i></p> <ul style="list-style-type: none"> Compliance with the National Standards for vessels (Tier 1) in the Australian National Guidelines for Whale and Dolphin Watching (DEH 2005). Interaction (with cetaceans) to be consistent with EPBC Regulations 2000 – Part 8 Division 8.1, Regulation 8.05.
Light	<ul style="list-style-type: none"> Localised/temporary attraction of fauna to vessel during the survey 	<ul style="list-style-type: none"> Should any cetaceans or relevant megafauna be observed in the vicinity of operational vessels, all necessary care to avoid collisions will be taken. Vessels will comply with maritime guidelines and standards associated with safety and navigational requirements.
Biofouled vessels entering the field—introduction of marine pests	<ul style="list-style-type: none"> Establishment of NIMS causing displacement and/or loss of native species and reduction in biodiversity. 	<ul style="list-style-type: none"> Vessels will adhere to the IMO 'Guidelines for the Control and Management of Ships' Biofouling' 2012. Biofouling records will be maintained onboard all vessels.

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Source of risk	Potential impact	Control measure
<i>Discharges</i>		
Discharge of drilling fluid and cuttings	<ul style="list-style-type: none"> Localised/temporary reduction in water quality. Localised/temporary disturbance to benthic habitats. 	<ul style="list-style-type: none"> Small volume of drill cuttings expected to be generated Guar gum may be used – it is considered to Pose Little or No Risk to the Environment (PLONOR)
<i>Solid and hazardous waste</i>		
Sewage, grey water and putrescible wastes	<ul style="list-style-type: none"> Localised reduction in water quality. Localised nutrient enrichment of the receiving water. 	<ul style="list-style-type: none"> Vessels will comply with MARPOL 73/78 Annex IV and V (Prevention of pollution by garbage from ships). Vessels will comply with Annex IV, Navigation Act 1912 Part IV Division 12C and Protection of the Sea (Prevention of Pollution by Ships) Act 1983 Part IIIB - Division 2.
<i>Atmospheric emissions</i>		
Emissions of air pollutants	<ul style="list-style-type: none"> Localised effect on air quality (from BTEX, NO_x and SO_x) and global contribution to greenhouse effect. 	<p>All vessels will:</p> <ul style="list-style-type: none"> Comply with the MARPOL 73/78 Annex VI. Use low sulphur fuel (to minimise SOX emissions) where available. Hold a current IAPP Certificate. Have a routine inspection/ maintenance schedule of combustion equipment.

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Source of risk	Potential impact	Control measure
<i>Socio-economics</i>		
Collision with other vessels or entanglement in fishing gear	<ul style="list-style-type: none"> Disturbance to commercial shipping vessel routes. Disruption to commercial and recreational fishing vessel activities. Entanglement of trawling equipment on seabed infrastructure. 	<ul style="list-style-type: none"> Consultation with relevant stakeholders conducted in accordance with OPGGS (E) Regulation. Consultation with AMSA prior to commencement of survey. Appropriate navigation lights and markers will be displayed. AMSA Marine Orders Part 30: Prevention of Collisions will apply. Notices to Mariners will be issued. The distress channel will be communicated with mariners prior to the commencement of operations. As far as feasible and practical, all dropped objects that are considered to pose a potential risk to navigation and to fishing activities will be recovered and records of equipment lost overboard to be maintained.
<i>Uncontrolled events</i>		
Accidental discharge of waste into the marine environment.	<ul style="list-style-type: none"> Acute or chronic effects to marine fauna. Reduction in water quality. 	<ul style="list-style-type: none"> Induction of all personnel to include information on waste management procedures. Good housekeeping practices, including signage and appropriate segregation of wastes will be in place. Effective containment of wastes, including netting and/or covers for open waste containers. Vessels >100 tonnes (or certified for >15 persons onboard) will have a Waste Management Plan, in accordance with MARPOL 73/78. Vessels >400 tonnes (or certified for >15 persons onboard) will have a Garbage Record Book, in accordance with MARPOL 73/78.

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Source of risk	Potential impact	Control measure
Vessel collision resulting in fuel tank rupture and release of diesel (spill – maximum 80 m ³ assumes a rupture of a storage tank from a vessel released over six hours).	<ul style="list-style-type: none"> Acute or chronic toxic effects to marine biota. Reduction in water quality. 	<ul style="list-style-type: none"> Vessels comply with standard maritime safe operations with specific reference to AMSA Marine Orders Part 30: Prevention of Collisions. Vessels navigation aids and competent crew maintaining 24 hour visual, radio and radar watch for other vessels. Radio warnings to mariners as required. Notices to Mariners issued. Vessels have approved SOPEP. AMSA to be notified immediately in the event of a spill to ensure rapid mobilisation of response plans.
Accidental overboard release of hydrocarbon and/or non-hydrocarbon chemical contaminated deck drainage into marine environment.	<ul style="list-style-type: none"> Localised acute or chronic toxic effects to marine biota. Localised reduction in water quality. 	<ul style="list-style-type: none"> Bunding is present around all rotating equipment and all machinery containing hydrocarbon products (e.g. refuelling points). Hazardous and non-hazardous chemicals are stored and banded separately and drainage for banded areas has separate drainage collection. Use of drip trays in unbanded areas where necessary to contain drips or leaks. Spill kits contents are checked as per CMMS and restocked after usage. Personnel are trained in oil spill equipment usage and response. Strict housekeeping procedures are adhered to, and the decks of all vessels are kept clean and tidy and all spills are cleaned up immediately. Vessel includes testing of the oily water detection meter and testing and maintenance of the OIW separator in accordance with manufacturer's specifications and MARPOL 73/78 Annex I requirements. Discharge of bilge water in line with MARPOL 73/78, Annex I.
Release of hydraulic fluid into the marine environment	<ul style="list-style-type: none"> Localised/temporary reduction in water quality. 	<ul style="list-style-type: none"> Routine maintenance and checks on the ROV and associated lifting equipment. Loss of pressure will trigger the fail safe resulting in the pumps shutting down to minimise the spill.

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6. OVERALL MANAGEMENT APPROACH

Eni is committed to achieving the highest practicable standard of environmental protection and this commitment is documented in the Eni Health, Safety and Environment (HSE) Policy. This policy is supported by Eni's ISO14001:2004 certified HSE Integrated Management System (IMS) which provides audited assurance of a best practice environmental management system based on continual improvement. The following plans have been developed to manage the risks described in this summary:

- AC/P-21 Numisia-1 Geotechnical & Geophysical Environment Plan (NUM1_HSE_W_WE.0002); and
- AC/P-21 Numisia-1 Drilling Oil Spill Contingency Plan (NUM1-HSE-W-CS-0004).

Eni conducts operations in accordance with the above internal policies and management systems. In addition to implementing risk controls, the operation will comply with key requirements and legislation, including (but not limited to):

- Offshore Petroleum and Greenhouse Gas Storage Act 2006 and the associated OPGGS(E) Regulations;
- IMO 'Guidelines for the Control and Management of Ships' Biofouling' 2012
- MARPOL 73/78, as enacted under *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; and
- APPEA Code of Environmental Practice.


Specific responsibilities identified with respect to environmental management arrangements (i.e. control implementation) are assigned in the accepted EP's implementation strategy. This will help ensure that the environmental risks associated with the drilling program are maintained at a level which is ALARP.

Environmental performance objectives are defined for each environmental aspect. These objectives are monitored and reviewed against key performance standards to ensure environmental outcomes are achieved during the drilling program.


Monitoring of environment performance will be undertaken in a number of ways, including the use of the following tools and systems:

- Internal reporting, including daily (e.g. fuel inspection logs) and as required (e.g. waste manifest, incident reports etc.);
- External reporting, such as regulatory reporting (e.g. Well Environmental Report);
- Scheduled inspections; and
- Auditing and assurance of operating facilities.

Environment incidents will be investigated to identify prevention measures. Incidents will be reviewed to promote on-going environmental awareness. The relevant Regulator (i.e. NOPSEMA or AMSA) will be notified of all reportable incidents.

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All Eni and contractor personnel will receive training on their environmental responsibilities in connection with the survey program. The environmental induction will instruct personnel on the issues and management actions identified in the EP.


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7. CONSULTATION

Stakeholder assessment was undertaken to identify potentially affected and interested stakeholders based on the well location, proposed activities and timing.

A consultation fact sheet was sent electronically to all identified stakeholders prior to lodgement of the EP to NOPSEMA for assessment and approval. This was supported by engagement with potentially affected stakeholders, relevant regulators and industry associations.


Eni has not received any material concerns from stakeholders prior to or after lodgement of the Environment Plan for assessment and approval. Eni will continue to accept feedback from stakeholders during the survey program. During survey, regular Communications Bulletin will be issued to AMSA, defence and fisheries.

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8. CONTACT DETAILS

The nominated contact person for this proposal is:

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