

# **Polly 3D Marine Seismic Survey Environment Plan Summary**

**Geotechnical Operations**

Date: 18 January 2013

Status: Rev 0

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## 1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator, will undertake a three dimensional (3D) marine seismic survey (MSS), referred to as the Polly 3D MSS, in offshore Commonwealth waters approximately 60 km north of Dampier, in Petroleum Exploration Permit Areas WP-465-P, WP-467-P, WP-472-P, WP-473-P (see **Section 2** for further location details (**Figure 2-1**). The Polly 3D MSS will take approximately five months and is planned to be completed by 31 May 2013.

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

Nearest landfall is the Dampier Archipelago at approximately 35 km south west of the closest point of the operational area boundary. Distance to other key landfall locations include approximately 60km to Dampier, 80 km to Karratha and 93 km to Port Hedland.

The Polly 3D MSS will occur within an operational area of approximately 18,200 km<sup>2</sup>, in Petroleum Exploration Permit Areas WP-465-P, WP-467-P, WP-472-P, WP-473-P (**Figure 2-1**).

The area referred to as the 'operational area' (**Figure 2-1**) includes:

- A 'survey acquisition area' (i.e. the area within which seismic acoustic emissions will occur for the purposes of acquiring data), is approximately 7,985km<sup>2</sup>; and
- The 'acquisition area' is surrounded by a 'buffer' area of approximately 10 – 15 km in width (referred to as the operational area). Within this operational area, the seismic source may be discharged at or below full capacity (power) for the purpose of run-outs, source testing and soft starts.

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

**Table 2-1: Approximate Boundary coordinates for the 'survey acquisition area'\***.

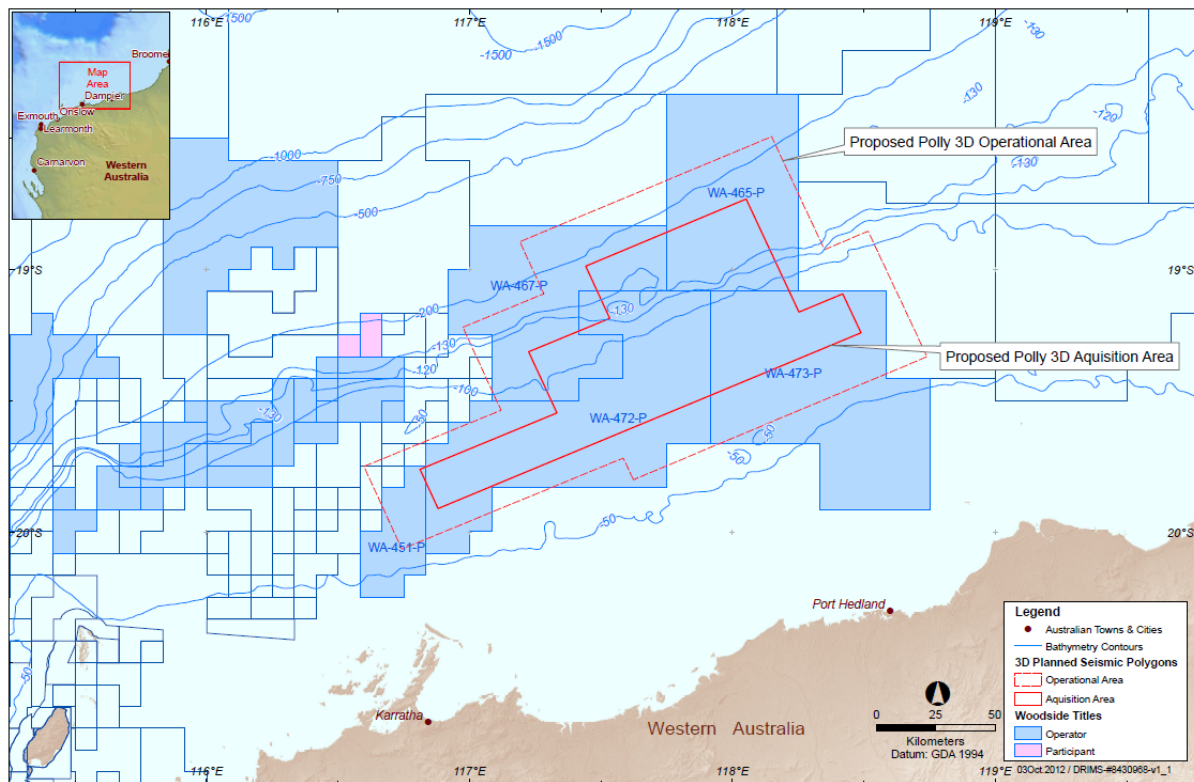
Location Point	Latitude	Longitude
A	19°54'38.050"S	116°52'50.160"E
B	19°45'40.819"S	116°48'43.919"E
C	19°32'47.193"S	117°19'59.824"E
D	19°18'46.427"S	117°13'32.773"E
E	19°11'5.968"S	117°32'1.152"E
F	18°59'10.775"S	117°26'31.567"E
G	18°43'49.664"S	118°3'11.340"E
H	19°9'42.415"S	118°15'13.608"E
I	19°5'29.746"S	118°25'12.427"E
J	19°14'24.686"S	118°29'22.802"E

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

Location Point	Latitude	Longitude
A	19°48'2.620"S	117°37'26.093"E
B	19°43'4.753"S	117°35'7.954"E
C	20°3'55.304"S	116°44'35.553"E
D	19°45'0.658"S	116°35'56.732"E
E	19°32'9.254"S	117°7'13.527"E
F	19°13'9.658"S	116°58'31.001"E
G	19°5'30.708"S	117°16'59.473"E
H	18°53'35.041"S	117°11'31.143"E
I	18°29'31.505"S	118°8'59.525"E
J	18°55'23.928"S	118°21'1.505"E
K	18°51'11.003"S	118°30'59.328"E
L	19°19'53.842"S	118°44'27.424"E

\*Datum: GDA94



**Figure 2-1: Location of the Polly 3D MSS operational and acquisition survey areas.**

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### 3. DESCRIPTION OF ENVIRONMENT

#### 3.1 Physical Environment

The Polly 3D MSS operational area is entirely in Commonwealth waters, primarily located in the Northwest Shelf (NWS) province of the North-West Marine Region (NWMR).

Water depths within the operational area range from approximately 50 m to 280 m. Much of the seabed where the survey is located is gently sloping, featureless, sandy-mud sediments ranging from coarse to fine loose sand in the upper part of the area to fine muddy carbonate sediments further down the slope in the deeper parts of the survey area. Topographic features within the adjacent region include areas of rise, ridges, canyons and apron/fans particularly to the north west of the survey operational area.

The nearest significant features to the survey area are the Glomar Shoals and the Dampier Archipelago. The Glomar Shoals are an area of the continental shelf elevated above the surrounding seabed, with a depths ranging from 26 -70 m, approximately 10 km from the Polly 3 D MSS operational area boundary and 120 km north of Dampier. On a regional level, the Glomar Shoals are not thought to constitute a specific habitat type, although it is considered unique on a local scale. The Dampier Archipelago is approximately 35 km to the south of the survey area.

#### 3.2 Biological Environment

Benthic grab sampling in the vicinity of Woodside infrastructure located in depths of approximately 100 m (for example Goodwyn A Platform located approximately 70 km west of the closest point of the Polly 3D MSS operational area boundary) revealed a low abundance, high variability and diversity of infauna dominated by polychaetes and crustaceans, typical taxa composition for the NWS.

A review of the *EPBC Act* database (Protected Matters Search Tool) held by SEWPaC, identified a total of 62 listed species (SEWPaC, 2012). Of those listed species, 25 were whales and other cetaceans. Seven cetaceans were listed as migratory, with the Blue whale (*Balaenoptera musculus*) listed as Endangered, and the Humpback whale, (*Megaptera novaengaliae*) listed as Vulnerable. Five turtle species were listed as threatened along with one species of shark, one marine mammal, one seabird and one seasnake.

There are no *EPBC Act* listed threatened ecological communities in the vicinity of the Polly 3D MSS operational area and the area does not contain habitat that is critical to the survival of any listed species.

A number of whale species occur in and/or migrate through the NWMR, including the blue whale (*Balaenoptera musculus*), sperm whale (*Physeter macrocephalus*), humpback whale (*Megaptera novaengaliae*), antarctic minke whale (*Balaenoptera bonaerensis*), brydes whale (*Balaenoptera edeni*) and killer whale (*Orcinus orca*).

The humpback whale is the most commonly sighted whale in north Western Australian waters. The species has been observed seasonally to complete their northern migration in the Camden Sound area of the west Kimberley, after feeding in Antarctic waters during the summer months. It is likely that the whales follow a predictable migratory path and migrate both north and south within the continental shelf boundary (200 m bathymetry). However, on the southbound migration it is likely that most individuals, and particularly cow/calf pairs, will stay closer to the coast than the northern migratory path. Given the timing and duration of the Polly 3D MSS (commencing in January 2013 and planned to be completed by 31 May 2013), it is unlikely that many humpbacks will be encountered as the survey is not taking place in migration season, and most pods are found closer to shore, in much shallower water depths (less than 200 m) than the survey operational area (500 to 2,000 m).

There are no known breeding, calving or feeding grounds for any listed threatened or migratory cetacean species within, or in the immediate vicinity of the Polly 3D MSS operational area.

Five marine turtle species may occur in the operational area and adjacent waters - the green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), hawksbill

turtle (*Eretmochelys imbricata*), and the flatback turtle (*Natator depressus*). Green, hawksbill, flatback and loggerhead turtles are known to feed. Leatherback turtles also migrate through the region and feed there but there are no known nesting sites within WA (DEC 2012).

With consideration of the distance offshore (approximately 60 km from the closest point of the operational area boundary to Dampier), depth range of offshore waters, and absence of potential nesting or foraging sites, i.e. no emergent islands, reef habitat or shallow shoals, the Polly 3D MSS operational area is not considered an important habitat for marine turtles.

### **3.3 Socio-economic Environment**

The Polly 3D MSS operational area is located within three Commonwealth (beyond 200 m isobath) and two State (within 200 m isobath) managed fisheries which occur in the region.

Seven AMSA shipping fairways pass through the Polly 3D MSS operational area. The fairways are not mandatory, but AMSA strongly recommends commercial vessels remain within the fairway when transiting the region.

#### **3.3.1 Marine Conservation Reserves**

The State and Commonwealth government have established a comprehensive and representative network of marine protected areas (MPA) in the State and Commonwealth waters of 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 six State MPAs and four gazetted Commonwealth MPAs within the region, however they are all at least 135 km away from the Polly 3D MSS operational area.

## 4. DESCRIPTION OF THE ACTION

Seismic data will be collected using a purpose built seismic survey vessel towing dual air-powered acoustic source arrays (airguns) and hydrophone cables (also known as streamers). The acoustic emissions from the airguns will be detected by the streamers 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 activities, the survey vessel will traverse a series of pre-determined sail lines (approximately 600 m apart and average 100 sail line km's long distributed in a grid pattern) within the survey acquisition area at a speed generally less than 8 knots. As the vessel travels along the survey lines a series of noise pulses (every 7-10 seconds) will be directed down through the water column and seabed. The released sound is attenuated and reflected at geological boundaries and the reflected signals are detected using sensitive microphones arranged along a number of hydrophone cables (streamers) towed behind the survey vessel.

The source (airgun array) tow depth will be 5 - 8 m (+/- 1 m). The operating pressure for the airgun array will be approximately 13,800 kPa (2,000 psi). The airgun array will consist of source-arrays, each with a maximum volume of approximately 0.058 m<sup>3</sup> (3,480 cui). The source arrays will be fired alternately with a shotpoint interval of 18.75 m horizontal distance. The source produces sound pulses (sound pressure level – SPL) within a few meters in the order of 265-275 dB re 1µPa at frequencies extending up to approximately 100 Hz. These sound pulses decrease to levels in the order of 201 dB re 1µPa (SPL) within 1 km of the source and approximately 181 dB re 1µPa (SPL) within 10 km, dependent on the sound propagation characteristics of the area.

The proposed Polly 3D MSS will use a seismic vessel to tow up to 12 solid streamers, each of which will be up to 8 km in length. Recent advances in cable technology have led to a new generation of seismic streamers, moving away from the traditional fluid filled cable to a solid cable, constructed from extruded foam where the requirement for fluid has been reduced. The streamer/s will be towed at a depth of approximately 8 - 10 m (+/- 2m) and approximately 100 m apart.

### 4.1.1 Survey Vessels

The Polly 3D MSS will be conducted by the geophysical contractor Polarcus, using the 3D capable vessel, the Polarcus Alima (**Figure 4-1**), a primary support vessel, the Sealink 161, and two chase vessels, the Empress and Limitless.



**Figure 4-1: The Seismic Vessel - Polarcus Alima and Primary Support Vessel - Sealink 161**

The primary support and chase vessels will accompany the seismic survey vessel to maintain a safe distance between the towed array and other vessels and manage interactions with shipping and fishing activities, if required. At least one support/chase vessel will remain on station supporting the seismic vessel at all times.

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## 5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Polly 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.

The key environmental hazards and control measures to be applied to the Polly 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 Polly 3D MSS will be managed in compliance with the *Polly 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 Polly 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 Polly 3D MSS EP details for each environmental aspect (identified and assessed in the Environmental Risk Assessment – *Section 5 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 Polly 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 Polly 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 the seismic 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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## 9. REFERENCES

DEC (Department of Environment and Conservation) 2012. Marine Turtles of Western Australia.  
[http://www.dec.wa.gov.au/index.php?option=com\\_content&task=view&id=2462&Itemid=1401](http://www.dec.wa.gov.au/index.php?option=com_content&task=view&id=2462&Itemid=1401)

## APPENDIX A: Summary of Major Environmental Hazards and Control Measures to be applied to the Polly 3D Marine Seismic Survey

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
<b>Planned (Routine and Non-routine Activities)</b>		
<b>Physical Presence of Survey Vessels</b>		
Noise emissions during normal survey operations (Vessels and Helicopters, excluding seismic source noise)	Disturbance to marine fauna, particularly whales and marine turtles, potentially as direct physical damage or as a behavioural effect	<ul style="list-style-type: none"> <li>Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.04) – Interacting with cetaceans                             <ul style="list-style-type: none"> <li>survey vessels will not travel at greater than 6 knots within 300 m of a cetacean (caution zone) and minimise noise;</li> <li>Survey vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception animals bow riding);</li> </ul> </li> </ul> <p><i>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, vessels undertaking operations such as vessel to vessel bunkering and in the event of an emergency.</i></p>
Collision between survey vessels and marine fauna	Injury or fatality to protected fauna	<ul style="list-style-type: none"> <li>Interaction between survey vessels and cetaceans (whales and dolphins) within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.04) – Interacting with cetaceans                             <ul style="list-style-type: none"> <li>survey vessels will not travel at greater than 6 knots within 300 m of a cetacean (caution zone) and minimise noise;</li> <li>Survey vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception animals bow riding);</li> </ul> </li> <li>Compliance with required Notifications of activities affecting cetaceans under the EPBC Regulations</li> </ul> <p><i>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, vessels undertaking operations such as vessel to vessel bunkering and in the event of an emergency.</i></p>
Interference with/exclusion of commercial fishing and shipping	Interference with/exclusion of commercial fishing and shipping	<ul style="list-style-type: none"> <li>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:                             <ul style="list-style-type: none"> <li>Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights).</li> </ul> </li> <li>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.</li> <li>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.</li> <li>North West Slope Trawl Fishery, Pilbara Trawl and Trap Fishery, and West Australian Mackerel Fishery fishing vessels and other vessels will be contacted via VHF channel 16, (or alternative channel if necessary), where required, to prevent disturbance or avoid collision with within the operational area during the survey.</li> <li>The North West Slope Trawl Fishery (NWSTF), Pilbara Trawl and Trap Fishery, and West Australian Mackerel Fishery is given a pre-start notification within three weeks of mobilisation including:                             <ul style="list-style-type: none"> <li>Proposed survey mobilisation date</li> <li>Map of survey area and acquisition lines</li> <li>Relevant contact details for survey duration communication                                     <ul style="list-style-type: none"> <li>VHF Radio Channel</li> </ul> </li> </ul> </li> </ul>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<ul style="list-style-type: none"> <li>○ Satellite call sign</li> <li>○ Vessel Call Signs</li> <li>• A communications protocol referred to as the “Communications Protocol between Polly 3D Marine Seismic Survey and Commercial Fishing Operations” (ref DRIMS #8611737) 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:               <ul style="list-style-type: none"> <li>• Communications</li> <li>• Work programming</li> <li>• Hazard management</li> <li>• Emergency response</li> </ul> </li> <li>• Two 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 Polly 3D Marine Seismic Survey and Commercial Fishing Operations.</li> </ul>
<b>Acoustic Source Emissions</b>		
Underwater noise emissions from operation of seismic source	Disturbance to marine fauna, particularly whales, marine turtles, potentially as physical damage or as a behavioural effect.	<ul style="list-style-type: none"> <li>• Operation of the seismic source within the operational area will be compliant with EPBC Act Policy Statement 2.1- Interactions between offshore seismic activities and whales (DEWHA 2008) – Procedures:               <ul style="list-style-type: none"> <li>Precaution Zones (measured in horizontal radius from acoustic source)                   <ul style="list-style-type: none"> <li>• Observation zone: 3 km+;</li> <li>• Low power zone: 2 km; and</li> <li>• Shut-down zone: 500 m</li> </ul> </li> <li>Observation and Compliance Reporting                   <ul style="list-style-type: none"> <li>• Use of vessel crew to supplement dedicated marine fauna observer in whale observations and monitoring compliance of Policy Statement 2.1.</li> <li>• Record kept of whale observations</li> </ul> </li> <li>Pre-Survey Planning                   <ul style="list-style-type: none"> <li>• Planning to avoid overlap with critical habitat used by EPBC Act listed whale species (critical habitat defined as breeding, calving, resting and feeding areas)</li> <li>• Planning to avoid peak migratory pathways (particularly constricted pathways)</li> </ul> </li> <li>During Survey                   <ul style="list-style-type: none"> <li>• Pre start-up Visual Observation</li> <li>• Soft start Procedure</li> <li>• Start-up Delay Procedure</li> <li>• Operations Procedure</li> <li>• Stop Work Procedure</li> <li>• Night-time and Low Visibility Procedure</li> </ul> </li> </ul> </li> <li>• Additional procedures to manage the operation of the seismic source in relation to whale sharks and marine turtles will be implemented as outlined below:               <ul style="list-style-type: none"> <li>Precaution zone (measured in horizontal radius from acoustic source)</li> </ul> </li> </ul>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<ul style="list-style-type: none"> <li>• Observation and shutdown zone 500 m.</li> </ul> <p>During Survey</p> <ul style="list-style-type: none"> <li>• Pre start-up Visual Observation (final 10 minutes of the cetacean pre-start up observation period))</li> <li>• Soft start Observations(final 10 minutes of the cetacean soft start period)</li> <li>• 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)</li> <li>• Operations Procedure (continuous observations focusing on 500 m zone)</li> <li>• Stop Work Procedure (applied to whale shark and turtle sightings in 500m shutdown zone)</li> </ul> <p>Observation and Compliance Reporting</p> <ul style="list-style-type: none"> <li>• Use of vessel crew to supplement dedicated marine fauna observer in whale shark and turtle observations and monitoring compliance.</li> <li>• Record kept of whale shark and turtle sightings</li> <li>• Record kept of observation effort, observation conditions, source operations and procedures implemented</li> </ul> <ul style="list-style-type: none"> <li>• No discharge of the seismic source outside of the operational area.</li> </ul>
<b>Routine Atmospheric Emissions</b>		
Emissions from fuel and waste combustion	Contribution to global greenhouse gas emissions; and Consumption of non-renewable natural resources	<ul style="list-style-type: none"> <li>• 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: <ul style="list-style-type: none"> <li>• Vessel has a valid International Air Pollution Prevention Certificate (IAPP),</li> <li>• Use of low sulphur fuel when it is available</li> </ul> </li> </ul>
<b>Routine Discharges</b>		
Discharges of Bilge water, grey water, sewage and Putrescible wastes	Localised eutrophication of the water column; and localised adverse effect to marine biota.	<p><b>Sewage, Grey water and Putrescible Waste:</b></p> <ul style="list-style-type: none"> <li>• 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 including: <ul style="list-style-type: none"> <li>• all sewage, grey water and putrescible waste holding tanks are to be fully operational prior to survey commencement.</li> <li>• operational onboard sewage treatment plant approved by the International Maritime Organisation (IMO).</li> <li>• a valid International Sewage Pollution Prevention Certificate (ISPP).</li> <li>• All MARPOL discharge boundaries requirements are met</li> </ul> </li> </ul> <p><b>Bilge Water:</b></p> <ul style="list-style-type: none"> <li>• 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; <ul style="list-style-type: none"> <li>• 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.</li> </ul> </li> </ul>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
<b>Unplanned (Accidents/Incidents) Activities</b>		
<b>Waste Management and Chemical Use</b>		
Hazardous and Non-hazardous waste handling and disposal	Pollution and contamination of the environment and secondary impacts of marine fauna (e.g. ingestion, entanglement).	<ul style="list-style-type: none"> <li>• 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"> <li>• All waste storage facilities in good working order and designed in such a way as to prevent or contain any discharges.</li> <li>• All hazardous wastes will be segregated prior to onshore disposal.</li> </ul> </li> <li>• No incidents of significant releases of waste materials to the marine environment</li> <li>• Any accidental release of significant wastes to the marine environment will be recovered where safe and practicable to do so.</li> </ul>
<b>Loss of Equipment</b>		
Loss of Towed Equipment	Damage to deepwater benthic communities and submarine infrastructure	<ul style="list-style-type: none"> <li>• Operational procedures will be in-place on board the seismic vessels for deployment and retrieval of towed equipment.</li> <li>• Streamers cleaned when bio-fouling presents a significant risk to streamer integrity.</li> <li>• Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally.</li> <li>• Lost towed equipment will be relocated and recovered where safe and practicable to do so.</li> </ul>
<b>Non-routine Accidental Hydrocarbon release</b>		
Streamer fluid release caused by loss of integrity of streamer	Pollution of the marine environment adverse effects on marine life (shoreline or open water)	<ul style="list-style-type: none"> <li>• Operational procedures will be in-place on board the seismic vessels for deployment and retrieval of towed equipment.</li> <li>• Streamers cleaned when bio-fouling presents a significant risk to streamer integrity.</li> <li>• Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally.</li> <li>• Solid streamers will be used for the Polly 3D MSS.</li> <li>• Streamers equipped with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if lost accidentally.</li> <li>• Lost towed equipment will be relocated and recovered where safe and practicable to do so.</li> </ul>
Hydrocarbon released caused by topsides (vessel) loss of containment	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries.	<ul style="list-style-type: none"> <li>• 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: <ul style="list-style-type: none"> <li>• Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place.</li> <li>• Survey vessels hold a valid IOPP Certificate, as applicable to vessel class.</li> </ul> </li> </ul> <p><b>Storage:</b></p> <ul style="list-style-type: none"> <li>• Any hydrocarbon storage on 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.</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• Equipment located on deck utilising hydrocarbons (e.g cranes, winches or other hydraulic equipment) will have as a minimum primary bunding (i.e.. deck edge lips or up-stands) to prevent loss of hydrocarbons to the marine environment.</li> </ul>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p><b>Exceptions:</b> <i>The above requirement does not apply to hydraulic hoses that are located on crane knuckles that protrude outside of the deck boundary and additionally, the Gun Deck where wash ports on the ship's side, which are designed to allow excess sea water to drain quickly from the deck to prevent the sea water free surface effect compromising the stability of the vessel - these ports will be secured closed in fine weather conditions when safe to do so.</i></p> <p><b>Spill Response:</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul>
Hydrocarbon release during bunkering activities	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries	<ul style="list-style-type: none"> <li>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: <ul style="list-style-type: none"> <li>Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place.</li> <li>Survey vessels hold a valid IOPP Certificate, as applicable to vessel class.</li> </ul> </li> <li>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.</li> <li>Operational procedures and equipment will be in-place and implemented on board the survey vessels for bunkering operations and will be subject to the following Woodside requirements: <p><b>Procedures:</b></p> <ul style="list-style-type: none"> <li>Bunkering will occur during daylight hours only and when sea conditions are appropriate as determined by the vessel master;</li> <li>JHA (or equivalent) in place and reviewed before each fuel transfer;</li> <li>Bunkering operations will be manned with constant visual monitoring of gauges, hoses, fittings and sea surface; and</li> <li>Radio communication between seismic and support vessel</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>Bulk transfer hose (visually checked for integrity)</li> <li>Dry break couplings (or similar in place checked for integrity)</li> </ul> </li> <li>Implementation of the Polly 3D Marine Seismic Survey Oil Spill Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</li> </ul>
Hydrocarbon release caused by loss of structural integrity	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries	<ul style="list-style-type: none"> <li>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: <ul style="list-style-type: none"> <li>Current Shipboard Oil Pollution Emergency Plans (SOPEP) in place.</li> <li>Survey vessels hold a valid IOPP Certificate, as applicable to vessel class.</li> </ul> </li> <li>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: <ul style="list-style-type: none"> <li>Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights).</li> </ul> </li> <li>Procedure (or equivalent) relating to seismic and support vessel working in close proximity (e.g. transfer of supplies) including:</li> </ul>

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<ul style="list-style-type: none"><li>• Resupply and crew transfers will commence during daylight hours only and when sea conditions are appropriate (calm) as determined by the vessel master; and</li><li>• radio communication will be maintained between the seismic and support vessel.</li><li>• Implementation of the Polly 3D Marine Seismic Survey Oil Spill Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.</li></ul>

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