

Lord 3D Marine Seismic Survey Environment Plan Summary

March 2014

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Page 5 of 21

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TABLE OF CONTENTS

| | | |
|------------|---|-----------|
| 1. | INTRODUCTION..... | 8 |
| 1.1 | Location of the Activity..... | 8 |
| 2. | DESCRIPTION OF THE ENVIRONMENT..... | 10 |
| 2.1 | Regional Setting..... | 10 |
| 2.1.1 | <i>Timor Province.....</i> | 10 |
| 2.2 | Physical Environment..... | 11 |
| 2.2.1 | <i>Bathymetry and Seabed Composition.....</i> | 11 |
| 2.3 | Biological Environment..... | 12 |
| 2.3.2 | <i>Protected Marine Fauna.....</i> | 12 |
| 2.4 | Socio-Economic Environment..... | 13 |
| 2.4.1 | <i>Commercial Fisheries.....</i> | 13 |
| 2.4.2 | <i>Tourism and Recreational Fishing.....</i> | 13 |
| 2.4.3 | <i>Existing Petroleum Activities.....</i> | 13 |
| 2.4.4 | <i>Shipping.....</i> | 14 |
| 2.4.5 | <i>Defence Activities.....</i> | 14 |
| 2.4.6 | <i>Cultural Heritage.....</i> | 14 |
| 2.4.7 | <i>Commonwealth and National Heritage.....</i> | 14 |
| 2.5 | Values and Sensitivities..... | 14 |
| 3. | DESCRIPTION OF THE ACTIVITY..... | 15 |
| 3.1.1 | <i>Seismic Source.....</i> | 15 |
| 3.1.2 | <i>Receiver Technology.....</i> | 16 |
| 4. | ENVIRONMENTAL IMPACTS, RISKS AND CONTROLS..... | 16 |
| 5. | MANAGEMENT APPROACH..... | 16 |
| 6. | CONSULTATION..... | 17 |
| 7. | CONTACT DETAILS..... | 17 |

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LIST OF FIGURES

| | |
|--|----|
| Figure 2-1: Lord 3D MSS Location Map | 9 |
| Figure 3-1: North West Marine Region and location of the Lord 3D MSS (Bioregions as defined by DEWHA 2008) | 10 |
| Figure 3-14: Existing and Proposed Marine Parks and Reserves in relation to the operational area..... | 15 |

LIST OF TABLES

| | |
|---|----|
| Table 2-1: Approximate Boundary coordinates for the 'Lord 3D survey acquisition area'* ¹ | 8 |
| Table 2-2: Approximate Boundary coordinates for the 'operational area'* | 9 |
| Table 3-1: EPBC Act Protected Matters Search for the Lord 3D MSS Operational Area | 12 |

1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator, proposes to undertake a three dimensional (3D) marine seismic survey (MSS), referred to as the Lord 3D MSS, in offshore Commonwealth waters.

This Environment Plan (EP) summary has been prepared as per the requirements of Regulation 11 (8) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (SLI No.251, 2011)* (Commonwealth) (Environment Regulations). This document summarises the Lord 3D MSS Environment Plan (EP), accepted under Regulation 11(1) of the Environment Regulations by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

The Lord 3D MSS will take up to approximately 70 days to complete. This survey is planned to commence in March 2014. The actual survey commencement and duration will be dependent on survey vessel availability, operational constraints and prevailing weather conditions.

1.1 Location of the Activity

The Lord 3D MSS will occur in offshore Commonwealth waters, within the North West Marine Region (NWMR). The operational area is located approximately: 330 km north-west of Broome; 250 km from the Kimberley coastline; 200 km south west of Scott Reef; and, approximately 150 km north of the Rowley Shoals. The survey will be conducted in deep, offshore waters with water depths ranging from approximate 1500 m to 2500 m.

The area referred to as the 'operational area', a total area of 7730 km², (**Figure 2-1**) includes:

- A '3D survey acquisition area' (i.e. the area within which seismic acoustic emissions will occur for the purposes of acquiring data), which is approximately 3350 km² in Petroleum Exploration Permit Areas WA-495-P, WA-447-P, WA-449- P and WA-466-P, and;
- A surrounding 'buffer' area (of approximately 15 km width) in which the seismic source may be discharged at or below full capacity (power) for the purpose of run-outs, source testing and soft starts (in accordance with the Part A Standard Management Procedures (*EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales*; DEWHA 2008a).

The boundary coordinates for the proposed Lord 3D MSS 'survey acquisition area' and 'operational area' are presented in **Table 1-1 to Table 1-2**, and in **Figure 1-1**.

Table 1-1: Approximate Boundary coordinates for the 'Lord 3D survey acquisition area'*¹.

| Location Point | Latitude | Longitude |
|----------------|----------------|-----------------|
| A | 15°49'55.086"S | 119°33'21.130"E |
| B | 15°20'02.993"S | 119°32'59.030"E |
| C | 15°10'32.129"S | 119°44'31.995"E |
| D | 15°10'27.939"S | 120°0'21.215"E |
| E | 15°50'10.996"S | 120°0'21.303"E |
| F | 15°50'11.333"S | 119°53'0.023"E |
| G | 15°49'55.079"S | 119°53'0.023"E |
| H | 15°49'55.066"S | 119°50'4.596"E |
| I | 15°49'55.068"S | 119°45'4.597"E |
| J | 15°49'55.070"S | 119°40'4.598"E |
| K | 15°49'55.072"S | 119°35'4.599"E |
| L | 15°49'55.086"S | 119°33'21.130"E |

*Datum: GDA1994

* Note: the final acquisition area may be subject to slight modifications as the survey scope becomes better defined, however no changes will exceed the operational area boundary. Therefore this boundary will be used for the purpose of assessing potential environmental impacts associated with

the Lord 3D MSS.

Table 1-2: Approximate Boundary coordinates for the 'operational area'*.

| Location Point* | Latitude | Longitude |
|-----------------|----------------|-----------------|
| A | 15°58'18.581"S | 119°25'3.248"E |
| B | 15°16'19.148"S | 119°24'33.802"E |
| C | 15°2'25.097"S | 119°41'26.826"E |
| D | 15°2'17.729"S | 120°8'43.976"E |
| E | 15°58'17.694"S | 120°8'47.588"E |
| F | 15°58'18.581"S | 119°25'3.248"E |

*Datum: GDA1994

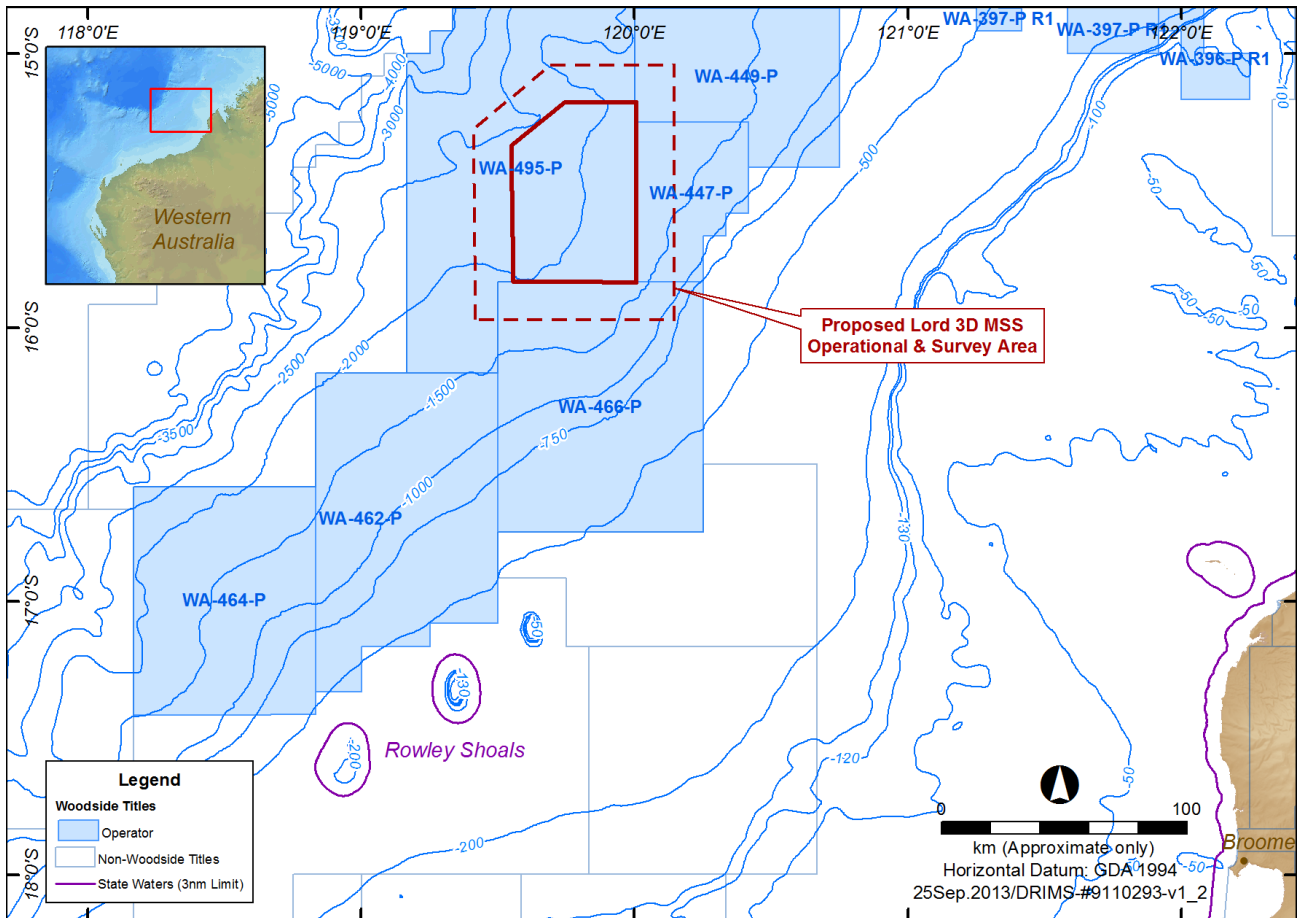


Figure 1-1: Lord 3D MSS Location Map

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2. DESCRIPTION OF THE ENVIRONMENT

In accordance with Regulation 13(2) of the Environment Regulations, a description of the existing environment that may potentially be affected by planned and unplanned activities relating to the Lord 3D MSS operational area is presented in this section. It includes a description of relevant natural, cultural and socio-economic aspects of the environment, as well as details of relevant values and sensitivities.

The description includes Regional Setting (**Section 2.1**); Physical Environment (**Section 2.2**); Biological Environment (**Section 2.3**), Socio-Economic Environment (**Section 3.4**) and Sensitive Marine Environments (**Section 3.5**) and covers the aspects of the environment relevant for consideration of the environmental risks and impacts of the operations.

2.1 Regional Setting

The Lord 3D MSS operational area is located entirely in Commonwealth waters, within the North West Marine Region (NWMR). The Lord 3D MSS operational area is within the Timor Province bioregion within the NWMR, as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0) and shown in **Figure 2-1**.

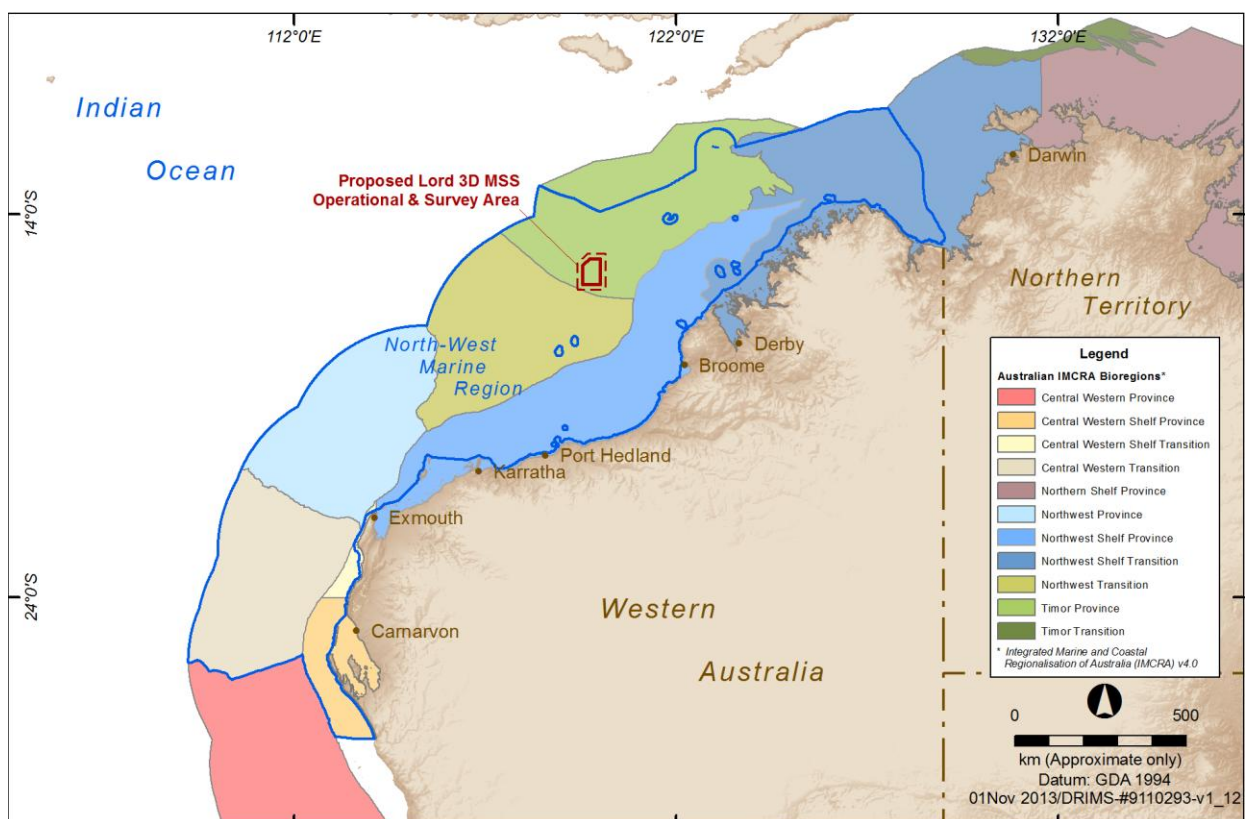


Figure 2-1: North West Marine Region and location of the Lord 3D MSS (Bioregions as defined by DEWHA 2008)

2.1.1 Timor Province

This provincial bioregion covers almost 15 per cent of the North-west Marine Region, predominantly covering the continental slope and abyss between Broome and Cape Bougainville. Water depth ranges from about 200 m near the shelf break to 5920 m over the Argo Abyssal Plain. In addition to the Argo Abyssal Plain, the major geomorphic features are the Scott Plateau, the Ashmore Terrace, part of the Rowley Terrace and the Bowers Canyon. The oceanic reef system of Ashmore Reef, Cartier Island, Seringapatam Reef and Scott

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Page 10 of 21

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Reef are important features of the provincial bioregion as they are regarded as hotspots for biodiversity (DSEWPaC 2012a).

The key physical and ecological features relating to the Timor Province are summarised as follows:

The regional oceanography is dominated by the Indonesian Throughflow (ITF), which brings warm, relatively nutrient poor (oligotrophic), low salinity water from the north and the thermocline within the water column is particularly pronounced and associated with the generation of internal tides, an important oceanographic feature of this area.

Planktonic primary productivity is generally low due to the oligotrophic tropical waters, although areas of upwelling stimulates higher productivity and localised areas of biological production especially along the shelf areas.

The variety of geomorphic features in the Timor Province, together with the variation in bathymetry, results in several distinct habitats and biological communities, many of which are in close proximity to each other. The reefs and islands of the bioregion are regarded as particular hotspots for biodiversity. A high level of endemism exists in demersal fish communities of the continental slope in the Timor Province and two distinct communities have been identified – one associated with the upper slope, the other with the mid slope (DEWHA 2008).

2.2 Physical Environment

This subsection describes the ambient physical environment and the metocean conditions that are expected for the Lord 3D MSS, unless stated otherwise.

2.2.1 Bathymetry and Seabed Composition

The bathymetry of the NWMR is characterised by four distinct zones: the inner continental shelf, the middle continental shelf, the outer shelf/continental slope and the abyssal plain. These divisions are made on the basis of water depth and geomorphic features in the region (Heap and Harris, 2008). The inner continental shelf is the area from the coast to approximately 30 m water depth, and the middle continental shelf is the area between 30 and 120 m water depth. At approximately 120 m, a terrace (start of the outer shelf) showing gradients of between 5 and 20 degrees represents a palaeo-shoreline and marks an important divide between the shelfal carbonate sands and cemented carbonates and the finer, less cemented slope materials offshore.

The Timor Province is located on the continental slope and includes topographic features such as the Scott Plateau, the Ashmore Terrace, and part of the Rowley Terrace, as well as a portion of the Argo Abyssal Plain (DEWHA 2008b). Other topographic features within the bioregion include areas of rise, ridges, canyons and apron/fans. Almost half of the reefs in the North-west Marine Region occur in the Timor Province, including Scott, Seringapatam and Ashmore reefs and Cartier Island.

The Lord MSS operational area is located on the outer continental slope to the southwest of Scott Plateau with water depths in the operational area ranging from approximately 1500 m to 2500 m in the northwest corner (Figure 2-1). The variation in bathymetry of the Timor Province, and its position traversing the continental slope, stratification of the water column is more pronounced than in most other bioregions. Internal tides associated with highly stratified water bodies are a feature of the Timor Province. The depth of the overlying surface waters, and hence the depth of the thermocline in this bioregion, is modified by seasonal and interannual variability in current strengths (DEWHA 2008b).

2.3 Biological Environment

2.3.1.1 Biological Productivity

The Timor Province and specifically the Kimberley Slope as described by Brewer et al (2007) comprises of a variety of geomorphic features and varying bathymetry, resulting in several distinct habitats and associated biological communities, many of which occur in close proximity to each other. For example, shallow reefs on the shelf break occur in close proximity to adjacent deep water muddy seabeds on the slope (Brewer et al. 2007). The reefs and islands of the bioregion are regarded as biodiversity hotspots and include a range of important pelagic and benthic ecological communities. (DEWHA 2008b). The mid slope (750–1000 m depth) habitats of the continental slope of this bioregion and the neighbouring Northwest Transition support rich and diverse demersal fish communities with a high level of endemism (64 species), known as the Key Ecological Feature, Continental Slope Demersal Fish Communities (DEWHA 2008b).

2.3.1.2 Benthic Communities

The benthic communities of the outer slope area of the Browse Basin beyond the 200 m isobath comprise of sparse epifauna such as isolated bryozoans colonies, brittlestars and basketstars and sea anemones associated with unconsolidated sediment seabed habitats composed of fine sand and silt. With consideration of the depth range (1500-2500 m) and location of the Lord 3D MSS operational area, the benthic communities are likely to be similar in composition, represented by a range of invertebrates including infauna such as meiofauna (minute animals living between grains of sediment on the seabed, e.g. nematodes), larger infauna (that burrow into sediments, e.g. polychaete worms) and sparsely distributed epibenthic communities (comprising sessile filter-feeding organisms that live on the surface of the seabed, e.g. seapens) (Brewer et al. 2007).

2.3.1.3 Plankton Communities

The deepwater, offshore environment of this region is poorly studied; however, periodic upwelling drives phytoplankton based productivity in this region of oligotrophic offshore waters. It is expected that the dominant primary consumers are copepods that support secondary consumers comprising a wide range of larger planktonic taxa including larval fish and invertebrates (Brewer et al 2007).

2.3.2 Protected Marine Fauna

A search using the DoE (formally known as SEWPaC) online protected matters search tool was carried out encompassing the operational area for the Lord 3D MSS. The search identified a total of 40 EPBC Act listed marine species that may occur within or traverse the area. Of those, 17 are listed in **Table 2-1** where nine are threatened marine species and 17 are migratory species under the EPBC Act.

Table 2-1: EPBC Act Protected Matters Search for the Lord 3D MSS Operational Area

| Species | Common Name | Status |
|--|-----------------------|-----------------------|
| Cetaceans (Whales and Dolphins) | | |
| <i>Balaenoptera musculus</i> | Blue Whale | Endangered/ Migratory |
| <i>Megaptera novaeangliae</i> | Humpback Whale | Vulnerable/ Migratory |
| <i>Balaenoptera bonaerensis</i> | Antarctic Minke Whale | Migratory |
| <i>Balaenoptera edeni</i> | Bryde's Whale | Migratory |
| <i>Orcinus orca</i> | Killer Whale | Migratory |
| <i>Physeter macrocephalus</i> | Sperm Whale | Migratory |
| Turtles | | |
| <i>Caretta caretta</i> | Loggerhead Turtle | Endangered/ Migratory |
| <i>Chelonia mydas</i> | Green Turtle | Vulnerable/ Migratory |

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Page 12 of 21

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| | | |
|--|---------------------|-----------------------|
| <i>Dermochelys coriacea</i> | Leatherback Turtle | Endangered/ Migratory |
| <i>Eretmochelys imbricata</i> | Hawksbill Turtle | Vulnerable/ Migratory |
| <i>Lepidochelys olivacea</i> | Olive Ridley Turtle | Endangered/ Migratory |
| <i>Natator depressus</i> | Flatback Turtle | Vulnerable/ Migratory |
| Sharks | | |
| <i>Isurus oxyrinchus</i> | Shortfin Mako | Migratory |
| <i>Isurus paucus</i> | Longfin Mako | Migratory |
| Seabirds | | |
| <i>Calonectris leucomelas/ Puffinus leucomelas</i> | Streaked Shearwater | Migratory |

Source: DSEWPac Protected Matters Search Tool, accessed 8th October 2013

2.4 Socio-Economic Environment

2.4.1 Commercial Fisheries

A number of Commonwealth (beyond 200 m isobath) and State (generally within 200 m isobath) managed fisheries occur in the region. The Lord 3D MSS operational area is located in water depths 1500 m - 2500 m, and is consequently unlikely to affect State fisheries.

2.4.1.1 Commonwealth Fisheries

The Lord 3D MSS operational area is located in waters that constitute part of four Commonwealth managed commercial fisheries:

- the North West Slope Trawl Fishery (NWSTF);
- the Southern Bluefin Tuna Fishery (SBTF);
- the Western Skipjack Tuna Fishery (WSTF); and
- the Western Tuna and Billfish Fishery (WTBF).

These fisheries are managed by the Australian Fisheries Management Authority (AFMA) and, of these four fisheries, only the NWSTF is active in the deeper continental slope waters off the NWS.

2.4.2 Tourism and Recreational Fishing

There are no known recreational fisheries located within the Lord 3D MSS operational area or surrounding waters due to the offshore, open deep water location (1500-2500 m depth range) location. There is seasonal recreational fishing at Rowley Shoals, located at Clerke and Imperieuse reefs (over 150 km south-west of the Lord 3D MSS operational area) and this fishery primarily targets pelagic fish (game fish) in the waters surrounding the shoals and demersal fish fauna on the outer reef slopes.

Fishing activities at the Rowley Shoals are managed jointly by the WA Department of Fisheries and the WA Department of Parks and Wildlife (DPAW – within the Rowley Shoals Marine Park).

Given the offshore, deep water survey location and distance from the nearest oceanic reef system where recreational fishing and limited tourism activities occur (i.e., the Rowley Shoals) no interaction between the Lord 3D MSS activities and tourism/recreational activities are expected.

2.4.3 Existing Petroleum Activities

There are no petroleum production facilities or any subsea infrastructure located within or immediately adjacent to the operational area.

2.4.4 Shipping

The operational area is traversed by a major shipping route between the port of Dampier and Lombok Strait. This route carries significant traffic comprising bulk carriers and LNG vessels. Australian Maritime Safety Authority (AMSA) commercial shipping fairways are applied to the south of the operational area. The fairways are not mandatory, but AMSA strongly recommends commercial vessels remain within the fairway when transiting the region.

2.4.5 Defence Activities

There are no designated military / defense exercise areas in the operational area or the immediate vicinity.

2.4.6 Cultural Heritage

There are no known indigenous cultural heritage values or issues for the waters and seabed within and immediately adjacent to the operational area. A search of the National Shipwrecks database (SEWPaC 2011b) indicates that there are no known historic shipwreck sites within or immediately adjacent to the operational area.

2.4.7 Commonwealth and National Heritage

Commonwealth and National Heritage listed sites nearest to the operational area include:

- 'Mermaid Reef, Rowley Shoals' is a Listed Place on the Commonwealth Heritage List (Place ID 105255, Place File No 5/09/210/0033). Mermaid is one of three oceanic reef atolls named the Rowley Shoals. The atoll rises up almost vertically from over 400 m depth and support a diversity of corals and fish (some of which are endemic to reefs).
- 'Scott Reef and Surrounds' is a Listed Place on the Commonwealth Heritage List (Place ID 105480, Place File No 9/04/001/0008). Scott Reef is a large, emergent shelf atoll located on the edge of the broad continental shelf and representative of ocean reef atolls of the NWS. It is of regional significance given the representativeness of species not recorded for coastal waters. The listing comprises the emergent reefs, partially enclosed lagoons and the surrounding oceanic waters extending to the 50 m bathymetric contour.
- 'Seringapatam and Surrounds' is a Listed Place on the Commonwealth Heritage List (Place ID 105243 Place File No. 9/04/001/0007). Seringapatam Reef is a large, emergent shelf atoll located on the edge of the broad continental shelf and representative of ocean reef atolls of the NWS. Similar to Scott Reef, Seringapatam represents a site of regional biological diversity and importance.
- The 'West Kimberley' is a Listed Place on the National Heritage List. (Place ID 106063, Place File No 5/09213/0034). It comprises all of the land mass of the west Kimberley, plus coastal waters and islands within WA State waters.
- Both 'Clerke Reef - Rowley Shoals' (Place ID 100378, Place File No 5/09/210/0033) and 'Imperieuse Reef – Rowley Shoals' (Place ID 100377, Place File No 5/09/210/0033) are listed on the Register of National Estate (non-statutory archive since register closure in 2007) and are located within WA State Waters..

2.5 Values and Sensitivities

The values and sensitivities of the operational area and wider regional perspective are presented in this subsection of the existing environment description. The offshore environment of the Timor Province contains environmental assets (such as habitats and species) of high ecological and conservation value and/or sensitivity including Commonwealth offshore waters as well as those in the wider regional context which include coastal waters and habitats such as the Rowley Shoals and the associated resident, temporary or migratory marine species recorded which include EPBC Act species such as marine mammals, turtles and marine birds. These values and sensitivities of the wider receiving environment include habitats or species that are particularly vulnerable or that provide valuable ecological services such as coral reefs. The marine environment of these offshore locations is pristine and many sensitive receptor locations are protected and

managed within Commonwealth marine reserves (**Figure 2-2**) including those established in 2012 as the proclaimed network of Northwest Marine Bioregion Commonwealth Marine Reserves.

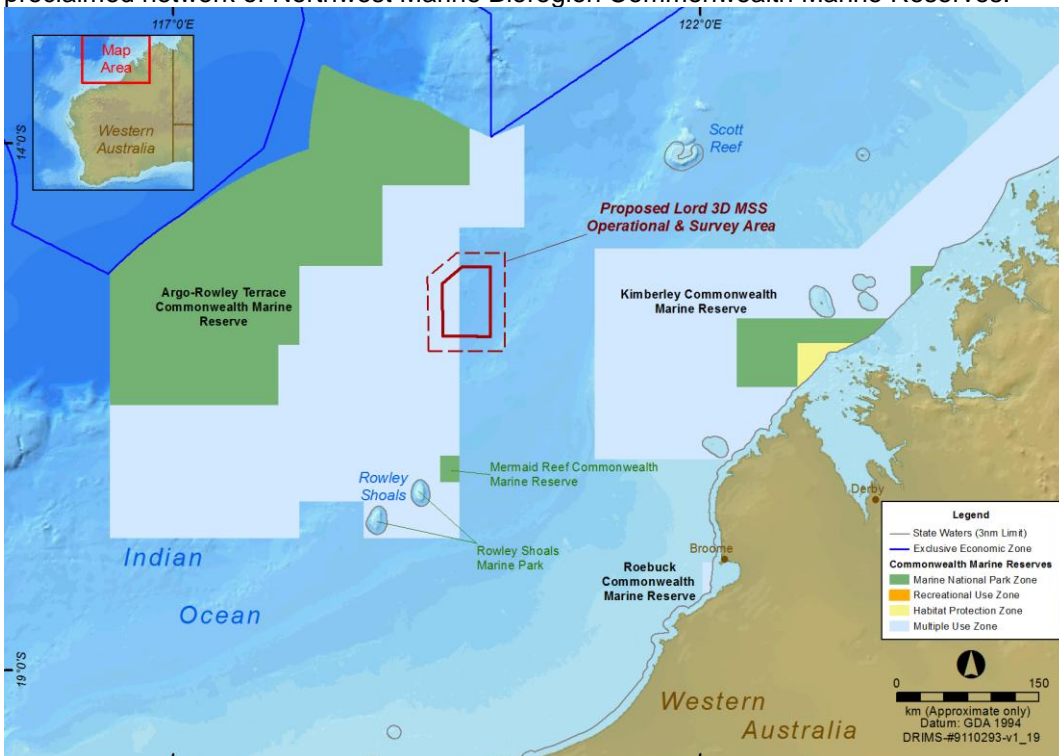


Figure 2-2: Existing and Proposed Marine Parks and Reserves in relation to the operational area

3. DESCRIPTION OF THE ACTIVITY

The marine seismic survey proposed is a typical seismic survey similar to most others conducted in Australian marine waters (in terms of technical methods and procedures). No unique or unusual equipment or operations are proposed. The survey will be conducted using a purpose-built seismic vessel.

During the proposed activities, the survey vessel will traverse a series of pre-determined sail lines within the survey acquisition area at a speed of approximately 7-9 km/hr. The survey lines have been defined on the basis of experience from previous surveys and survey optimisation considerations. As the vessel travels along the survey lines a series of noise pulses (every 7-10 seconds depending on shot point interval) will be directed down through the water column and seabed. The released sound is attenuated and reflected at geological boundaries and the reflected signals are detected using sensitive microphones arranged along a number of hydrophone cables (streamers) towed behind the survey vessel. The reflected sound is then processed to provide information about the structure and composition of geological formations below the seabed in an attempt to identify hydrocarbon reservoirs.

3.1.1 Seismic Source

The proposed Lord 3D MSS seismic source will comprise an airgun array with a maximum volume of up to 4,500 in³ capacity with an operating pressure of approximately 13,800 kPa (2,000 psi). The maximum 4,500 in³ array capacity is required due to the depth of the survey targets and nature of the geological structures.

The source array will be towed at depth of 6 to 8 m (+/- 1 m). The source arrays will be fired alternately with a shotpoint interval of approximately 18.75 m horizontal distance. The source produces sound pulses (sound

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Page 15 of 21

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pressure level – SPL) within one metre of the source in the order of 245-260 dB re 1µPa at frequencies extending up to approximately 200 Hz due to absorption within the water column.

3.1.2 Receiver Technology

The proposed Lord 3D MSS will use a seismic vessel to tow up to 14 solid streamers, each of which will be up to 7 km in length. The streamer/s will be towed at a depth of approximately 12 m to 15 m (+/- 2m) and approximately 100 m apart. Recent advances in cable technology have led to a new generation of seismic streamers, moving away from the traditional fluid filled cable to a solid cable, constructed from extruded foam where the requirement for fluid has been reduced.

The streamers contain steering devices in the form of remote controlled wings, integral to the streamer, which enable both precise depth control and horizontal steering. Horizontal streamer steering provides feather (where the streamer tends to veer offline a little due to wind and currents) correction, safe streamer separation control, and active steering.

4. ENVIRONMENTAL IMPACTS, RISKS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Lord 3D MSS to ensure they are reduced to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level using a method consistent with Woodside standards.

A summary of environmental hazards and controls to be applied to the Lord 3D MSS activities are shown in **Appendix A**. These are consistent with Woodside corporate and project-specific objectives, standards and criteria. All control measures associated with the hazards will be used to reduce environmental risk to ALARP and will be of an acceptable level.

5. MANAGEMENT APPROACH

The Lord 3D MSS will be managed in compliance with the *Lord 3D MSS Environment Plan* accepted by NOPSEMA under the Environment Regulations, other relevant environmental legislation and Woodside's Management System (e.g. Woodside Environment Policy).

The objective of the EP is to ensure that potential adverse impacts on the environment associated with the Lord 3D MSS, during both routine and non-routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

The Lord 3D MSS EP details for each environmental aspect (identified and assessed in the Environmental Risk Assessment – *Section 4 of the Environment Plan*) specific performance objectives and standards, and identifies the range of controls (controls available in **Appendix A** of this summary) to be implemented (consistent with the standards) to achieve the performance objectives and identifies the specific measurement criteria used to demonstrate that these performance objectives are achieved.

The implementation strategy detailed in the Lord 3D MSS EP identifies the roles/responsibilities and training/competency requirements for all personnel (Woodside and its contractors) in relation to implementing controls, managing non-conformance, emergency response and meeting monitoring, auditing, and reporting requirements during the activity. The Lord 3D MSS EP details the types of monitoring and auditing that will be undertaken, the reporting requirements for environmental incidents and reporting on overall compliance of the survey with the EP.

6. CONSULTATION

Woodside conducted a stakeholder assessment for the proposed activity to identify relevant 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 with NOPSEMA for assessment and acceptance. This advice was supported by engagement with potentially affected stakeholders.

Woodside received feedback on the proposed activity from a range of stakeholders, including government agencies, recreational fishing organisations and conservation groups. Issues of interest or concern included the location of the proposed survey across shipping fairways and commercial fishing areas, as well as potential impacts on marine mammals.

Woodside considered this feedback in its development of management measures specific to this survey. Woodside will continue to accept feedback from stakeholders during the survey.

7. CONTACT DETAILS

For further information about this activity, please contact:

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APPENDIX A: Summary of Major Environmental Hazards and Control Measures to be applied to the Lord 3D MSS

| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--|---|---|
| PLANNED (ROUTINE AND NON-ROUTINE) ACTIVITIES | | |
| Vessel noise emissions during normal survey operations (excluding survey acoustic sources) | Short-term localised disturbance to marine fauna, such as alteration of behaviour and localised displacement. | Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.04) – Interacting with cetaceans <ul style="list-style-type: none"> • survey vessels will not travel at greater than 6 knots within 300 m of a cetacean (caution zone) and minimise noise; • Survey vessels will not approach closer than 100 m for a cetacean (with the exception animals bow riding); |
| Interference with/exclusion of commercial fishing operations and shipping | Interference with/exclusion of commercial fishing operations and shipping | Survey vessels compliant with Marine Orders Part 30: Prevention of Collisions (Issue 8) and Marine Orders Part 21: Safety of navigation and emergency procedures, Issue 8, specifically: <ul style="list-style-type: none"> • Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights). The Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) (as part of marine safety division) is notified of the seismic vessel movements prior to mobilisation so that AMSA RCC ensures that navigation Auscoast warnings can be issued and kept up to date The Australian Hydrographic Service (AHS) is advised of the survey details (survey details, location, timing) two weeks prior to mobilisation so that AHS can then issue a notice to mariners. The seismic survey vessel will have an Automatic Identification System (AIS) tracking device installed to aid identification by other vessels. At least one dedicated support vessel will be employed to assist seismic and support vessels to mitigate interference associated with concurrent seismic and third party vessel operations. |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|---|--|--|
| Underwater noise emissions from operation of survey equipment | Disturbance to marine fauna, particularly whales and marine turtles, potentially as physical damage or as a behavioural effect | <p>Operation of the seismic source within the operational area will be compliant with EPBC Act Policy Statement 2.1- Interactions between offshore seismic activities and whales (DEWHA 2008) –Procedures:</p> <ul style="list-style-type: none"> • A MFO or trained bridge crew member will be on watch onboard the seismic vessel to undertake observations for Policy 2.1 applicable species during daylight hours. <p>Precaution Zones (measured in horizontal radius from acoustic source)</p> <ul style="list-style-type: none"> • Observation zone: 3 km+; • Low power zone: 2 km; and • Shut-down zone: 500 m <p>Observation and Compliance Reporting</p> <ul style="list-style-type: none"> • Use of vessel crew to supplement dedicated marine fauna observer in whale observations and monitoring compliance of Policy Statement 2.1. • Record kept of whale observations <p>During Survey</p> <ul style="list-style-type: none"> • Pre start-up Visual Observation • Soft start Procedure • Start-up Delay Procedure • Operations Procedure • Stop Work Procedure • Night-time and low visibility procedure <p>The following additional management measure, as identified in Part B of <i>the EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales</i> (September 2008), must be implemented during all seismic operations.</p> <ul style="list-style-type: none"> • If the survey is required to shutdown/power-down 3 or more times per day for 3 consecutive days as a result of sighting blue whales*, then the seismic operations must not be undertaken thereafter at night-time or during low visibility conditions. Seismic operations cannot resume at night-time or during low visibility conditions, until there has been a 24-hour period, which included seismic operations during good visibility conditions, during which no shutdowns/power-downs have occurred for blue whale* sightings. <p><i>*Note: The definition of “Blue Whale” includes any whales sighted whose species are unable to be determined.</i></p> <p>Two dedicated SEA/MFO will be employed onboard the seismic vessel for the duration of the Lord 3D MSS.</p> <p>No discharge of the seismic source outside of the operational area.</p> |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--|---|--|
| Emissions from fuel and waste combustion | Contribution to global greenhouse gas emissions; and Consumption of non-renewable natural resources | <p>Compliance with MARPOL 73/78 Annex VI - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Regulations for the Prevention of Air Pollution from Ships - Marine Orders – Part 97 (Part IIID Marine Pollution Prevention – Air Pollution) – where applicable to vessel class including:</p> <ul style="list-style-type: none"> • Vessel has a valid International Air Pollution Prevention Certificate (IAPP) • Use of low sulphur fuel when it is available • Onboard incinerator will comply with MARPOL Regulation 16 Annex VI |
| Discharge of bilge water, sewage, grey water, and putrescible wastes | Localised eutrophication of the water column; and localised adverse effect to marine biota. | <p>Sewage, Grey water and Putrescible Waste: Compliance with MARPOL 73/78 - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Orders - Part 96: Marine Pollution Prevention – Sewage, - as required by vessel class:</p> <ul style="list-style-type: none"> • all sewage, grey water and putrescible waste holding tanks are to be fully operational prior to survey commencement. • operational onboard sewage treatment plant approved by the International Maritime Organisation (IMO). • a valid International Sewage Pollution Prevention Certificate (ISPP). • All MARPOL discharge boundaries requirements are met <p>Bilge Water: Compliance with MARPOL 73/78 - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Orders - Part 91 Marine Pollution Prevention – Oil, as required by vessel class;</p> <ul style="list-style-type: none"> • Bilge water contaminated with hydrocarbons must be contained and disposed of onshore, except if the oil content of the effluent without dilution does not exceed 15 ppm or an IMO approved oil/water separator (as required by vessel class) is used to treat the bilge water. |
| UNPLANNED ACTIVITIES (ACCIDENTS OR INCIDENTS) | | |
| Collision between survey vessels and marine fauna | Injury or fatality to protected marine fauna | <p>Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.04) – Interacting with cetaceans</p> <ul style="list-style-type: none"> • survey vessel will not travel at greater than 6 knots within 300 m of a cetacean (caution zone) and minimise noise; • survey vessel will not approach closer than 100 m for a cetacean (with the exception animals bow riding). <p>Exception: <i>The above requirement does not apply in the event of an emergency.</i></p> <p>Compliance with required notifications of activities affecting cetaceans under the EPBC Regulations.</p> |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--|---|--|
| Release of hazardous or non-hazardous waste | Pollution and contamination of the environment and secondary impacts of marine fauna (e.g. Ingestion, entanglement) | <p>Current Vessel Waste Management Plan (or equivalent) implemented during the survey detailing wastes generated and disposal requirements to prevent significant instances of releases of waste material discharged to the marine environment. Must contain as a minimum:</p> <ul style="list-style-type: none"> All waste storage facilities in good working order and designed in such a way as to prevent or contain any discharges. All hazardous wastes will be segregated prior to onshore disposal. <p>No incidents of significant releases of waste materials to the marine environment.</p> <p>Onboard incinerator will comply with MARPOL Regulation 16 Annex VI</p> <p>Any accidental release of significant wastes to the marine environment will be recovered where safe and practicable to do so.</p> |
| Accidental loss of towed equipment. | Damage to benthic habitat, collision/entanglement of marine fauna. Toxic effects from loss of isopar. | <p>Operational procedures will be implemented on board the seismic vessel to prevent grounding or loss of towed equipment during deployment and retrieval of towed equipment</p> <p>Streamers cleaned when bio-fouling presents a significant risk to streamer integrity.</p> <p>Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally.</p> <p>Lost towed equipment will be relocated and recovered where safe and practicable to do so.</p> <p>Streamer deployment during transit to and from the operational areas will not occur in water closer than 12 nm to shore, or in waters less than 50 m deep.</p> |
| Streamer fluid release caused by loss of integrity of streamer | Pollution of the marine environment. Adverse effects on marine life | <p>Operational procedures will be implemented on board the seismic vessel to prevent instances of streamer fluid being discharged to the marine environment during deployment and retrieval of towed equipment.</p> <p>Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally.</p> <p>Solid streamers will be used for the Lord 3D MSS</p> <p>Lost towed equipment will be relocated and recovered where safe and practicable to do so.</p> |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--|--|--|
| <p>Hydrocarbon release caused by topsides (vessel) loss of containment</p> | <p>Localised and temporary reduction in water quality due to hydrocarbon contamination</p> | <p>Compliance with MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), –as applicable to vessel class:</p> <ul style="list-style-type: none"> • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate, where required, under vessel class. <p>Storage: Any hydrocarbon storage above deck must be designed and maintained to have at least one barrier (i.e. form of bunding) to contain and prevent deck spills entering the marine environment. This can include containment lips on deck (primary bunding) and/or secondary containment measures (bunding, containment pallet, transport packs, absorbent pad barriers) in place.</p> <p>Equipment: Equipment located on deck utilising hydrocarbons (e.g. cranes, winches or other hydraulic equipment) will be maintained to reduce risk of loss of hydrocarbon containment to the marine environment. <i>Exceptions: The above requirement does not apply to hydraulic hoses that are located on crane knuckles that protrude outside of the deck boundary and additionally, the Gun Deck where wash ports on the ship's side, which are designed to allow excess sea water to drain quickly from the deck to prevent the sea water free surface effect compromising the stability of the vessel - these ports will be secured closed in fine weather conditions when safe to do so.</i></p> <p>Equipment: Equipment located on deck utilising hydrocarbons (e.g. cranes, winches or other hydraulic equipment) will be maintained to reduce risk of loss of hydrocarbon containment to the marine environment.</p> <p>Spill Response: Spill response bins/kits are maintained and located in close proximity to hydrocarbon storage areas and deck areas for use to contain and recover deck spills.</p> <p>Implementation of the Lord 3D Marine Seismic Survey Oil Spill Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</p> |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--|---|--|
| Hydrocarbon release caused by loss of structural integrity from vessel collision | Localised and temporary reduction in water quality and potential for hydrocarbon contact and potential impact to individual megafauna species transiting the spill affected area. | <p>Survey vessels compliant with Marine Orders Part 30: Prevention of Collisions (Issue 8) and Marine Orders Part 21: Safety of navigation and emergency procedures, Issue 8, specifically:</p> <ul style="list-style-type: none"> • Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights). <p>Compliance with MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), –as applicable to vessel class:</p> <ul style="list-style-type: none"> • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate, where required, under vessel class. <p>At least one dedicated support vessel will be employed to assist seismic and support vessels to mitigate interference associated with concurrent seismic and third party vessel operations.</p> <p>Procedure (or equivalent) relating to seismic and support vessel working in close proximity (e.g. transfer of supplies) in place and implemented during the survey and will include:</p> <ul style="list-style-type: none"> • Resupply and crew transfers will commence during daylight hours only and when sea conditions are appropriate (calm) as determined by the vessel master; and • radio communication will be maintained between the seismic and support vessel. <p>Implementation of the Lord 3D Marine Seismic Survey Oil Spill Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</p> |
| Hydrocarbon release during bunkering operations | Localised and temporary reduction in water quality due to hydrocarbon contamination | <p>Compliance with MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), –as applicable to vessel class:</p> <ul style="list-style-type: none"> • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate as applicable to vessel class. <p>Spill Response: Spill response bins/kits are maintained and located in close proximity to hydrocarbon storage areas and deck areas for use to contain and recover deck spills.</p> <p>Implementation of the Lord 3D Marine Seismic Survey First Strike Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</p> <p>Operational procedures and equipment will be in-place and implemented on board the survey vessels for bunkering operations and will be subject to the following Woodside requirements:</p> |

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| Source of Risk (Hazards) | Potential Environmental Impact | Control/ Mitigation Measures |
|--------------------------|--------------------------------|--|
| | | <p>Procedures:</p> <ul style="list-style-type: none"> • Bunkering will occur during daylight hours only and when sea conditions are appropriate as determined by the vessel master; • JHA (or equivalent) in place and reviewed before each fuel transfer; • Bunkering operations will be manned with constant visual monitoring of gauges, hoses, fittings and sea surface; and • Radio communication between seismic and support vessel <p>Equipment:</p> <ul style="list-style-type: none"> • Bulk transfer hose (visually check for integrity) <p>Dry break couplings (or similar in place checked for integrity)</p> |

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