



AC/P-21 NUMISIA-1 DRILLING ENVIRONMENT PLAN SUMMARY

| | | | | | | | | |
|---|-------------|----------|----------------------------|--------------|------------|---|---------------------|------------------|
| | 02 | 22/01/14 | Re-Issued for Use | TLU | RPH | MMCC | | |
| | 01 | 03/01/14 | Issued for Use | TLU | GEL | CWI | | |
| | 00 | 02/01/14 | Issued for Internal Review | TLU | | | | |
| Validity Status | Rev. Number | Date | Description | Prepared by | Checked by | Approved by | Contractor Approval | Company Approval |
| Revision index | | | | | | | | |
|  | | | | Project name | | Company identification | | |
| | | | | | | NUM1_HSE_W_WE.0008 Job N. _____ | | |
| | | | | | | Contractor identification | | |
| | | | | | | Contract _____ | | |
| (Vendor logo and business name) | | | | | | Vendor identification | | |
| | | | | | | Order N..... | | |
| Facility Name | | | Location | | Scale | | Sheet of Sheets | |
| NUMISIA-1 | | | Australia AC/P-21 | | 1:1 | | 1 / 25 | |
| Document Title | | | | | | Supersedes N..... | | |
| AC/P-21 NUMISIA-1 DRILLING ENVIRONMENT PLAN SUMMARY | | | | | | Superseded by N..... | | |
| | | | | | | Plant Area | | Plant Unit |

| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 2 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

REVISION HISTORY

| Rev. | Date | Nr. of sheets | Description |
|------|----------|---------------|----------------------------|
| 00 | 02/01/14 | 28 | Issued for Internal Review |
| 01 | 03/01/14 | 28 | Issued for Use |
| 02 | 22/01/14 | 25 | Re-Issued for Use |
| | | | |



| | | | | | |
|---|--|-------------------------------------|-------------|------|----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 3 / 25 |
| | | | Validity | Rev. | |
| | | | Status | No. | |
| | | | | 02 | |

TABLE OF CONTENTS

| | | |
|-----------|--|-----------|
| 1. | INTRODUCTION | 5 |
| 1.1 | Proposed Activity | 5 |
| 1.2 | Compliance | 5 |
| 1.3 | Location of Activity | 5 |
| 1.4 | Operator Contact Details | 5 |
| 2. | DESCRIPTION OF ACTIVITY | 7 |
| 3. | DESCRIPTION OF RECEIVING ENVIRONMENT | 8 |
| 3.1 | Physical Environment | 8 |
| 3.2 | Biological Environment | 8 |
| 3.2.1 | Continental Shelf | 8 |
| 3.2.2 | Shoals..... | 9 |
| 3.2.3 | Intertidal Reefs and Islands | 9 |
| 3.2.4 | Matters of National Environmental Significance | 9 |
| 3.3 | Socio-economic environment..... | 10 |
| 3.3.1 | Commercial Fisheries..... | 10 |
| 3.3.2 | Commercial Shipping..... | 10 |
| 3.3.3 | Tourism/Recreational Fishing | 10 |
| 3.3.4 | Defence Activities | 10 |
| 3.3.5 | Petroleum Activities..... | 11 |
| 3.4 | Conservation Interests | 11 |
| 3.4.1 | National Heritage Places | 11 |
| 3.4.2 | Commonwealth Marine Areas..... | 11 |
| 3.4.3 | Marine Protected Areas | 11 |
| 4. | ENVIRONMENTAL RISK ASSESSMENT | 12 |
| 5. | OIL SPILL RESPONSE STRATEGIES | 20 |
| 5.1 | Properties of Hydrocarbon..... | 20 |
| 5.2 | Spill scenarios and response strategies..... | 20 |
| 6. | OVERALL MANAGEMENT APPROACH | 23 |
| 7. | CONSULTATION | 24 |
| 8. | REFERENCES | 25 |


| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 4 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

TABLES

| | | |
|------------|--|----|
| Table 2.1: | Indicative geographical coordinates of Numisia-1 exploration well location | 5 |
| Table 2.1: | Indicative geographical coordinates of Numisia-1 exploration well location | 7 |
| Table 5.1: | Summary of environmental hazards and control measures to be applied..... | 13 |
| Table 6.1: | Definition of spill tiers | 20 |
| Table 6.2: | Summary of oil response strategies | 21 |
| Table 6.3: | Summary of impacts associated with implementation of response strategy | 21 |

FIGURES

| | | |
|-------------|--|---|
| Figure 2.1: | Numisia-1 AC/P-21 Permit Area and well location map with coastal and marine features | 6 |
|-------------|--|---|

| | | | | | |
|--|--|-------------------------------------|-------------|------|----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 5 / 25 |
| | | | Validity | Rev. | |
| | | | Status | No. | |
| | | | | 02 | |

1. INTRODUCTION

1.1 Proposed Activity

Eni Australia Limited (Eni) proposes to drill the Numisia-1 exploration well in Exploration Permit AC/P-21 in the Timor Sea off the northern Australian coast, approximately 567 km north-north-west of Derby, Western Australia (WA) (Figure 1.1). The drilling campaign will be carried out using a jack-up Mobile Offshore Drilling Unit (MODU) suited to the depth, location profile and drilling objectives.

1.2 Compliance

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

1.3 Location of Activity

Numisia-1 is in Exploration Permit AC/P-21 in the Timor Sea, approximately 287 km north-west of the west Kimberley coast and 567 km north-north-west of Derby. The indicative coordinates and depth of the well are provided in Table 1.1 below.


Table 1.1: Indicative geographical coordinates of Numisia-1 exploration well location

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

1.4 Operator Contact Details

The nominated contact person for this proposal is:

Attention: Mr Rob Phillips
Senior Environmental Advisor
Eni Australia Ltd
226 Adelaide Terrace
Perth WA 6000
Tel: (08) 9320 1541
Fax : (08) 9320 1100
Email: rob.phillips@eniaustralia.com.au

| | | | | | |
|---|---------------------------------|-------------------------------|-----------------|----------|---------------------------|
|  | Company document identification | Owner document identification | Rev.index | | Sheet of sheets 6 / 25 |
| | NUM1_HSE_W_WE.0008 | | Validity Status | Rev. No. | |
| | | | | 02 | |

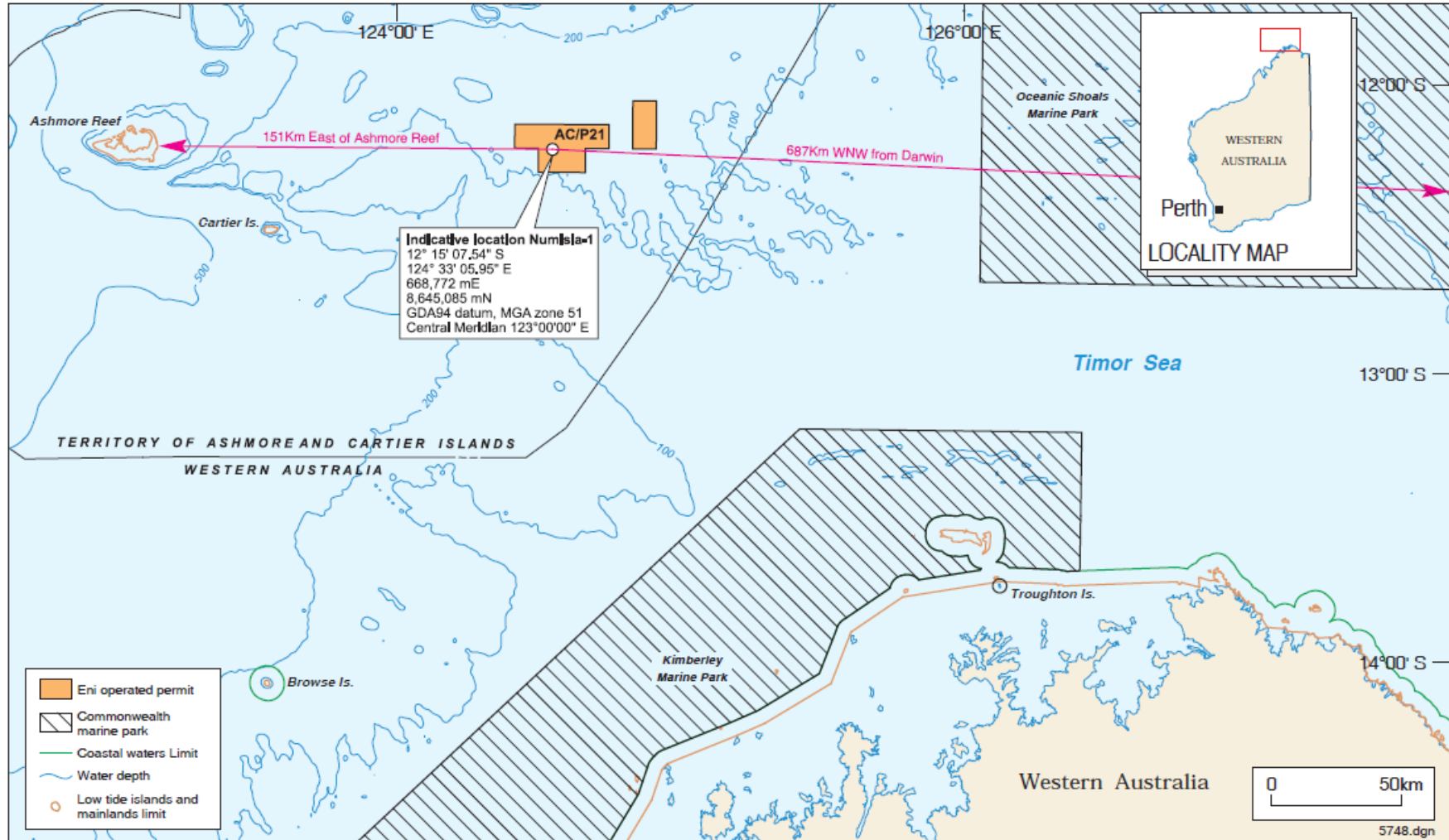



Figure 1.1: Numisia-1 AC/P-21 Permit Area and well location map with coastal and marine features

| | | | | | |
|---|--|-------------------------------------|--------------------|-------------|----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 7 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

2. DESCRIPTION OF ACTIVITY


Numisia-1 well is expected to be drilled in mid-2014. Indicative coordinates and depth of the well are provided in Table 1.1 below.

Table 2.1: Indicative geographical coordinates of Numisia-1 exploration well location

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

The drilling program will comprise the following activities:

- Mobilisation to Permit Area AC/P-21.
- Position the MODU, water depth ~105 m lowest astronomical tide (LAT).
- Drill 914 mm (36") hole to depth of ~ 185 m (measured from the drilling rig rotary table (RT). RT is 35 m above LAT). Drilling fluid: seawater. Returns: to seabed.
- Run and cement 16 joints of 762 mm (30") conductor.
- Nipple up low pressure riser and diverter.
- Drill 311 mm (12¼") hole to depth of ~1,905 m (measured from the drilling rig RT). Drilling fluid: seawater and Pre-Hydrated Gel (PHG). Returns: to drilling rig.
- Run and cement 167 joints of 244 mm (9⅝") casing.
- Nipple up Blowout Preventer (BOP).
- Drill 216 mm (8½") hole to depth of ~2,185 m (measured from the drilling rig RT). Drilling fluid: water based mud (WBM) (KCl polymer). Returns: to drilling rig.
- Wireline logs.
- Plug and abandon.
- Contingent – if hydrocarbons are discovered:
 - Well test
 - Plug and abandon.

| | | | | | |
|---|--|-------------------------------------|--------------------|-------------|----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 8 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

3. DESCRIPTION OF RECEIVING ENVIRONMENT

3.1 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).

3.2 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.

3.2.1 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.

| | | | | | |
|---|--|-------------------------------------|--------------------|-------------|----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 9 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

3.2.2 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 Permit Area);
- Vulcan Shoal (approximately 66 km to the south of the Permit Area); and
- Eugene McDermott Shoal (approximately 91 km to the south of the Permit Area).

3.2.3 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 Permit Area.

Cartier Island, located 114 km west of the Permit 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 Permit 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.

3.2.4 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:

- Two birds, with one listed as vulnerable (Australian Lesser Noddy);

| | | | | | |
|---|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 10 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

- 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 (sea snakes), dugongs, and 16 species of whales and dolphins.

3.3 Socio-economic environment

3.3.1 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 Permit Area.

3.3.2 Commercial Shipping

Vessels involved in the drilling program 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.

3.3.3 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 focused 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.

3.3.4 Defence Activities

Border 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 Border 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.

| | | | | | |
|---|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 11 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

3.3.5 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. Production areas in the Bonaparte Basin include:

- PTTEP Australia operated facilities at Montara;
- 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 gas field floating LNG facility by Linde Group and SBM Offshore, PTT FLNG Ltd and PTTEP Australasia.

3.4 Conservation Interests

3.4.1 National Heritage Places


There are no National Heritage Places within the Permit Area.

3.4.2 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.

3.4.3 Marine Protected Areas

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

| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 12 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

4. 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 4.1




| | | | | | |
|---|---|----------------------------------|-----------|----------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev.index | | Sheet of sheets 13 / 25 |
| | | | Validity | Rev. No. | |
| | | | Status | 02 | |

Table 4.1: Summary of environmental hazards and control measures to be applied


| Source of risk | Potential impact | Control measure |
|---|--|--|
| <i>Planned activities</i> | | |
| R1 – MODU positioning | Localised or temporary disturbance to benthic habitats. | Development of the rig move/positioning procedure will consider environmental impacts. |
| R2 – Lighting | Localised or temporary attraction of fauna to vessel during the survey | <ul style="list-style-type: none"> • MODU and offshore support vessels (OSVs) to comply with maritime guidelines and standards associated with safety and navigational requirements. • No excessive lighting used. |
| R3 – Ballast water | Establishment of non-Indigenous marine species (NIMS) causing displacement and/or loss of native species and reduction in biodiversity. | <ul style="list-style-type: none"> • All vessels will comply with Department of Agriculture, Fisheries and Forestry (DAFF) Ballast Water Requirements. • Ballast water from a foreign port will not be discharged into Australian waters less than 200 m deep or within 12 nm from land. • Ballast water records will be maintained onboard all vessels. |
| R4 – Hull biofouling and antifouling paints | Release of persistent compounds into the environment, resulting in contamination of sediment and the water column and possible bioaccumulation. | <ul style="list-style-type: none"> • Vessel contractor adheres to the <i>IMO Guidelines for the Control and Management of Ships' Biofouling</i> 2012. • OSVs compliant with the <i>National Biofouling Management Guidance for the Petroleum Production and Exploration Industry</i> (DAFF 2009). |
| R5 – Atmospheric emissions | <ul style="list-style-type: none"> • Localised effect on air quality. • Contribution to global atmospheric concentrations of greenhouse gases (GHGs). • Depletion of stratospheric ozone. | <p>All OSVs will:</p> <ul style="list-style-type: none"> • Comply with the MARPOL 73/78 Annex VI. • Use low sulphur fuel (to minimise SO_x emissions) where available. • Hold a current International Air Pollution Prevention (IAPP) Certificate. <p>The MODU to:</p> <ul style="list-style-type: none"> • Have a routine inspection/maintenance schedule of combustion equipment. • The rate of gas flared will be controlled by surface equipment and the volume will be determined at the time by the reservoir engineer consistent with Well Operations Management Plan (WOMP) (ENI-DRL-PL-017). |

| | | | | | |
|---|---|----------------------------------|-----------|----------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev.index | | Sheet of sheets 14 / 25 |
| | | | Validity | Rev. No. | |
| | | | Status | 02 | |


| Source of risk | Potential impact | Control measure |
|--|---|--|
| | | <ul style="list-style-type: none"> Vulcan Burner Heads (or equivalent) will be used in event of well testing. |
| R6 – Vessel movements and their interaction with marine megafauna | Injury or death of marine fauna from vessel strikes. | <ul style="list-style-type: none"> Comply with the EPBC Act 1999 and the <i>Australian National Guidelines for Whale and Dolphin Watching</i> (DEH 2006). Should any cetaceans or relevant megafauna be observed in the vicinity of operational vessels, all necessary care to avoid collisions will be taken. |
| R7 – Underwater noise from drilling, OSVs and vertical seismic profiling (VSP) | <ul style="list-style-type: none"> Potential physiological effects or disruption to behaviour patterns of cetaceans, turtles, and avifauna. Behavioural change in marine fauna (localised avoidance/attraction). Hearing impairment and pathological damage to marine fauna. | <ul style="list-style-type: none"> Vessels will not approach within 300 m of a cetacean, in accordance with the EPBC Act 1999 and the <i>Australian National Guidelines for Whale and Dolphin Watching</i> (DEH 2006). All opportunistic sightings of whales will be recorded and forwarded to DotE. Vessels will implement the mitigation measures outlined consistent with <i>EBPC Policy Statement 2.1—Interaction between Offshore Seismic Exploration and Whales</i>. |
| R8 – Noise caused by helicopter | <ul style="list-style-type: none"> Potential physiological effects or disruption to behaviour patterns of cetaceans, turtles, and avifauna. Behavioural change in marine fauna (localised avoidance/attraction). Hearing impairment and pathological damage to marine fauna. | <p>Cetacean interaction guidelines for aircraft as it refers helicopters, i.e. no flying lower than 500 m within a 500 m radius of a whale or dolphin (DEH 2006).</p> |
| R9 – Deck drainage discharge | <ul style="list-style-type: none"> Toxicity or physical effects on marine biota. Adverse effects on water quality. | <ul style="list-style-type: none"> Any spill onboard vessel will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP). Spill response kits are available onboard all vessels and are kept fully stocked. Use of low toxicity, biodegradable detergents. All vessels hold a current International Oil Pollution Prevention (IOPP) Certificate. Deck drains on all vessels routed to a holding tank for onshore disposal or an oil-water separator (OWS) and monitored for oil in water (OIW) content prior to discharge. |

| | | | | | |
|---|---|----------------------------------|-----------|----------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev.index | | Sheet of sheets 15 / 25 |
| | | | Validity | Rev. No. | |
| | | | Status | 02 | |


| Source of risk | Potential impact | Control measure |
|---|---|---|
| | | <ul style="list-style-type: none"> Discharge OIW content of <15 mg/l or less in accordance with MARPOL 73/78 Annex I and vessel Waste Management Procedures. Vessel Waste Management Procedures followed and oil records kept. |
| R10 – Sewage, grey water and putrescible waste discharge | <ul style="list-style-type: none"> Localised reduction in water quality. Localised nutrient enrichment of the receiving water. | <ul style="list-style-type: none"> The vessels shall comply with MARPOL 73/78 Annex IV and V (prevention of pollution by garbage from ships). Comply with Annex IV, <i>Navigation Act 1912</i> Part IV Division 12C and <i>Protection of the Sea (Prevention of Pollution by Ships) Act 1983</i> Part IIIB - Division 2. International Sewage Pollution Prevention (ISPP) certificates are valid for each vessel. The ISPP certificate verifies the sewage systems on board comply with MARPOL 73/78 requirements. |
| R11 – Solid and hazardous and non-hazardous waste | <ul style="list-style-type: none"> Toxicity effects on marine fauna through ingestion or physical contact. Physical effects on fauna through entanglement or ingestion. Adverse effects on water quality. | <ul style="list-style-type: none"> Wastes designated as hazardous or dangerous goods will be identified, packaged, segregated, handled, stored, transported and tracked in accordance with MARPOL 73/78 and applicable International Maritime Dangerous Goods (IMDG) requirements. All solid and hazardous wastes will be returned to the Australian mainland for appropriate onshore disposal. Induction of all personnel includes information on waste management procedures. Safety Data Sheets (SDSs) are available for hazardous wastes. |
| R12 – Drill cuttings and water-based drilling mud discharge | <ul style="list-style-type: none"> Increased turbidity in the water column. Disturbance to pelagic marine fauna. Localised adverse impacts to benthic habitats, benthic and epibenthic fauna as a result of smothering from drill cuttings. Toxicity effects on marine biota. | <ul style="list-style-type: none"> Use of low toxicity WBM. Shaker and centrifuge used to separate and maximise recycling of WBM and thereby minimising mud discharge with cuttings. |

| | | | | | |
|---|---------------------------------|-------------------------------|-----------|----------|--------------------------------|
|  | Company document identification | Owner document identification | Rev.index | | Sheet of sheets 16 / 25 |
| | NUM1_HSE_W_WE.0008 | | Validity | Rev. No. | |
| | | | Status | 02 | |


| Source of risk | Potential impact | Control measure |
|--|--|---|
| R13 – Cement discharge | <ul style="list-style-type: none"> Localised impacts to benthic habitats as a result of smothering from cement disposal. Localised toxicity effects on marine biota. | <ul style="list-style-type: none"> Eni have selected benign cement and associated chemicals using Chemical Hazard and Risk Management system, which do not pose a risk the environment. A remotely operated vehicle will be used to assist in detecting returns of cement to the seabed (only during the cementing of the conductor pipe). |
| R14 – Cooling water and reject water discharge | Temporary and localised increase in sea surface water temperature and salinity. | Engines and associated equipment that requires cooling by water will be maintained in accordance with the MODU preventative maintenance system so that they are running within specified operating parameters. |
| <i>Non-routine activities</i> | | |
| N1 – Interference with other marine users | <ul style="list-style-type: none"> Disturbance to commercial shipping vessel routes. Disruption to commercial fishing vessel activities. Entanglement of trawling equipment on seabed infrastructure. Dropped objects. | <ul style="list-style-type: none"> Consultation with relevant stakeholders conducted in accordance with OPGGS (E) Regulations. Appropriate navigation lights and markers are displayed. Australian Maritime Safety Authority (AMSA) Marine Orders Part 30: Prevention of Collisions apply. Notices to Mariners issued informing the designation of a 500 m Petroleum Safety Zone (PSZ) around the MODU. The distress channel will be communicated to mariners prior to the commencement of operations. On completion of the well, the casings will be cut below the sea floor to ensure nothing remains above the seabed level. Two OSVs will be contracted to provide support to the MODU, including maintaining watch of surrounding vessel activity, warning vessels and enforcing the 500 m PSZ and providing emergency response if required. As far as feasible and practical, all dropped objects that are considered to pose a potential risk to navigation and fishing activities will be recovered. An incident report will be kept and will be used to consult with stakeholders if any objects are not retrieved and represent an ongoing risk. |

| | | | | | |
|---|---------------------------------|-------------------------------|-----------------|----------|----------------------------|
|  | Company document identification | Owner document identification | Rev.index | | Sheet of sheets 17 / 25 |
| | NUM1_HSE_W_WE.0008 | | Validity Status | Rev. No. | |
| | | | | 02 | |


| Source of risk | Potential impact | Control measure |
|--|---|--|
| N2 – Unignited flare gas during well testing | Temporary decrease in surface water quality. | <ul style="list-style-type: none"> Well flows will be initiated during suitable weather conditions as defined by pre-start checks. A high efficiency burner will be used to reduce liquid dropout rates. The early flow will be directed to separator tanks to remove liquids prior to flaring. A flare watch will be used for immediate system shutdown in the event of a drop out being observed. |
| N4 – Loss of well integrity | <ul style="list-style-type: none"> Acute and chronic toxic effects to pelagic marine biota. Release of hydrocarbon gasses to the atmosphere contributing to GHG load and associated impacts. Loss of natural resource. | <ul style="list-style-type: none"> Well design and completion plan details the drilling specifications. Eni Barrier verification. Develop a Well Control Response Plan. Develop a Well Relief Plan. BOP systems for wells installed and not removed unless well is suspended or abandoned. An independent specialist will inspect the BOP system prior to the rig acceptance as part of the WOMP (ENI-DRL-PL-017). BOP is pressure tested on surface prior to connection and is pressure tested following installation to test the connection with the well head. Eni Drilling Supervisors shall be well control school certified. Senior drilling crew members shall be well control school certified, trained in the well shut in procedure for the rig. Continual monitoring of well information. Implement a 500 m PSZ around the MODU. |
| N5 – Vessel collision | <ul style="list-style-type: none"> Toxic effects to marine biota. Disruption to other activities. Decline in sediment and water quality. | <ul style="list-style-type: none"> Vessels must seek approval from the MODU to enter the 500 m PSZ. Vessels >400 gross tonne must have an approved SOPEP and associated resources. Vessels within the 500 m PSZ must operate under the MODU Safety Management System. |

| | | | | | |
|---|---|----------------------------------|-----------|----------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev.index | | Sheet of sheets 18 / 25 |
| | | | Validity | Rev. No. | |
| | | | Status | 02 | |

| Source of risk | Potential impact | Control measure |
|--|---|--|
| | | <ul style="list-style-type: none"> • IMO International Regulations for Preventing Collisions at Sea (COLREGS). • Issuance of Notice to Mariners. • Vessels navigation aids and competent crew maintaining 24 hour visual, radio and radar watch for other vessels. • Radio warnings to mariners as required. • The distress channel shall be communicated to mariners prior to the commencement of operations. • All vessels will have suitably qualified vessel operators and crew. |
| N6 – Spill during MODU refuelling | <ul style="list-style-type: none"> • Localised toxic effects to marine biota. • Disruption to other activities. • Decline in sediment and water quality. | <ul style="list-style-type: none"> • Transfer hoses will be fitted with 'dry break' couplings and tested with air up to 40 psi prior to transfer. • Toolbox meetings. • Vessels >400 gross tonne must have an approved SOPEP and associated resources. • Bunkering as per vessel specifications. • Watchman will visually monitor the loading hose and connections for leaks during the entire operations. • Radio communications will be maintained. |
| N7 – Leaks from fittings and connections | Localised toxic effects to marine biota. | <ul style="list-style-type: none"> • Preventative maintenance and testing system and schedule. • Vessels have a SOPEP. • Closed deck drainage system directed to OWS. • The BOP will be a closed loop hydraulic system. • Visual inspections shall be carried out in accordance with maintenance schedule. |

| | | | | | |
|---|---|----------------------------------|-----------|----------|-----------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev.index | | Sheet of sheets 19 / 25 |
| | | | Validity | Rev. No. | |
| | | | Status | 02 | |

| Source of risk | Potential impact | Control measure |
|---------------------------------------|---|--|
| N8 – Bulk transfer spill | Toxic effects to marine biota. | <ul style="list-style-type: none"> Transfer operations will be overseen by the Vessel Master or First Officer to ensure transfer of material to the rig from the supply vessels is undertaken in accordance with MODU Marine Operations Manual. Bulk chemicals are stored in tote tanks and 'pods' (built in storage) on board the MODU. Transfer hoses will be fitted with 'dry break' couplings and hose tested with air up to 40 psi prior to transfer. |
| N9 – Implementation strategy delivery | <ul style="list-style-type: none"> Increased number of incidents and/or severity. Lack of appropriate response. Breach of environmental legislation. | <ul style="list-style-type: none"> Eni will internally report all accidental releases as per the Eni Hazard, Near Miss and Incident Reporting (ENI-HSE-PR-003) and detailed in the Eni Incident Report. All external reporting will be provided to regulators within defined timeframes. Training records show environmental competency of crew. Environmental audits planned, undertaken and documented. Environmental performance data recorded and reported throughout the drilling programme. |
| N10 – Oil Spill Response Preparedness | <ul style="list-style-type: none"> Increased incident severity. Lack of appropriate response. | <ul style="list-style-type: none"> Spill response training for key response personnel to ensure they have the required experience and competency for their role. Training and oil spill response exercises. Maintenance of associate membership with oil spill response agencies. |

| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 20 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

5. OIL SPILL RESPONSE STRATEGIES

5.1 Properties of Hydrocarbon

In a success case, it is anticipated that the Numisia-1 oil will be a Group A oil similar in composition and character to the Vesta-1 and Jabiru oils. Jabiru oil is a light crude oil (API 42.3°, density 0.814 @ 15.6°C) with low viscosity (3.7 cSt @ 20°C) but with a relatively high pour point for light crude oils (18°C) (BHP 1989). This pour point is higher than ambient water temperatures but is lower than the lowest seasonable ranges (sea surface temperature range of 26–29.5°C). Hence, the whole oil can be expected to initially flow and spread due to forces of gravity and surface tension if spilled onto the sea at any time of year.

Residues are determined to have a pour point (39°C+) higher than the highest sea surface temperatures that can be expected and will therefore likely solidify. The wax content of this residual is measured at 33%+, indicating that the residual is likely to be present as wax sheets under calm conditions. These waxy residues are likely to break up and form spherical balls under rougher sea conditions. If stranded on shorelines, where temperatures during the daytime exceed the pour point, the residues would melt to form liquids, subject to percolation into sandy substrates.

5.2 Spill scenarios and response strategies

Hydrocarbon spill scenarios are categorised into three tiers, as defined in Table 5.1.

Table 5.1: Definition of spill tiers

| Tier | Definition | Example spill scenarios |
|--------|--|---|
| Tier 1 | A small spill requiring a local response and local resources | <ul style="list-style-type: none"> Flare dropout General operations, e.g. hydrocarbon transfers Oily water discharges Fuel spill – bunkering/refuelling |
| Tier 2 | A medium spill requiring a regional response and/or national assistance. | <ul style="list-style-type: none"> Vessel collision and fuel tank rupture |
| Tier 3 | A large spill requiring national and/or international assistance. | <ul style="list-style-type: none"> Loss of well control – blow out |

There are eight potential response strategies that may be implemented in the event of a spill depending on the volume of hydrocarbon spilled, location of the spill event, environmental conditions at the time of the spill, and sensitivities in the zone of potential impact. The response strategies are outlined in Table 5.2.


| | | | | | |
|---|---|-------------------------------|-----------------|----------|--------------------------------|
|  | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 21 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |


Table 5.2: Summary of oil response strategies

| Strategy | Description |
|---------------------------|--|
| Monitor and evaluate | Applicable to all spill scenarios. This is supported by an Oil Scientific Monitoring Program. |
| Dispersant application | During a Tier 3 spill incident, dispersant amenability testing and a Net Environmental Benefit Assessment (NEBA) will be undertaken to confirm the suitability of this strategy. |
| In-situ burning | A secondary strategy that may be considered in the event of a loss of well control if there are high concentrations of surface oil on the sea surface. |
| Containment and recovery | Recovery of persistent weathered residues floating on the sea surface to prevent them from reaching shore. |
| Protection and deflection | To be considered when surface hydrocarbons threaten sensitive receptors after dispersant application and/or containment and recovery techniques have been considered and/or deployed and failed. A NEBA will determine whether this strategy will be deployed. |
| Shoreline clean-up | 'Last resort' and only to be deployed in the event of surface hydrocarbons impact shorelines. A NEBA will determine whether this strategy will be deployed. |
| Oiled wildlife response | To be considered for deployment where surveillance activities identify marine fauna that may be impacted by the spill |
| Waste management | As required. |


All potential hazards that may arise through implementation of response strategies are summarised below in Table 5.3.

Table 5.3: Summary of impacts associated with implementation of response strategy

| | Hazard Ref | Monitor and Evaluate | Contain and Recover | Protect and Deflect | Shoreline Clean up | Dispersant Application | In-Situ Burning | Oiled Wildlife |
|----------------------------|------------|----------------------|---------------------|---------------------|--------------------|------------------------|-----------------|----------------|
| Increased vessel movements | R1, R6, N1 | X | X | X | X | X | - | - |
| Hazardous waste management | R11 | - | X | X | X | X | - | - |
| Atmospheric emissions | R5 | X | X | X | - | X | - | - |
| Noise | R7, R8 | X | X | X | - | X | - | X |

| | | | | | | |
|---|----------------------|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  | eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 22 / 25 |
| | | | | Validity Status | Rev. No. | |
| | | | | | 02 | |

| | Hazard Ref | Monitor and Evaluate | Contain and Recover | Protect and Deflect | Shoreline Clean up | Dispersant Application | In-Situ Burning | Oiled Wildlife |
|---|-------------------|-----------------------------|----------------------------|----------------------------|---------------------------|-------------------------------|------------------------|-----------------------|
| Disturbance to natural habitat | N11 | - | - | X | X | - | - | X |
| Introduction of dispersants to the marine environment | N12 | - | - | - | - | X | - | - |
| In-situ burning smoke, fire and residue | N13 | - | - | - | - | - | X | - |
| Oiled fauna displacement and handling | N14 | - | - | - | - | - | | X |
| Recovered oil being released back to the environment during decanting | N15 | - | X | - | - | - | - | - |

| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 23 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

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 Drilling Environment Plan (NUM1_HSE_W_WE.0003);*
- *AC/P-21 Numisia-1 Drilling Oil Spill Contingency Plan (NUM1-HSE-W-CS-0004);* and
- *ENSCO 104 2013-2014 Drilling Campaign Incident Management Plan (ENI DRL-PL-015).*

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.

| | | | | | |
|--|--|-------------------------------------|--------------------|-------------|-----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 24 / 25 |
| | | | Validity Status | Rev. No. | |
| | | | | 02 | |

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.


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

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 drilling program. During the activity, regular Communications Bulletin will be issued to AMSA, defence and fisheries.

| | | | | | |
|--|--|-------------------------------------|-------------|------|-----------------------------------|
|  eni australia | Company document identification NUM1_HSE_W_WE.0008 | Owner document identification | Rev. index. | | Sheet of sheets 25 / 25 |
| | | | Validity | Rev. | |
| | | | Status | No. | |
| | | | | 02 | |

8. REFERENCES

- [1] BHP (1989). JABIRU CRUDE OIL ASSAY. CONDUCTED BY BHP PETROLEUM LABORATORY. MAY 1989.
- [2] BUREAU OF METEOROLOGY (BOM) (2011). CLIMATE STATISTICS FOR AUSTRALIAN LOCATIONS (PIRLANGIMPI). AUSTRALIAN GOVERNMENT, CANBERRA. VIEWED OCTOBER 2011 AT:
<[HTTP://WWW.BOM.GOV.AU/CLIMATE/AVERAGES/TABLES/CW_014142.SHTML](http://www.bom.gov.au/climate/averages/tables/cw_014142.shtml)>.
- [3] CEE (2002) ENVIRONMENTAL IMPACT STATEMENT FOR THE TASSIE SHOAL METHANOL PROJECT. PREPARED BY CONSULTING & ENVIRONMENTAL ENGINEERS PTY LTD FOR MEO AUSTRALIA LTD, MELBOURNE.
- [4] DEPARTMENT OF THE ENVIRONMENT AND HERITAGE (DEH) (2006). BLUE, FIN AND SEI WHALE RECOVERY PLAN 2005 - 2010. [ONLINE]. DEPARTMENT OF THE ENVIRONMENT AND HERITAGE. CANBERRA, COMMONWEALTH OF AUSTRALIA. AVAILABLE FROM:
[HTTP://WWW.ENVIRONMENT.GOV.AU/BIODIVERSITY/THREATENED/PUBLICATIONS/R/ECOVEY/BALAENOPTERA-SP/INDEX.HTML](http://www.environment.gov.au/biodiversity/threatened/publications/r/ecovey/balaenoptera-sp/index.html).
- [5] DEWHA (2008A) - THE NORTH MARINE BIOREGIONAL PLAN. BIOREGIONAL PROFILE. A DESCRIPTION OF THE ECOSYSTEMS, CONSERVATION VALUES AND USES OF THE NORTH MARINE REGION. AUSTRALIAN GOVERNMENT, CANBERRA.
- [6] DEWHA (2008B) - THE NORTH-WEST MARINE BIOREGIONAL PLAN. BIOREGIONAL PROFILE. A DESCRIPTION OF THE ECOSYSTEMS, CONSERVATION VALUES AND USES OF THE NORTH MARINE REGION. AUSTRALIAN GOVERNMENT, CANBERRA.
- [7] INTERNATIONAL MARINE ORGANISATION (IMO). 1978. INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO (MARPOL 73/78)
- [8] LE PROVOST, DAMES AND MOORE (1997). BAYU-UNDAN FIELD DEVELOPMENT PRELIMINARY ENVIRONMENTAL REPORT. PREPARED FOR PHILLIPS PETROLEUM COMPANY AND BHP PETROLEUM.
- [9] PRZESLAWSKI, R., DANIELL, J., ANDERSON, T., BARRIE, J.V., BATTERSHILL, C., HEAP, A., HUGHES, M., LI, J., POTTER, A., RADKE, R., SIWABESSY, J., TRAN, M., WHITEWAY, T., NICHOL, S. (2011). SEABED HABITATS AND HAZARDS OF THE JOSEPH BONAPARTE GULF AND TIMOR SEA, NORTHERN AUSTRALIA. GEOSCIENCE AUSTRALIA, RECORD 2011/40, 69PP.