

Offshore Kimberley Geophysical and Geotechnical Campaign Environment Plan Summary

GeoTechnical Operations

February 2014

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator of the Browse Joint Ventures, for and on behalf of the Browse Joint Venture participants: Woodside Browse Pty Ltd, Shell Development (Australia) Pty Ltd, BP Developments Australia Pty Ltd, Japan Australia LNG (MIMI Browse) Pty Ltd and PetroChina International Investment (Australia) Pty Ltd, proposes to undertake geophysical and geotechnical (GPGT) surveys, within Commonwealth waters of the Offshore Kimberley region (referred to as the Offshore Kimberley GPGT Campaign).

This document is a summary of an Environment Plan (EP) that was prepared and accepted as part of the requirements under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Commonwealth) (Environment Regulations) as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

The Offshore Kimberley GPGT Campaign is proposed to commence from March 2014. The geophysical surveys will take approximately 70 days to complete, while the geotechnical surveys will range from 30 to 120 days depending on the weather, the results of the geophysical surveys, the characteristics of the sediments encountered during geotechnical surveys and the engineering requirements.

The actual fieldwork dates are dependent on vessel and equipment availability and prevailing weather conditions.

1.1. Location of the Activity

The proposed Offshore Kimberley GPGT Campaign will occur in offshore waters approximately 425 km north of Broome. Nearest landfall to the Offshore Kimberley GPGT Campaign operational area is Sandy Islet which forms part of Scott Reef and is located approximately 5 km to the west of the operational area. Water depths within the operational areas range from approximately 30 m to 1450 m.

The Offshore Kimberley GPGT Campaign will occur within an operational area of approximately 1830 km², and permits WA-28-R, WA-29-R, WA-30-R, WA-31-R and WA-32-R. The boundaries of the Offshore Kimberley GPGT Campaign operational area are provided in **Figure 1-1**. Boundary coordinates are provided in **Table 1-1**.

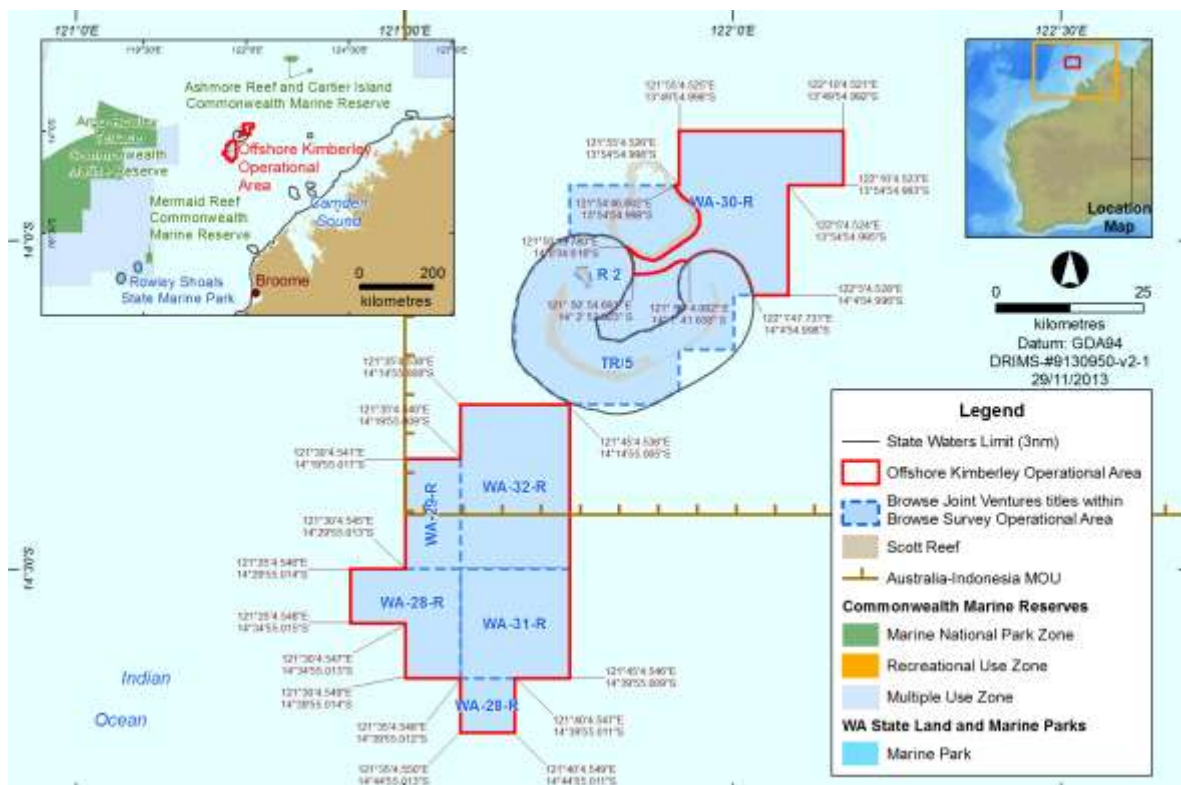


Figure 1-1: Location of the proposed Offshore Kimberley GPGT Campaign ‘operational area’

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Table 1-1: Approximate Boundary coordinates for Offshore Kimberley GPGT Campaign 'operational area'

Location Point	Latitude	Longitude
1	14° 4' 54.998" S	122° 1' 47.731" E
2	14° 4' 54.996" S	122° 5' 4.528" E
3	13° 54' 54.995" S	122° 5' 4.524" E
4	13° 54' 54.993" S	122° 10' 4.523" E
5	13° 49' 54.992" S	122° 10' 4.521" E
6	13° 49' 54.998" S	121° 55' 4.525" E
7	13° 54' 54.998" S	121° 55' 4.526" E
8	13° 54' 54.998" S	121° 54' 46.882" E
9	14° 0' 34.616" S	121° 50' 13.780" E
10	14° 2' 53.323" S	121° 50' 54.691" E
11	14° 1' 41.630" S	121° 56' 4.082" E
12	14° 14' 55.008" S	121° 35' 4.538" E
13	14° 14' 55.005" S	121° 45' 4.536" E
14	14° 39' 55.009" S	121° 45' 4.546" E
15	14° 39' 55.011" S	121° 40' 4.547" E
16	14° 44' 55.011" S	121° 40' 4.549" E
17	14° 44' 55.013" S	121° 35' 4.550" E
18	14° 39' 55.012" S	121° 35' 4.548" E
19	14° 39' 55.014" S	121° 30' 4.549" E
20	14° 34' 55.013" S	121° 30' 4.547" E
21	14° 34' 55.015" S	121° 25' 4.548" E
22	14° 29' 55.014" S	121° 25' 4.546" E
23	14° 29' 55.013" S	121° 30' 4.545" E
24	14° 19' 55.011" S	121° 30' 4.541" E
25	14° 19' 55.009" S	121° 35' 4.540" E

Datum: GDA94

2. DESCRIPTION OF THE ENVIRONMENT

In accordance with Regulation 13(2) of the Environment Regulations, a description of the existing environment that may be affected by planned and unplanned activities of the Offshore Kimberley GPGT Campaign are 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.

2.1. Regional Setting

The Offshore Kimberley GPGT Campaign operational areas are located entirely within the Commonwealth waters of the North-West Marine Region (NWMR) (**Figure 2-1**) as defined under the integrated Marine and Coastal Regionalisation of Australia *Version 4.0* (DSEWPac 2012a). The NWMR comprises of Commonwealth waters from the Western Australian – Northern Territory border to Kalbarri, south of Shark Bay, covering an area of some 1.07 million km². The NWMR has been divided into eight provincial bioregions, one of which intersect with Offshore Kimberley GPGT

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Campaign operational areas (**Figure 2-1**), the Timor Province. The Timor Province covers 14.6 per cent of the total area of the NWMR. The bioregion occupies the slope between Broome and Cape Bouganville and has an area of 156,669 km².

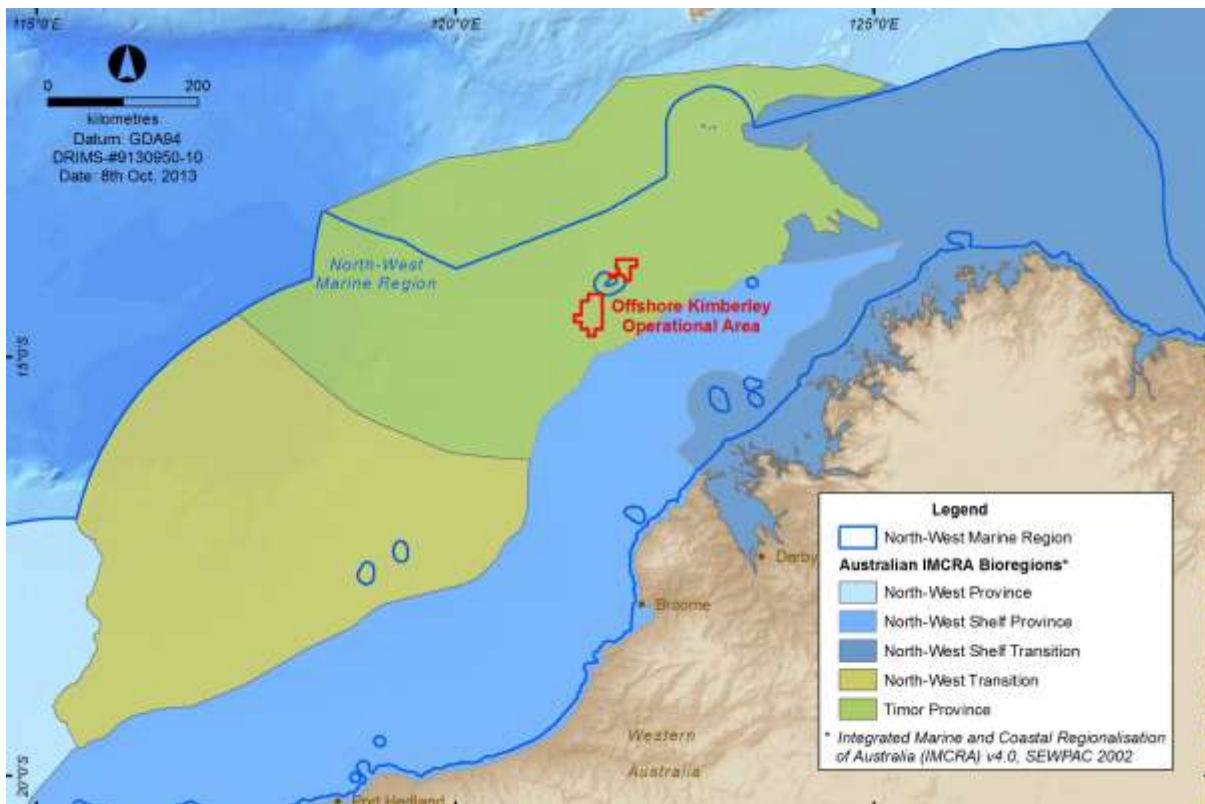


Figure 2-1: North-West Marine Bioregion and the location of the Offshore Kimberley GPGT Campaign (Bioregions as defined by DEWHA 2008).

2.2. Physical Environment

2.2.1. Bathymetry and Seabed Composition

The majority of 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 deep Argo Abyssal Plain. Significant seabed features adjacent to the operational area include Scott Reef and Seringapatam Reef. These oceanic atoll reefs occur on the upper continental slope rising close to the surface from surrounding water depths of 500 –1,500 m.

Scott Reef is one of a number of large emergent shelf atolls that occur along the edge of Australia's North West Shelf. The others include Ashmore, Seringapatam, Hibernia and the Rowley Shoals (comprising of Mermaid, Imperieuse and Clerke reefs).

The deeper locations of the Offshore Kimberley GPGT operational area have a gently sloping seabed from 475 to over 2,200 m and few seabed topographic features. The seabed is composed of unconsolidated soft sediments (generally soft silt and clays) within the Brecknock, Calliance and Torosa fields (Woodside 2011). Surface sediments in the channel separating North and South Scott Reef are characterised by well-rounded cobble/rubble and coarse shell fragments. The paucity of fine sediments in the surrounding seabed is due to the strong scour by tidal currents (Woodside 2011). Sediments of the operational area are likely to be largely unconsolidated coarse to fine sands becoming progressively finer silt to mud further down the continental slope (Baker *et al.* 2008).

2.3. Biological Environment

2.3.1. Benthic Communities

Benthic communities associated with the deep water habitats of the Offshore Kimberley GPGT operational area (i.e. to the south and east of Scott Reef) are likely to be sparse and dominated by a range of invertebrates including: 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 crustacean, such as isopods and epifauna such as shrimps and crabs). Sessile epifauna is generally sparse with records indicating coarse sediment supporting patches of filter-feeding organisms such as sponges, gorgonians, bryozoans and seapens. Mobile invertebrate fauna such as brittlestars and holothuria (echinoderms) are also present (Woodside 2011 and Brewer et al. 2007).

The operational area may support sparse populations of demersal fish and cephalopods in low densities. Much of the outer mid-shelf and upper slope is covered by a relatively featureless, sandy-mud seabed with a sparse covering of sessile organisms dominated by filter-feeding heterotrophs such as gorgonians, sponges, soft corals and detritus-feeding crabs and echinoderms (Brewer *et al.* 2007).

2.3.2. Protected Marine Fauna

A search using the Department of Environment (DoE) (formerly known as Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)) online protected matters search tool was carried for the two Offshore Kimberley GPGT Campaign operational areas (**Figure 1-1**). Results of the protected matters search are presented in **Table 2-1**.

A total of 54 listed marine species, 11 threatened marine species and 19 migratory species that may occur within, or may traverse the operational area. Two key ecological features were also reported, the continental slope demersal fish communities, and Seringapatam Reef and Commonwealth waters.

No critical habitats or threatened ecological communities, as listed under the EPBC Act were identified.

Table 2-1: EPBC Act Protected Matters Search for the Offshore Kimberley GPGT Campaign operational areas.

Type	Species	Common Name	Status
Mammals	<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
	<i>Orcaella brevirostris</i>	Snubfin Dolphin	Migratory
Marine Reptiles	<i>Aipysurus apraefrontalis</i>	Short-nosed Seasnake	Critically Endangered
	<i>Caretta caretta</i>	Loggerhead Turtle	Endangered/ Migratory
	<i>Chelonia mydas</i>	Green Turtle	Vulnerable/ Migratory
	<i>Dermochelys coriacea</i>	Leatherback Turtle	Endangered/ Migratory
	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Vulnerable/ Migratory
	<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	Endangered
	<i>Natator depressus</i>	Flatback Turtle	Vulnerable/ Migratory
Seabirds	<i>Anous tenuirostris melanops</i>	Australian Lesser Noddy	Vulnerable
	<i>Calonectris leucomelas</i> / <i>Puffinus leucomelas</i>	Streaked Shearwater	Migratory
	<i>Sterna albifrons</i>	Little Tern	Migratory

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Type	Species	Common Name	Status
Sharks	<i>Rhincodon typus</i>	Whale Shark	Vulnerable/ Migratory
	<i>Isurus oxyrinchus</i>	Shortfin Mako	Migratory
	<i>Isurus paucus</i>	Longfin Mako	Migratory

Source: DoE Protected Matters Search Tool, accessed 16th September 2013.

2.4. Socioeconomic Environment

2.4.1. Cultural and National Heritage

A review of the Department of Aboriginal Affairs (DAA) Heritage register identified no cultural heritage sites within the area of the proposed works (DIA 2009). Therefore it is not expected that the campaign will intersect or impact cultural heritage sites nor result in the loss of one or more aboriginal heritage values.

There are several Commonwealth heritage listed areas with the closest (to the operational areas) being the oceanic coral atolls of Scott Reef and surrounds and Seringapatam Reef and surrounds. In the wider region there are also the oceanic coral atolls of: Mermaid Reef (Rowley Shoals) and Cartier Island and Ashmore Reef (DSEWPaC 2012a).

The Australian National Shipwreck database lists one protected historic wreck, the *Yarra*, on Scott Reef (South Reef). The wreck of the *Yarra* is located on the shallow reef flat to the north side of Sandy Islet at: approximately Latitude: -14.038°S; Longitude: 121.766°E (DSEWPaC 2012b).

2.4.2. Indonesian Traditional Fisheries

The proximity of Scott Reef to the Indonesian Archipelago means that it has been a valuable resource for Indonesian fishers for more than three centuries. In the 1950s, the 200 nm Australian Fishing Zone was established around Australia, which included Scott Reef. Initially, this zone excluded fishing by Indonesians; however, in 1974 a Memorandum of Understanding (MoU) was agreed by both the Governments of Australia and Indonesia to allow concessions for these fishermen. This MoU permits traditional Indonesian fishermen to fish on the seabed within a designated area on the northwest continental shelf of Australia. The reefs or islets within the MoU are:

- Ashmore Reef (Pulau Pasir)
- Cartier Islet (Pulau Baru)
- Seringapatam Reef (Afringan)
- Scott Reef (Pulau Dato)
- Browse Island (Berselan).

This agreement came into effect on 1 February 1975 and with modifications has remained in effect to this day. An advisory note, dated 28 February 1988, attempted to define the traditional nature of fishing activities by prohibiting motorised vessels and by confining activities to sailing perahu (vessels). The effect of the changes to the original MoU, which included the closure of Ashmore Reef, shifted the activities of traditional Indonesian fishermen to Seringapatam Reef, Scott Reef and Browse Island. However, Seringapatam Reef offers limited opportunities for gathering trepang and Browse Island is mainly targeted for traditional shark fishing. Thus, Scott Reef is the principal reef in the MoU Box to which Indonesian fishermen regularly sail, on a seasonal basis. Figure 2-2 illustrates the MoU Box location.

The predominant anchoring and fishing grounds are within the sheltered shallow locations inside the North Reef and South reef lagoons. No anchoring or diving for trepang is expected to take place in the deep waters outside North Reef although some line fishing (trolling) may take place as vessels move outside North Reef. Although, the vessels are known to sail from North to South Reef lagoons and consequently will cross through the Offshore Kimberley GPGT Campaign operational area, this is expected to take place during daylight hours due to the lack of navigational equipment and night lighting on these very basic traditional fishing vessels.

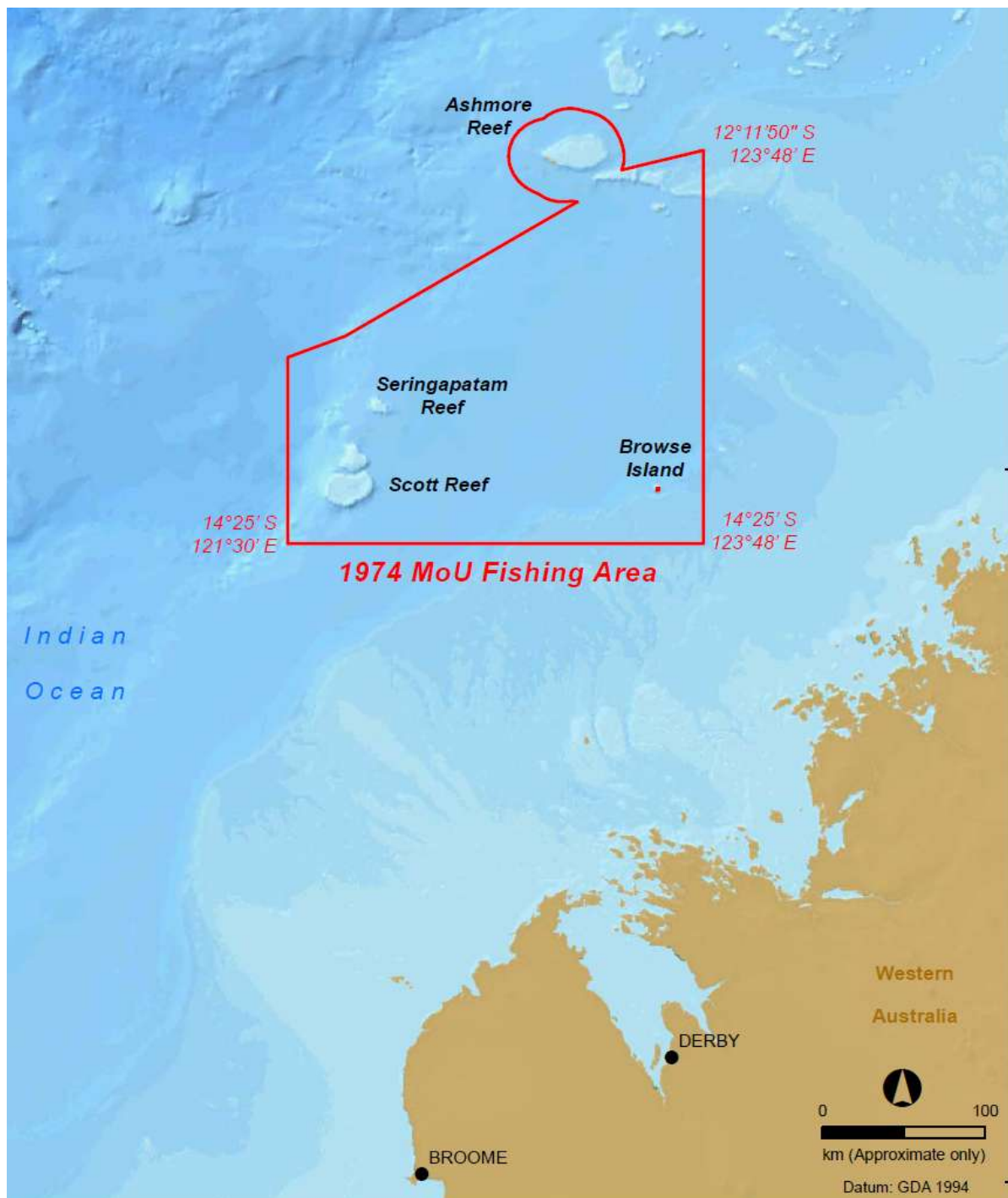


Figure 2-2: The Location of the 1974 MoU Box

2.4.3. Existing Petroleum Exploration and Production

No petroleum facilities exist within the Offshore Kimberley GPGT operational area.

2.4.4. Tourism Activity and Recreational Fishing

Historical discussions with regional tourism groups and RecFishWest indicate that only one to two recreational fishing charter operators access Scott Reef. The location has the potential to provide significant opportunities for pelagic sport fishing but, given the distance from Broome, only a limited

number of charter operators are prepared to take recreational fishers out to Scott Reef. Consequently interference is expected to be minimal.

2.4.5. Commercial Fishing

The diverse range of habitats and species within the North West has allowed for various fisheries to develop and operate throughout the region. In 1988, under the Offshore Constitutional Settlement (OCS), the Commonwealth passed jurisdiction for the management of many of the fisheries off the WA coast to the Government of Western Australia. Under the terms of the OCS, the Australian Fisheries management Authority (AFMA) has management responsibility for all marine species taken by trawl in waters deeper than 200 m, while the Department of Fisheries, Western Australia (DFWA) has responsibility for species taken with non-trawl methods in these waters (except tunas) and for all trawling in inshore waters (< 200 m depth). The Offshore Kimberley GPGT Campaign is located in water depths approximately 10 m to 1450 m. These depths are situated within both State and Commonwealth managed fisheries. Major commercial fisheries relevant to the Offshore Kimberley GPGT Campaign are listed in **Table 2-2**.

Table 2-2: Commonwealth and State Commercial Fisheries.

Operational Region	Offshore Kimberley
Commonwealth Fisheries	
North West Slope Trawl Fishery (NWSTF)	I
Western Tuna and Billfish Fishery (WTBF)	I
Western Skipjack Fishery (WSTF)	I
Southern Bluefin Tuna Fishery (SBTF)	I
State Fisheries	
Pearl Oyster Fishery	I
Western Australia North Coast Shark Fishery	I
Abalone Fishery	A
West Australian Mackerel Fishery	I
Broome Prawn	A
Kimberley Prawn	A
Northern Demersal Scalefish Fishery (NDSF)	I

Note:

I - Fishery intersects with the operational area

A - Fishery is adjacent to the operational area

2.4.6. Shipping

The Kimberley GPGT Campaign operational areas are subject to commercial shipping en-route from ports along the West Australian coast. Shipping in the region is expected to include:

- international bulk freighters
- domestic support/supply vessels servicing offshore facilities

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- construction vessels/barges/dredges
- offshore survey vessels.

The Australian Maritime Safety Authority (AMSA) has introduced a network of commercial shipping fairways (AMSA 2013) in order to reduce the risk of potential vessel collisions with offshore infrastructure. The fairways are not mandatory, but AMSA strongly recommends commercial vessels remain within the fairway when transiting the region.

The main commercial shipping channels in the Offshore Kimberley Region are located approximately 50–100 km west of Scott Reef. Some minor shipping occurs between Broome and the Scott Reef area; however, the majority of these vessels are research vessels, fishing vessels and gas exploration support vessels.

2.4.7. Commonwealth and State Marine Parks and Reserves

The State and Commonwealth government have recently established a new comprehensive and representative network of marine protected areas (MPA) in the State and Commonwealth waters of Western Australia (Figure 2-3). The network includes a number of existing MPAs and a number of new MPAs that comprise of environmental assets of high value or sensitivity, from a regional, State or national perspective. These values and sensitivities include habitats or species that are particularly vulnerable or that provide valuable ecological services such as coral reefs, mangroves, seagrass meadows and macroalgae. Figure 2-3 show the marine parks and reserves surrounding the Offshore Kimberley GPGT Campaign area.

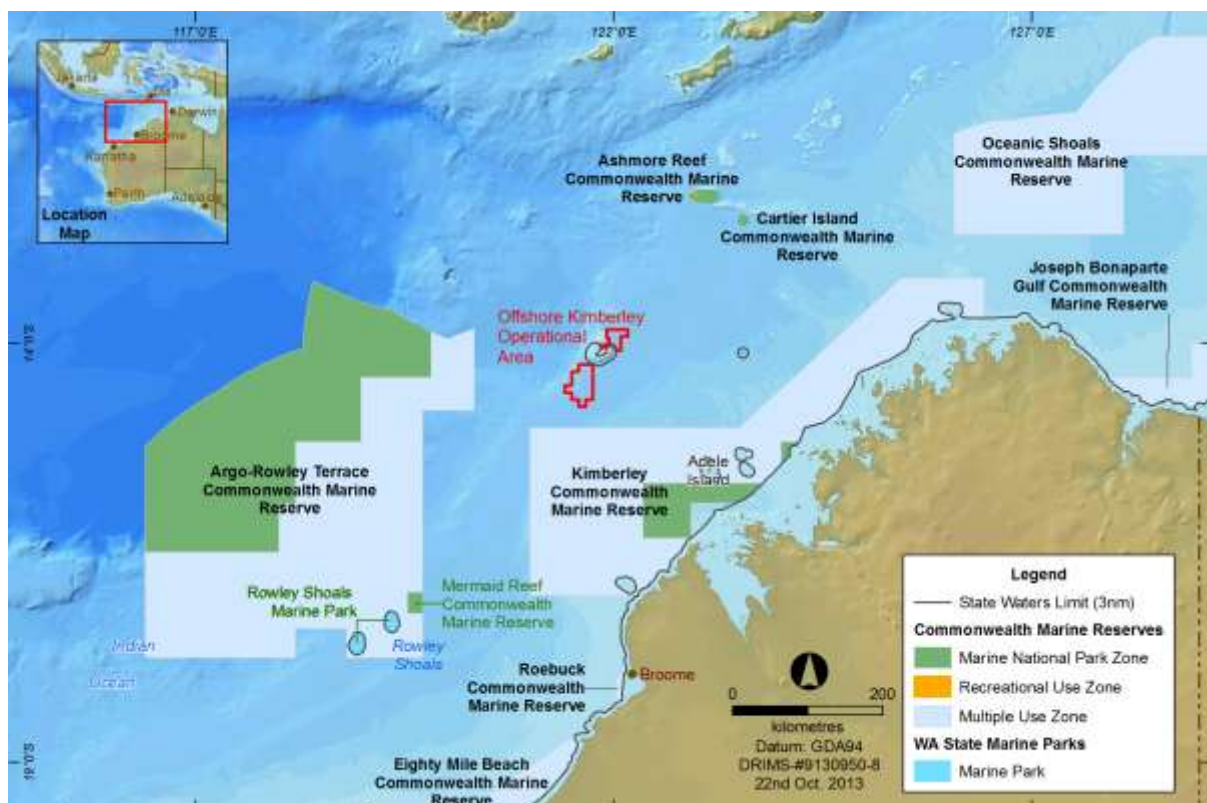


Figure 2-3: Existing and Proposed Marine Parks and Reserves for the Offshore Kimberley GPGT Campaign

3. DESCRIPTION OF THE ACTIVITIES

The purpose of the Offshore Kimberley GPGT Campaign is to acquire data to support engineering design for commercialising petroleum discoveries through new production facilities. The activity consists of two types of surveys; geophysical and geotechnical. Surveys within each operational area have been planned so that the geophysical survey results are used to optimise the number of geotechnical locations required.

Due to the type of each activity, each of these surveys will most likely require different vessels. In the event that separate vessels are required, all pre-mobilisation inspection measurement criteria related to the vessel will be reassessed/inspected.

3.1. Geophysical Survey

Geophysical survey is the systematic collection of geophysical data (i.e. measurements of seabed characteristics, imaging and profiling) for spatial studies. The geophysical phases of the Offshore Kimberley GPGT Campaign will be conducted along a series of survey lines nominally 100 m apart. Geophysical lines are proposed to be surveyed with the following conventional techniques:

- Multi Beam Echo Sounder (MBES);
- Side Scan Sonar (SSS);and
- Sub Bottom Profiler (SBP, including Mini Air Gun (MAG))

A survey vessel together with Autonomous Underwater Vehicle (AUV), towfish and catamaran will be used to deploy equipment and collect geophysical data.

3.2. Geotechnical Survey

The geotechnical investigation (survey) will be performed using standard industry equipment and will consist of *in situ* testing and the recovery of soil and rock samples at locations within the operational area to ground truth the geophysical data and provide geotechnical data for engineering design.

The geotechnical investigation will involve the following activities:

- *In Situ* Testing: To depths of between 1 – 100 metres below the seabed.
- Sampling: To depths of between 1 – 100 metres below the seabed.

At a limited number of locations, it may be necessary to perform sampling and/or *in situ* testing to a maximum depth of 150 m below seabed, depending on the ground conditions.

The geophysical survey data will be used to optimise the geotechnical sampling and *in situ* testing programme. The final geotechnical programme will be determined by the results of geophysical survey and the ground conditions.

4. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Offshore Kimberley GPGT Campaign 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 key environmental hazards and control measures to be applied to the Offshore Kimberley GPGT Campaign 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 Offshore Kimberley GPGT Campaign will be managed in compliance with the *Offshore Kimberley Geophysical and Geotechnical Campaign 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 Offshore Kimberley GPGT Campaign, during both routine and non routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

The Offshore Kimberley GPGT Campaign 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 Offshore Kimberley GPGT Campaign 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 Offshore Kimberley GPGT Campaign 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 campaign 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 and commercial 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 stakeholder feedback in its development of management measures specific to these activities. Woodside will continue to accept feedback from stakeholders during the surveys.

7. CONTACT DETAILS

For further information about this activity, please contact:

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8. REFERENCES

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APPENDIX A: Summary of Major Environmental Hazards and Control Measures to be applied to the Offshore Kimberley GPGT Campaign

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
PLANNED (ROUTINE AND NON-ROUTINE) ACTIVITIES		
<p>Vessel noise emissions during normal survey operations (excluding survey acoustic sources)</p>	<p>Short-term localised disturbance to marine fauna such as alteration of behaviours and localised displacement.</p>	<p>Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with <i>EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05) – Interacting with cetaceans</i>, which requires</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>Interaction between survey vessels and cetaceans (whales and dolphins), within the operational areas will be consistent with <i>EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.06) – Interacting with calves</i>, which requires</p> <ul style="list-style-type: none"> • survey vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone) • If a calf appears in the caution zone, then: <ul style="list-style-type: none"> • the vessel must be immediately stopped; and • Must either <ul style="list-style-type: none"> • Turn off the vessel’s engines; or • Disengage the gears; or • Withdraw the vessel from the caution zone at a constant speed of less than 6 knots. <p>The implementation of Performance Standard #1 to marine turtles from <i>1 December to 31 March</i>.</p> <p>Exception: <i>The above requirement does not apply to survey vessels operating under limited/constrained manoeuvrability including but not limited to vessels towing equipment and acquiring data, or in the event of an emergency.</i></p> <p>Geophysical and Geotechnical survey activities are not to be undertaken outside of the operational area.</p> <p>Note: <i>This performance standard provides a minimum offset of 5km from turtle nesting beaches.</i></p>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Transfer of ballast water	Introduction and establishment of invasive marine species from ballast water	<p>Adherence the <i>Australian Ballast Water Management Requirements (AQIS 2008)</i>;</p> <ul style="list-style-type: none"> As a minimum, all vessels mobilised from outside of Australia must undertake ballast water exchange > 50 nm from land and >200m water depth; or any alternative methods for ballast water management will be approved by DAFF Biosecurity in writing before the event. Ballast water exchange records will be maintained.
Transport of biofouling on the vessel hull, internal niches and in-water equipment	Introduction and establishment of invasive marine species from biofouling	<p>Adherence to the Woodside Energy Limited Invasive Marine Species Management Plan (WEL Doc No. A3000AH4345570).</p> <ul style="list-style-type: none"> Woodside's IMS risk assessment process will be applied to all vessels and submersible equipment planning to enter and operate within nearshore waters around Australia. Nearshore areas include all waters within 12 nautical miles of land and in all waters less than 50 m deep at LAT. Based on the outcomes of each IMS risk assessment, management measures commensurate with the risk will be implemented to minimise the likelihood of new IMS being introduced, or established IMS being spread within Australian waters. All vessels which come within the Scott Reef IMS Management Zone (ie 3nm of Scott Reef) and stay within this region for a period of time greater than 48 hours will be inspected. <p>The Department of Fisheries (DoF) will be notified within 24 hours of any known or suspected introduced marine species detected in Western Australian State waters.</p>
Vessel lighting	Disturbance to marine fauna	<p>Lighting used to meet standards required for safety as determined by the Vessel Master.</p> <p>During the sensitive operational period no lit vessels to be anchored or moored within 1.5 km of known turtle nesting beaches during turtle nesting season (unless in case of emergency).</p> <p>Lighting from indoor sources will be minimised by implementing measures (i.e. turning out lights where not required for safety, use of curtains (where available) etc.).</p>
Underwater noise emissions from operation of survey equipment	Disturbance to marine fauna, particularly whales, marine turtles, potentially as physical damage or as behavioural effect	<p>Geophysical and Geotechnical survey activities are not to be undertaken outside of the operational area.</p> <p>Note: <i>This performance standard provides a minimum buffer of 5km from turtle nesting beaches.</i></p> <p>The use of a dedicated Marine Fauna Observer (MFO) or dedicated and suitably trained crew member on the survey vessel during daylight hours when implementing Performance Standard for whale controls and marine turtle controls.</p>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p>Whale Controls</p> <p>The following mitigation measures will be applied when operating the MAG;</p> <ul style="list-style-type: none"> • If a whale is sighted within a 100 m observation zone from the MAG, then commencement of operation is delayed until the whale has moved outside of the 100 m observation zone, or a period of 10 minutes has passed since the last sighting; • The MAG will be shutdown if a whale is sighted within 100 m of the operating source; • The MAG will not will not be operated at night time if there has been 3 relevant whale shutdowns within daylight hours of the previous 24 hours; • Dedicated Marine Fauna Observer (MFO) or dedicated and suitably trained crew member will be on watch onboard the survey vessel to undertake observations for whales during daylight hours. <p>Marine Turtle Controls</p> <p>The following mitigation measures will be applied when operating the SBP if activities are conducted within the Sensitive Operational Period (<i>1 December to 31 March for marine turtles</i>);</p> <ul style="list-style-type: none"> • If marine turtles are sighted within a 100 m observation zone from surface sources, then commencement of operation of geophysical survey equipment is delayed until the marine turtle has moved outside of the 100 m observation zone, or a period of 10 minutes has passed since the last sighting. • The surface source will be shutdown if a marine turtle is sighted within 100 m of the operating source; • The surface source will not will not be operated at night time if there has been 3 relevant marine turtle shutdowns within the previous 24 hours Dedicated Marine Fauna Observer (MFO) or dedicated and suitably trained crew member will be on watch onboard the survey vessel to undertake observations for marine turtles during daylight hours. <p>No discharge of the SBP and/ or MAG within 50 m of the 80 metre water depth contour around Scott Reef.</p>
<p>Routine Atmospheric Emissions from fuel use or waste combustion</p>	<p>Contribution to global greenhouse gas emissions; and consumption of non-renewable natural resources</p>	<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
<p>Discharge of bilge water, grey water, sewage and putrescibles waste</p>	<p>Localised eutrophication of the water column; and consumption of non-renewable natural resources.</p>	<p>Sewage, Grey water and Putrescible Waste:</p> <p>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>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<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 <ul style="list-style-type: none"> <i>Treated Sewage</i> - Discharge permitted \geq 3nm from the nearest land. <i>Untreated Sewage</i> - Discharge permitted \geq 12nm from the nearest land. <i>Grey Water</i> - Discharge permitted except within \leq 3nm from outer boundaries of North and South Scott Reef (Figure 5-3 of EP). <i>Putrescible Waste</i> comminuted or ground to particle size $<$ 25mm - Discharge permitted \geq 3nm from the nearest land. <p><i>Putrescible Waste</i> not comminuted or ground - Discharge permitted \geq 12nm from the nearest land.</p> <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. No discharged of any bilge water \leq 3nm from outer boundaries of North and South Scott Reef (Figure 5-3 of EP).
<p>Disturbance to seabed as a result of geotechnical and geophysical activities including Permanent deployment of survey equipment (ie USBL Transponder weights, metocean monitoring sites)</p>	<p>Smothering of benthic communities and increased localised turbidity</p>	<p>Geotechnical survey activities are not to be undertaken outside of the operational area</p> <p>Geotechnical sampling and deployment of metocean equipment/USBL will not be undertaken at water depths $<$ 80 m.</p> <p>Metocean moorings deployed at depths $<$100m will be recovered where it is safe and practicable to do so.</p>
<p>Routine Discharge of drilling fluids to the marine environment from survey equipment</p>	<p>Localised contamination of the water column; and localised adverse affect to the marine biota (i.e. smothering)</p>	<p>Environment Procedure: Offshore Chemical Selection and Assessment (WEL Doc No. A1000PH9105410), including:</p> <ul style="list-style-type: none"> Where chemicals are rated Gold, Silver, E or D on OCNS with no substitution warnings, they may be approved for use, providing they are used as detailed in the relevant contractor procedure. Chemicals with OCNS rating other than Gold, Silver, E or D or those which have a substitution or product warning require an ALARP demonstration before use. The ALARP demonstration will include:

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<ul style="list-style-type: none"> ○ Details of the chemical application (volumes, concentration, location) ○ Ecotox data ○ Fate of the chemical ○ alternatives available to the Global and Australian market <p>Technical performance and safety considerations, including consideration of concentration of chemicals based on requirements for technical performance.</p> <p>Water Based Mud (WBM) drilling fluid will be used during the geotechnical survey.</p> <p>Geotechnical sampling will not be undertaken within the 80 metre water depth contour around Scott Reef.</p>
PLANNED ACTIVITIES (STAKEHOLDER RISKS)		
Interference with/exclusion of commercial fishing operations and shipping	Interference with/exclusion of commercial fishing/shipping operations	<p>Survey vessel 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>The Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) (as part of marine safety division) is notified of the vessel movements prior to mobilisation* so that AMSA RCC ensures that navigation Auscoast warnings can be issued and kept up to date</p> <p>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.</p> <p><i>*Separate notifications will be made for each activity (i.e. Geophysical, Geotechnical).</i></p>
Interference with/exclusion of recreational activities (i.e. recreational fishing, tourism activities, charter boats or research activities)	Interference with/exclusion of recreational fishing operations (i.e. fishing competitions), tourism, charter boats or research activities operations	<p>Survey vessel 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>The Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) (as part of marine safety division) is notified of the vessel movements prior to mobilisation* so that AMSA RCC ensures that navigation Auscoast warnings can be issued and kept up to date</p>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p>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. *Separate notifications will be made for each activity (i.e. Geophysical, Geotechnical).</p>
Interference with Indonesian Traditional Fisheries	Interference with and displacement of Indonesian Traditional fisherman	<p>Survey vessel 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>A survey information 'fact sheet' including safety warnings of the vessel activity will be translated into Bahasa Indonesia and distributed to traditional fishers to alert them of the survey vessel activity.</p>
UNPLANNED ACTIVITIES (ACCIDENTS OR INCIDENTS)		
Collision between survey vessel and marine fauna	Injury and fatality to protected fauna	<p>Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with <i>EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05) – Interacting with cetaceans</i>, which requires:</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>Interaction between survey vessels and cetaceans (whales and dolphins), within the operational areas will be consistent with <i>EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.06) – Interacting with calves</i>, which requires:</p> <ul style="list-style-type: none"> • survey vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone) • If calf appears in the caution zone, then: will <ul style="list-style-type: none"> • The vessel must be immediately stopped; and • Must either: <ul style="list-style-type: none"> • Turn off the vessel's engines; or • Disengage the gears; or • Withdraw the vessel from the caution zone at a constant speed of less than 6 knots. <p>The implementation of Performance Standard #1 to marine turtles from 1 December to 31 March. Exception: The above requirement does not apply to survey vessels operating under limited/constrained manoeuvrability including but not limited to vessels towing equipment and acquiring data, or in the event of an emergency.</p> <p>Geophysical and Geotechnical survey activities are not to be undertaken outside of the operational</p>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		area. Note: This performance standard provides minimum buffer of 5km from turtle nesting beaches. Compliance with required notifications of activities affecting cetaceans under the EPBC Regulations
Release of hazardous or non-hazardous waste	Pollution and contamination of the environment and secondary impacts of marine fauna (e.g. ingestion, entanglement)	Current Vessel Waste Management Plan (or equivalent) in place detailing wastes generated and disposal requirements. Must contain as a minimum: <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. No incidents of significant releases of waste materials to the marine environment Any accidental release of significant wastes to the marine environment will be recovered where safe and practicable to do so.
Accidental loss/grounding of significant geophysical or geotechnical equipment	Damage to benthic communities	Operational procedures will be in-place on board the vessel for deployment and retrieval of geophysical and geotechnical equipment. Geotechnical design packs will be provided from the contractor to demonstrate that geotechnical equipment rigging and supporting structures do no become overloaded during any phase of the geotechnical equipment deployment or recovery operations Lost equipment will be relocated and recovered where safe and practicable to do so. Geophysical and geotechnical acquisition will only be conducted in suitable sea conditions (i.e. safe sea states) as defined by the Vessel Master and/or Party Chief. AMSA/AHS/potentially affected stakeholders will be notified in the event significant equipment is unable to be recovered. Notification will allow for stakeholder to raise Notice to Mariners if necessary.
Vessel grounding	Damage to benthic communities	Survey vessel 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). No vessel operations or deployment of equipment outside of the operational areas. <i>Note: the operational area boundary was defined by applying a 100m offset from the 10 m smoothed contour at north Scott Reef to minimise risk of vessel grounding.</i> Geophysical survey lines designed to run parallel with bathymetry contours Close pass procedures will be developed for all activities within 400m of the operational area boundary. These procedures will include;

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<ul style="list-style-type: none"> • the requirement to undertake close pass operations only during daylight hours • clear identification of close pass lines • clearly defined roles and responsibilities including specifically assigned watch keepers (look-outs); • clearly defined communications protocols on vessel; • vessel readied including a check that all systems are functioning correctly and a review of sea state, weather, visibility requirements and other conditions; • an understanding of the tidal cycles, currents and bathymetry. <p><i>Note: The close pass procedure takes in to account 100 m offset from the 10 m smoothed contour implemented to define the operational area boundary for north Scott Reef.</i></p>
<p>Discharges from survey equipment to the marine environment</p>	<p>Localised contamination of the water quality and localised temporary affect to the marine environment</p>	<p>Subsea equipment utilising hydrocarbons will be maintained to reduce the risk of loss of hydrocarbon containment to the marine environment.</p> <p>In water equipment (subsea equipment and towed equipment) utilising hydrocarbons will be inspected to ensure equipment is not leaking and critical hydraulic hoses are in good working order prior to deployment.</p> <p>Subsea hydraulic fluid use will be monitored and recorded and any discrepancies will be investigated to identify unplanned use and possible integrity issues.</p>
<p>Hydrocarbon release caused by topside (vessel) loss of containment</p>	<p>Biological and ecological impacts to open water environment with temporary reduction in water quality and potential for sublethal impacts to transiting megafauna, if in spill affected area. Potential for sublethal and lethal impacts to coral species of the shallow reef habitats of Scott Reef (North and South) and Seringapatam</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 as applicable to vessel class. <p>Storage:</p> <p>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:</p> <p>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>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p>Spill Response: Spill response bins/kits are maintained and located in close proximity to hydrocarbon storage areas and deck equipment / bunkering areas for use to contain and recover deck spills.</p>
<p>Hydrocarbon release caused by loss of structural integrity (vessel collision or vessel grounding)</p>	<p>Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries</p>	<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 7, 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 as applicable to vessel class. <p>Implementation of the Offshore Kimberley GPGT Campaign Oil Spill Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</p> <p>No vessel operations or deployment of equipment outside of the operational areas.</p> <p><i>Note: the operational area boundary was defined by applying a 100m offset from the 10 m smoothed contour at north Scott Reef to minimise risk of vessel grounding</i></p> <p>Geophysical survey lines designed to run parallel with bathymetry contours.</p> <p>Close pass procedures will be developed for all activities within 400m of the operational area boundary. These procedures will include;</p> <ul style="list-style-type: none"> • clear identification of close pass lines • clearly defined roles and responsibilities including specifically assigned watch keepers (look-outs); • clearly defined communications protocols on vessel; • vessel readied including a check that all systems are functioning correctly and a review of sea state, weather, visibility requirements and other conditions; • an understanding of the tidal cycles, currents and bathymetry. <p><i>Note: The close pass procedure takes in to account 100 m offset from the 10 m smoothed contour implemented to define the operational area boundary for north Scott Reef.</i></p>

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