Fortuna 3D MSS
Environment Plan Summary

Geotechnical Operations

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator, proposes to undertake a three dimensional (3D) marine seismic survey (MSS), referred to as the Fortuna 3D MSS, in offshore Commonwealth waters approximately 87 km north-west of Dampier Archipelago.

The scope of this Environment Plan (EP) is the Fortuna 3D MSS operational area (refer to **Section 2.1**). The Fortuna 3D MSS survey acquisition lines are located within Petroleum Exploration Permit, Licence and Lease Areas WA-11-L, WA-23-L, WA-30-L, WA-5-L, WA-9-L, WA-16-L, WA-24-L, WA-3-L, WA-9-R, WA-1-L, WA-448-P, WA-2-L, WA-35-R, WA-28-P R7, WA-4-L, WA-6-L, WA-52-L and WA-53-L (previously known as WA-10-R), WA-1-P, WA-17-L, WA-208-P, WA-27-L, WA323-P, WA-330-P, WA-360-P, WA-361-P, WA-412-P, WA-452-P, WA-457-P, WA-48-R and WA-458-P (**Figure 2-1**).

The Fortuna 3D MSS is scheduled to begin in November 2013 and will run for a period of up to six months. The Fortuna 3D MSS is planned (survey timing and duration) to avoid windows of environmental sensitivity such as the humpback whale migratory period in the area.

The actual timeframe is dependent on survey vessel availability and prevailing weather conditions.

This document provides a summary of the Environment Plan (EP) that was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in accordance with Regulation 11(1) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Environment Regulations).

This EP summary has been prepared as per the requirements of Regulation 11 (7) and (8) of the Environment Regulations.

2. LOCATION OF THE ACTIVITY

The proposed Fortuna 3D MSS will occur in offshore Commonwealth waters approximately 87 km north-west of Dampier Archipelago. Water depths range from approximately 18 m (at the Rankin Bank) to 300 m within the operational area (**Figure 2-1**).

The Montebello Islands (approximately 33 km south west) are the nearest landfall to the Fortuna 3D MSS operational area. Approximate distances to other key landfall locations include: 108 km to Cape Preston.

An ‘operational area’ surrounds the ‘survey acquisition area’[1] providing a buffer area of approximately 10 – 15 km in width making up a total area of approximately 9850 km2.Within this ‘operational area’, the seismic source may be discharged at or below full capacity (power) for the purpose of run-ins and run-outs, source testing and soft starts.

The Fortuna 3D MSS ‘survey acquisition area’ and ‘operational area’ are presented in **Table 2-1, Table 2-2,** and in **Figure 2-1**.

[1] *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 Fortuna 3D MSS.*

Table 2-1: – Approximate Boundary coordinates for 'Survey acquisition area'

Location Point	Latitude	Longitude
A	19°25'8.731"S	116°14'12.878"E
B	19°23'16.118"S	116°17'15.138"E
C	19°19'55.231"S	116°28'56.493"E
D	19°19'55.234"S	116°30'4.664"E
E	19°19'55.234"S	116°30'4.757"E
F	19°19'55.230"S	116°31'14.279"E
G	19°23'13.236"S	116°36'28.911"E
H	19°35'47.783"S	116°36'1.054"E
I	19°37'23.898"S	116°33'22.195"E
J	19°46'40.823"S	116°17'59.350"E
K	19°49'55.236"S	116°15'4.743"E
L	19°49'55.284"S	116°1'5.640"E
M	19°49'55.246"S	116°0'5.943"E
N	19°56'32.855"S	115°49'26.885"E
O	19°56'32.777"S	115°47'18.857"E
P	19°56'32.265"S	115°39'22.740"E
Q	19°49'57.950"S	115°32'59.748"E
R	19°46'5.318"S	115°38'56.335"E
S	19°42'47.302"S	115°36'32.126"E
T	19°26'26.782"S	116°3'9.952"E
U	19°25'8.821"S	116°14'12.116"E

Datum: GDA94

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

Location Point	Latitude	Longitude
A	19°37'35.650"S	115°29'12.058"E
B	19°18'36.279"S	116°0'9.376"E
C	19°17'18.433"S	116°11'11.422"E
D	19°15'48.961"S	116°13'36.698"E
E	19°11'24.538"S	116°28'58.104"E
F	19°11'38.729"S	116°32'36.640"E
G	19°12'16.097"S	116°34'25.926"E
H	19°15'49.789"S	116°44'51.107"E
I	19°18'7.318"S	116°48'21.930"E
J	19°19'51.775"S	116°49'33.630"E
K	19°20'48.206"S	116°50'6.680"E
L	19°23'39.426"S	116°50'59.139"E
M	19°36'3.130"S	116°54'28.255"E
N	19°44'14.631"S	116°41'2.351"E
O	19°45'11.623"S	116°38'19.245"E
P	19°45'21.040"S	116°36'10.573"E
Q	19°52'52.890"S	116°23'41.945"E
R	19°58'2.978"S	116°19'3.493"E
S	19°58'3.259"S	116°2'38.696"E
T	20°4'40.810"S	115°52'1.630"E
U	20°4'39.747"S	115°35'35.712"E
V	19°48'34.075"S	115°19'59.044"E
W	19°44'23.455"S	115°26'24.168"E
X	19°41'19.736"S	115°27'2.876"E
Y	19°41'19.736"S	115°29'12.058"E

**Datum: GDA94*

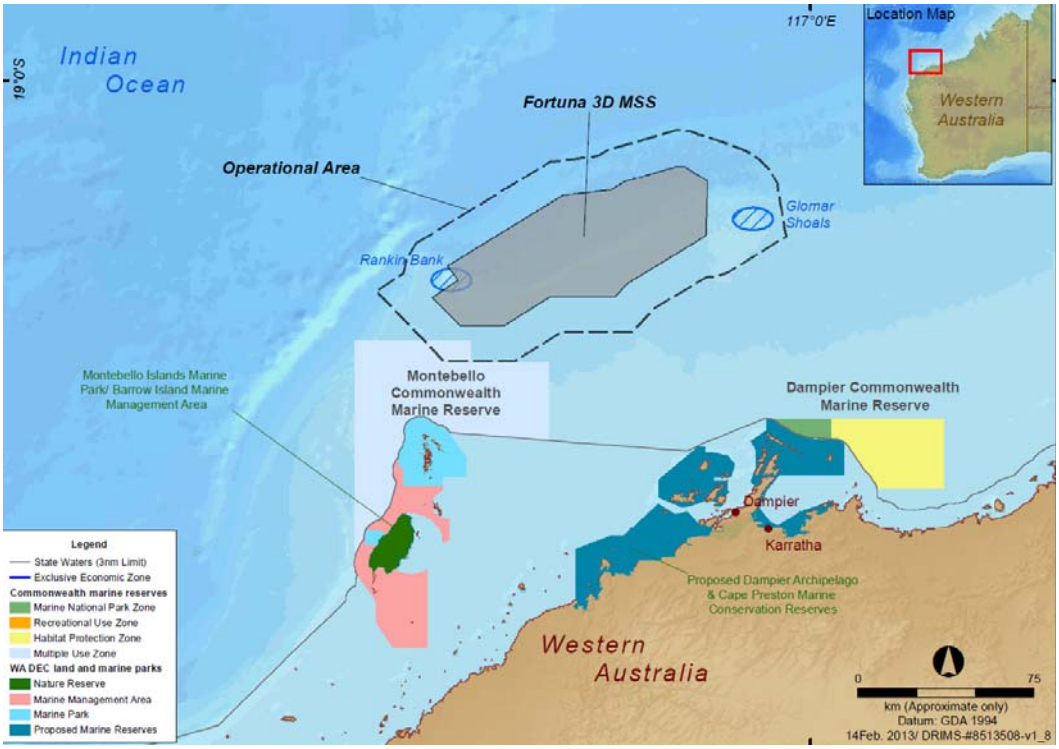

Figure 2-1: Location of the Fortuna 3D MSS 'operational' and 'acquisition' area.

3. DESCRIPTION OF ENVIRONMENT

3.1 Physical Environment

The proposed Fortuna 3D MSS will occur in offshore Commonwealth waters approximately 87 km north-west of Dampier Archipelago. Water depths range from approximately 18 m (at the Rankin Bank) to 300 m within the operational area. The North West Shelf (NWS) is part of the wider North-West Marine Region (NWMR) (**Figure 3-1**) as defined under the Integrated Marine and Coastal Regionalisation of Australia (CoA 2006). The NWS province encompasses the continental shelf between North West Cape and Cape Bougainville (Kimberly region), and varies in width from approximately 50 km at Exmouth Gulf to greater than 250 km off Cape Leveque (DSEWPaC 2012a).

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) of 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.

3.2 Biological Environment

A number of targeted surveys to investigate epibenthos and infauna of offshore NWS and slope environments have been carried out by Woodside. These surveys have included grab samples of seabed sediments from around North Rankin Complex (NRC), Goodwyn A (GWA), Angel facilities and the export pipeline route (Sinclair Knight Merz 2006) and the surrounding area, as well as additional sampling within permit areas further south and in greater depths (greater than 850 m) (Heyward *et al*. 2001).

The seabed surveys conducted along the export pipeline route showed infauna dominated by polychaetes and crustaceans which were associated with the soft, unconsolidated sediment in this area of the NWS (Bowman Bishaw Gorham 2000; Sinclair Knight Merz 2006). These results supported the findings of other NWS sampling programs which indicated a widespread and well represented infauna assemblage along the continental shelf and upper slopes (Rainer 1991; LeProvost, Dames and Moore 2000; Woodside 2004; Brewer *et al*. 2007; RPS 2012).

A review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database (Protected Matters Search Tool) (February 2013) held by the Department of Sustainability Environment Water Population and Communities (SEWPaC), identified a total of 79 EPBC Act listed marine species that may occur within or traverse the area. Of those, 10 threatened marine species and 16 are migratory species under the EPBC Act.

In general, the identified *EPBC Act* marine species if present within the operational area are likely to be transient visitors and there are no known feeding, breeding, resting or calving grounds for any EPBC Act listed species within the operational area. However, it is acknowledged that critical life stage activities for a number of the listed EPBC Act species (for example, marine turtles and seasonal nesting) occur in the wider region outside the operational area.

Whales

The humpback whale (*Megaptera novaeangliae*) is the most commonly sighted whale in north Western Australian waters. The species is observed seasonally during their migration to and from the Camden Sound area of the west Kimberley (Jenner *et al.*, 2001), after feeding in Antarctic waters during the summer months (Bannister and Hedley, 2001). Humpback whales follow a predictable migratory path and timing each year for both north and south bound migrations along the Western Australian coast, including the North West Shelf. The peak of the northward migration is during July, whilst the southern migration peak is late August and September. Satellite tracking of the north and southbound humpback

whales (Double *et al.* 2010 and 2011) has shown the whales travelling inshore of the Fortuna 3D MSS operational area. On the southbound migration it is likely that most individuals, particularly cow/calf pairs, stay closer to the coast in comparison to the northern migratory path, with whales following a relatively narrow track between the Dampier Archipelago and Montebello Islands. This was confirmed by satellite tracking of southbound female humpback whales in the Kimberley region (Double *et al.,* 2010).

The Fortuna 3D MSS has been scheduled to occur between November 2013 and May 2014 is expected to avoid humpback whale migration season.

Pygmy blue whale migration is thought to follow deep oceanic routes (DEWHA 2009). The most recent satellite tagging confirmed pygmy blue whales general distribution was offshore in water depths over 200 m and commonly over 1,000 m (Double *et al*. 2012). Sea noise loggers set at various locations along the coast of WA have detected an annual northbound and southbound migration of pygmy blue whales past Exmouth and the Montebello Islands (McCauley and Jenner 2010; McCauley and Duncan 2011). Satellite tracking has confirmed north-bound animals detected off Exmouth and the Montebello Islands between April and August, and south-bound animals passing the same areas from October to the end of January, peaking in late November to early December (Double *et al*. 2012). The Fortuna 3D MSS is not in proximity to the known pygmy blue whale migration routes (using satellite tracks) though the survey will overlap with the north bound (April / May) and south bound (November / December) migratory season.

The presence of other species such as the Antarctic minke whale, bryde's whale, killer whale and sperm whale within the Fortuna 3D MSS operational area is considered to be unlikely and limited to a few individuals transiting the area.

Whale sharks

Whale sharks may traverse offshore NWS waters including the Fortuna 3D MSS operational area during their migrations to and from Ningaloo Reef. However, it is expected that whale shark presence within the Fortuna 3D MSS operational area at the time of the survey would not comprise significant numbers given the main aggregations are recorded in coastal waters, particularly, the Ningaloo Reef edge in the period April to May (MPRA 2005; Sleeman *et al.* 2009) and their presence would be transitory and of a short duration.

Marine turtles

Five of the six marine turtle species, as recorded for the NWS province, are listed in the EPBC Act Protected Matters Report for the Fortuna 3D MSS operational area. The marine turtles identified were: green turtle (*Chelonia mydas*), the loggerhead turtle (*Caretta caretta*), hawksbill turtle (*Eretmochelys imbricata*), flatback turtle (*Natator depressus), and* leatherback turtle (*Dermochelys coriacea*)

With consideration of the distance offshore (approximately 87 km north-west of Dampier Archipelago), depth range (approximately 18 to 300 m), and absence of potential nesting or foraging sites (i.e. no emergent islands, reef habitat or shallow shoals) the Fortuna 3D MSS operational area is not considered an important habitat for marine turtles. While it is acknowledged that there are significant nesting sites along the mainland coast and islands of the region, the primary nesting locations (such as Dampier Archipelago) are at least 70 km distance from the operational area boundary of Fortuna 3D MSS.

Post-nesting migratory routes for green, hawksbill and flatback turtles are recorded for the Pilbara area (Barrow Island and mainland sites) (Chevron Australia 2012) and Scott Reef (Guinea 2011) indicate no overlap with the Fortuna 3D MSS operational area. Tracking data indicate the turtles travel and forage in relatively shallow water, with hawksbill turtles present in depths of less than 10 m, green turtles less than 25 m and flatback turtles less than 70 m (Chevron Australia 2012) and are therefore not expected in the offshore waters of the operational area in large numbers.

3.3 Socio-economic Environment

The Fortuna 3D MSS operational area is located in water depths approximately 18 m to 300 m, although acquisition will predominantly occur in water depths ranging from approximately 80 m to 300 m. These depths are situated within both State and Commonwealth managed fisheries. State fisheries, however, have not reported significant catches beyond the 50 m isobath, and the Commonwealth fisheries such as the Pilbara Trawl Fishery occur beyond the 200 m depth contour.

There are no known sites of Indigenous or European cultural heritage significance within the vicinity of the Fortuna 3D MSS operational area.

No tourism activities are known to regularly take place within the Fortuna 3D MSS operational area. However, it is acknowledged that there are growing tourism and recreational sectors in Western Australia and these sectors have expanded in the Pilbara and Gascoyne regions over the last couple of decades. Potential for growth and further expansion in tourism and recreational activities in the Pilbara and Gascoyne regions is recognised and, particularly, with the development of regional centres and a workforce associated with the resources sector (Gascoyne Development Commission 2012).

Due to water depths and distance offshore, recreational fishing and/or charter boats are unlikely to occur in the Fortuna 3D MSS operational area. An estimated third of the Western Australian population participate in recreational fishing each year (approximately 640,000 fishers) (DoF 2012), however, it is mainly concentrated around the coastal waters and islands (including Dampier Archipelago, Ningaloo Marine Park, North West Cape area) (DoF 2011). Occasional recreational/charter boat fishing occurs at Glomar Shoals (located within the north western area of the operational area) and Rankin Bank (in the south west of the operational area).

There is one shipping lane passing through the Fortuna 3D MSS operational area. However, this was confirmed during consultation with the Australian Hydrographic Office as being intended for Gorgon traffic when that project is operational.

3.3.1 Marine Conservation Reserves

The State and Commonwealth government has established a comprehensive and representative network of marine protected areas (MPAs) in the State and Commonwealth waters off Western Australia. The network includes a number of MPAs that comprise 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. There are two State MPAs (Montebello Islands Marine Park and Lowendal Islands Nature Reserve) and two Commonwealth MPAs (Montebello Commonwealth Marine Reserve (Multiple Use Zone) and Dampier Commonwealth Marine Reserve within the region. The Montebello Commonwealth Marine Reserve (Multiple Use Zone) overlaps with the operational area of the Fortuna 3D MSS but does not overlap with the acquisition area (**Figure 2-1**).

4. DESCRIPTION OF THE ACTIVITY

Seismic data will be collected using a purpose built seismic vessel towing dual air-powered acoustic source arrays (airguns) and a hydrophone cable (also known as streamers). The acoustic emissions from the airguns will be detected by streamers (up to 16) and then recorded onboard the seismic vessel. The reflected sound is then processed to provide information about the structure and composition of geological formations below the seabed to aim to identify any hydrocarbon reservoirs.

During the proposed Fortuna 3D MSS activities, the seismic vessel will traverse a series of pre-determined sail lines (approximately 300 m apart) within the operational area, generally at a speed of less than 8 knots, unless in an emergency. The streamer vessel may need to transverse a limited number of part lines more than once for undershoot requirements.

As the seismic vessel travels along the survey lines a series of noise pulses (approximately every 15 – 30 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 the streamers (streamers up to 8.2 km long) towed behind the seismic survey vessel. The seismic survey vessel will tow an acoustic source array at a depth between 5 and 12 (+/-1) m. The acoustic source uses compressed air, with an operating pressure of approximately 2,000psi and a volume of up to approximately 4,200 cubic inches (cui). The source produces sound pulses (sound pressure level – SPL) within a few meters 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, dependent on the sound propagation characteristics of the area.

Given that there are four existing oil and gas facilities within the operational area, undershooting of three of these facilities is also required to obtain complete data coverage of the underlying geology. Undershooting will involve the use of a specific undershooting source vessel, installed with a similar sized source array as that used by the seismic vessel. The undershooting source vessel will travel along one side of the existing facilities and release the source array, whilst the seismic vessel will run in a parallel direction on the opposite side of the facility so that the streamers can acquire data received from under the facilities. It may also be possible that both the seismic vessel and the undershooting source vessel will conduct staggered shooting of the gun arrays simultaneously to gather more complete data under each facility. Acquisition within these areas will be limited to a number of kilometres and will only take a short period of time (approximately 60 minutes per pass) to acquire.

4.1.1 Survey Vessels

The contract for the Fortuna 3D MSS is yet to be awarded and therefore the exact seismic, undershooting source, and support vessels cannot be defined. However, maximum approximate parameters of the vessels can be provided based on experience and are outlined in **Table 4-1.** The successful vessels will be required to pass a Woodside Marine Assurance Inspection Audit (to assess compliance with safety management requirements and marine compliance laws) and will be required to operate in accordance with Woodside's Health Safety and Environment policies.

Table 4-1: Proposed Approximate Maximum Vessel Specifications*

	Seismic Vessel (To be confirmed)	Primary Support Vessel (To be confirmed)	Secondary Support Vessel (To be confirmed)	Undershooting Source Vessel (To be confirmed)
Vessel	To be confirmed	To be confirmed	To be confirmed	To be confirmed
Registered tonnage	13,000	3,000	3,000	13,000
Length overall (LOA)	110 m	65 m	65 m	110 m
Breadth	40 m	20 m	20 m	40 m
Draft (max)	8 m	7 m	7 m	8 m
Capacity	80 ppl	50 ppl	30 ppl	80 ppl

**Note all values provided are approximations only.*

The support vessel/s (excluding the undershooting source vessel) will accompany the seismic vessel to manage interactions with shipping and fishing activities, if required and to also be an additional advanced

warning of shallower water depths. The support vessel/s will also re-supply the seismic vessel with fuel and other logistical and operational supplies (including taking the seismic vessel under tow if required). When the primary support vessel needs to return to port to re-supply the secondary support vessel will assist with providing support during operations.

The use of the undershooting source vessel will be intermittent in that it will only be required when undershooting is occurring during the survey. It is estimated that the undershooting source vessel will be required for a limited period of time (up to 4 weeks). Survey planning will try to optimise the use of the undershooting source vessel where possible to try and minimise the time that the vessel is required in the operational area.

At sea bunkering is planned. The bunkering frequency will be dependent on fuel consumption and vessel master contingency requirements, and will be subject to controls (procedural and equipment). In addition, appropriate oil spill contingency planning and equipment will be available in the unlikely event of a fuel spill (**Appendix A**).

Crew changes if required during the survey, will be conducted either via helicopter operating out of the Karratha heliport, or vessel port call through Dampier or Broome Port, and will occur approximately every five weeks (expected to be approximately six times during the survey depending on crew change schedule prior to commencement and duration of survey).

5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Fortuna 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 key environmental hazards and control measures to be applied to the Fortuna 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.

6. MANAGEMENT APPROACH

The Fortuna 3D MSS will be managed in compliance with the *Fortuna 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 Fortuna 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 Fortuna 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 Fortuna 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 Fortuna 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.

7. 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.

8. 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 Fortuna 3D MSS

Source of Risk (Hazard)	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 behaviours 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 • 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 50 m for a dolphin and/or 100 m for a whale (with the exception animals bow riding). ***Exception:*** *The above requirement does not apply to survey vessels operating under limited/constrained manoeuvrability including but not limited to seismic vessels towing equipment and acquiring data, and in the event of an emergency.*
Interference with/ exclusion of commercial fishing operations and shipping	Interference with/ exclusion of fishing/charter boat operations	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: • 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) is notified of the seismic survey vessel movements during the survey so that AMSA RCC ensures that navigation Auscoast warnings can be issued and kept up to date. The Australian Hydrographic Office (AHO) is advised of the survey details (survey details, location, timing) within three weeks of mobilisation so that AHO can then issue a notice to mariners. A communications protocol referred to as the "Communications Protocol between Fortuna 3D Marine Seismic Survey and Commercial Fishing Operations" will be in place between survey vessels and known commercial fishing vessels within the survey operational area, to actively manage concurrent activities. The communications protocol will include the following aspects: Communications, Work programming, Hazard management, Emergency response. At least one dedicated high speed chase vessels will be employed to assist seismic and support vessels to mitigate interference associated with concurrent seismic and commercial fishing operations, in accordance with the Communications Protocol between Fortuna 3D Marine Seismic Survey and Commercial Fishing Operations.
Interference with/exclusion of recreational fishing operations and tourism operations	Interference with/ exclusion of recreational fishing and tourism operations	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: • 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) is notified of the seismic survey vessel movements during the survey so that AMSA RCC ensures that navigation Auscoast warnings can be issued and kept up to date. The Australian Hydrographic Office (AHO) is advised of the survey details (survey details, location, timing) within three weeks of mobilisation so that AHO can then issue a notice to mariners.
Transfer of ballast water	Introduction and establishment of invasive marine species from	Adherence the *Australian Ballast Water Management Requirements (AQIS 2008)*; • As a minimum, all vessels mobilised from outside of Australia must undertake ballast water exchange > 50 nm from land and >200m water depth;

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
	ballast water	• Ballast water exchange records maintained.
Transport of biofouling on the vessel hull, internal niches and in-water equipment	Introduction and establishment of invasive marine species from biofouling	Adherence to the Woodside Energy Limited Invasive Marine Species Management Plan (WEL *Doc No. A3000AH4345570*). • 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. The Department of Fisheries will be notified within 24 hours of any known or suspected introduced marine species detected in Western Australian State waters, as a result of following Woodside IMS procedures.
Interference with existing operational infrastructure	Minor disturbance to, damage to operating infrastructure	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: • Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights). Survey vessels will comply with the relevant exclusion zone as it applies to the specific existing operational oil and gas facility. Survey vessels will operate in accordance with the *Communications Protocol between Fortuna 3D Marine Seismic Survey and Existing Operational Oil and Gas Facilities.* The seismic sail-lines have been planned to meet the technical objectives of the survey as well as providing for safe operations. All lines approach and then deviate around existing oil and gas facilities with no lines 'dead-head' into the facilities. The lines all have open water on one side providing a clear escape path if required. Streamers equipped with real time monitoring equipment to ensure that streamer depth is managed such that they do not come in contact with the seabed.
Underwater noise emissions from operation of survey equipment	Disturbance to marine fauna, particularly whales, marine turtles, potentially as physical damage or as a behavioural effect	Operation of the seismic source within the operational area will be compliant with *EPBC Act Policy Statement 2.1*- Interactions between offshore seismic exploration and whales (DEWHA 2008) – Procedures: Precaution Zones (measured in horizontal radius from acoustic source) • Observation zone: 3 km+; • Low power zone: 2 km; and • Shut-down zone: 500 m Observation and Compliance Reporting • 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 Pre-Survey Planning

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		• Planning to avoid overlap with critical habitat used by EPBC Act listed whale species (critical habitat defined as breeding, calving, resting and feeding areas) • Planning to avoid peak migratory pathways (particularly constricted pathways) During Survey • Pre start-up Visual Observation • Soft start Procedure • Start-up Delay Procedure • Operations Procedure • Stop Work Procedure • Night-time and Low Visibility Procedure Additional procedures to manage the operation of the seismic source in relation to whale sharks and marine turtles will be implemented as outlined below: Precaution zone (measured in horizontal radius from acoustic source) • Observation and shutdown zone 500 m. During Survey • Pre start-up Visual Observation (final 10 minutes of the cetacean pre-start up observation period)) • Soft start Observations(final 10 minutes of the cetacean soft start period) • Start-up Delay Procedure (applied if whale shark or turtle is sighted within the 500m shutdown zone, recommence soft start if animal/ s observed to move outside of the 500 m shut down zone or a period of 10 minutes has passed since last sighting) • Operations Procedure (continuous observations focusing on 500 m zone) • Stop Work Procedure (applied to whale shark and turtle sightings in 500m shutdown zone) Observation and Compliance Reporting • Use of vessel crew to supplement dedicated marine fauna observer in whale shark and turtle observations and monitoring compliance. • Record kept of whale shark and turtle sightings • Record kept of observation effort, observation conditions, source operations and procedures implemented No discharge of the seismic source ('no firing zone') within 200m of the 50 metre water depth contour around the Rankin Bank and Glomar Shoals. No discharge of the seismic source outside of the operational area.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Routine atmospheric emissions from fuel use and waste combustion	Contribution to global greenhouse gas emissions; and Consumption of non-renewable natural resources	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: • Vessel has a valid International Air Pollution Prevention Certificate (IAPP) • Use of low sulphur fuel when it is available
Discharge of bilge water, sewage, grey water, and putrescible wastes	Localised eutrophication of the water column; and localised adverse effect to marine biota.	**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: • 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 **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; • 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 (Accidents/Incidents) Activities		
Collision between survey vessel and marine fauna	Injury or fatality to protected fauna	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 • 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 50 m for a dolphin and/or 100 m for a whale (with the exception animals bow riding). ***Exception:*** *The above requirement does not apply to survey vessels operating under limited/constrained manoeuvrability including but not limited to seismic vessels towing equipment and acquiring data, and in the event of an emergency.* Compliance with required notifications of activities affecting cetaceans under the EPBC Regulations.
Release of hazardous and 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: • 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 streamer grounding or	Damage to benthic communities	Operational procedures will be in-place on board the seismic and undershooting source vessel for deployment and retrieval of towed equipment.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
permanent loss of towed equipment		Streamers cleaned when bio-fouling presents a significant risk to streamer integrity. Proposed acquisition sail lines will be designed (i.e. streamer configuration and depth) to maintain a 5 m exclusion zone between streamers and the seabed. Woodside (i.e. Woodside Project Manager) will review and approve the final design of these sail lines with respect to detailed positioning and bathymetry planning prior to acquisition. Detailed bathymetry of shallow banks within operational area will be provided to the seismic vessel Streamers equipped with real time monitoring equipment to ensure that streamer depth is managed such that they maintain a 5m exclusion zone between streamers and the seabed. Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally. Lost towed equipment will be relocated and recovered where safe and practicable to do so.
Hydrocarbon release caused by topsides (vessel) loss of containment	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries	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: • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate, where required, under vessel class **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. **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. ***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.* **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. **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.
Hydrocarbon release caused by loss of structural	Biological and ecological impacts to megafauna, plankton, deepwater	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: • Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights).

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
integrity	benthic communities, offshore fish species, and fisheries	At least one dedicated high speed chase vessel will be employed to assist seismic, undershooting source, and support vessels to mitigate interference associated with concurrent seismic and third party vessel operations. 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: • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate, where required, under vessel class. Procedure (or equivalent) relating to seismic, undershooting source and support vessel working in close proximity (e.g. transfer of supplies) including: • 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, undershooting source, and support vessel. No close proximity operations / activities (such as bunkering, supply or equipment transfer, crew change, unless in case of emergency) will be undertaken within 200 m of the 50 m contour of Rankin Bank and Glomar Shoals. Implementation of the Fortuna 3D Marine Seismic Survey First Strike Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.
Hydrocarbon release during bunkering operations	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries	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: • Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place. • Survey vessels hold a valid IOPP Certificate as applicable to vessel class. **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. No close proximity operations / activities (such as bunkering, supply or equipment transfer, crew change, unless in case of emergency) will be undertaken within 200 m of the 50 m contour of Rankin Bank and Glomar Shoals. Implementation of the Fortuna 3D Marine Seismic Survey First Strike Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.