Greater Western Flank – Phase II Geophysical and geotechnical Survey Environment Plan Summary

Geotechnical Operations

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator, proposes to undertake a geophysical and geotechnical survey, referred to as the Greater Western Flank – Phase 2 Geophysical and Geotechnical Survey (GWF-2 GPTS) located in offshore Commonwealth waters approximately 120 km north west of Dampier. The GWF-2 GPTS operational area, will occur within an operational area of approximately 675 km^2, located in Petroleum Areas WA-6-L, WA-5-L, WA-23-L, WA-24-L, WA-28-P R7 and WA-9-R (refer to **Section 2** for further location details (**Figure 2-1**)).

The purpose of the GWF-2 GPTS is to evaluate development options for commercialising North West shelf gas discoveries through the existing Goodwyn A (GWA) production facilities. The GWF-2 GPTS is notionally planned to occur between July 2013 and September 2013 and is expected to take up to 60 days to complete (20 days for the geophysical survey phase and 40 days for the geotechnical survey phase). The actual fieldwork dates are dependent on vessel and equipment 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 GWF-2 GPTS will occur in offshore Commonwealth waters on the North-West Shelf to the south west of the Goodwyn A (GWA) platform, approximately 120 km from Dampier. Nearest landfall is the Montebello Islands approximately 55 km to the south (**Figure 2-1**).

The boundary coordinates for the proposed GWF-2 GPTS 'operational area' are presented in **Table 2-1** and **Figure 2-1**.

Table 2-1: – Approximate Boundary coordinates for GWF-2 GPTS 'operational area'

Location Point	Latitude	Longitude
1	115°45'11.602"E	19°35'1.752"S
2	115°59'57.873"E	19°35'1.336"S
3	115°59'57.847"E	19°49'48.740"S
4	115°49'57.872"E	19°49'48.598"S
5	115°49'57.871"E	19°54'48.331"S
6	115°35'11.618"E	19°54'48.755"S
7	115°35'11.616"E	19°45'1.760"S
8	115°40'11.615"E	19°45'1.755"S
9	115°40'11.609"E	19°40'1.756"S
10	115°45'11.608"E	19°40'1.751"S

Datum: GDA94

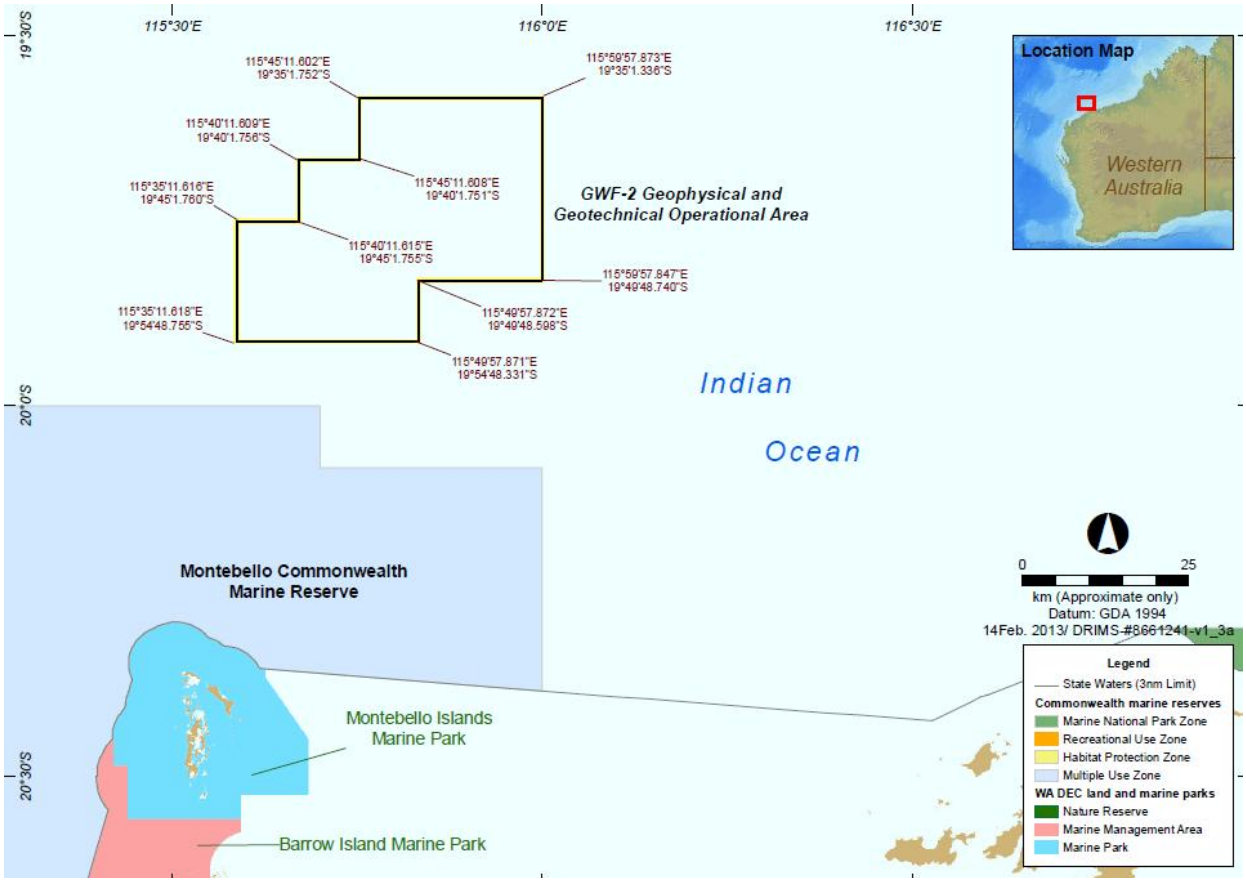

Figure 2-1: Location of the GWF-2 GPTS 'operational area'

3. DESCRIPTION OF ENVIRONMENT

3.1 Physical Environment

The GWF-2 GPTS operational area is located within the Commonwealth waters of the North West Shelf (NWS) province, approximately 120 km from Dampier, in water depths from approximately 18 m (shallowest discrete water depth over Rankin Bank) to 150 m, although acquisition will predominantly occur in water depths ranging from approximately 80 m to 130 m. The NWS is part of the wider North-West Marine Region (NWMR) 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 (Kimberley 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).

Other regional surveys included benthic grab sampling around the GWA facility (located within the GWF-2 GPTS operational area) and have revealed infauna communities described as of a low abundance, highly variable and diverse. Polychaetes and crustaceans dominated the infauna composition and surveys revealed a higher species richness and abundance in the GWA area as compared to NRC (Sinclair Knight Merz 2006). More recent seabed sediment sampling for the Greater Western Flank, which the GWF-2 GPTS operational area overlaps, revealed similar findings to the GWA seabed survey. The area supported a highly diverse invertebrate faunal composition, dominated by burrowing polychaete worms and crustaceans (RPS 2012).

A review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database (Protected Matters Search Tool) (February 2013) held by SEWPaC, identified a total of 63 listed species (SEWPaC, 2012) comprising nine threatened marine species and 15 migratory species, that may occur within, or traverse the operational area. Of those listed species, 22 were whales and other cetaceans including the Humpback whale, (*Megaptera novaengaliae)* listed as Vulnerable, with the Blue whale (*Balaenoptera musculus)* listed as Endangered, the Antarctic minke whale (*Balaenoptera bonaerensis*), Brydes whale (*Balaenoptera edeni*), Killer whale (*Orcinus orca*), and Sperm whale (*Physeter macrocephalus*).

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, ie, 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 GWF-2 GPTS 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 recent satellite tracking of southbound female humpback whales in the Kimberley region (Double *et al.,* 2010).

The GWF-2 GPTS will temporally overlap with the timing of both northern and southern humpback whale migrations, however, the proposed timing and duration of the activity (in the period July to September) overlaps more predominately with the northern humpback whale migration period. Migratory humpback whales may transit the operational area but numbers are expected to be low given the offshore location and the documented migratory routes location which is inshore of the operational area.

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 GWF-2 GPTS is not in proximity to the known pygmy blue whale migration routes though the surveys will temporally overlap with the north bound migratory season.

The presence of other species such as the Antarctic minke whale, bryde's whale, killer whale and sperm whale within the GWF-2 GPTS 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 GWF-2 GPTS operational area during their migrations to and from Ningaloo Reef. However, it is expected that whale shark presence within the GWF-2 GPTS 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, if recorded. Whale shark sightings (a total of five individuals) recorded from the North Rankin A and Goodwyn A platforms in the period June to September 2012 (Woodside 2013) support the potential for only low presence of transiting individuals at the time of the activity.

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 GWF-2 GPTS operational area. The marine turtles identified were: the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*) and flatback turtle (*Natator depressus*) .

With consideration of the distance offshore (approximately 120 km from Dampier), depth range of the GWF-2 GPTS operational area (18 to 150 m – predominately in the 80-130m depth range), and absence of potential nesting or foraging sites (ie, no emergent islands, reef habitat or shallow shoals) the GWF-2 GPTS operational area is not considered an important habitat for marine turtles. Furthermore, 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 100 km distance from the operational area of GWF-2 GPTS.

Furthermore, 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 GWF-2 GPTS 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).

3.3 Socio-economic Environment

The GWF-2 GPTS operational area is located in water depths approximately 18 m to 150 m, although acquisition will predominantly occur in water depths ranging from approximately 80 m to 130 m. These depths are situated within both State and Commonwealth managed fisheries. State fisheries, however, do not have significant catches beyond the 50 m isobath, and the Commonwealth fisheries such as the North West Slope Trawl Fishery (NWSTF) occur beyond the 200 m depth contour.

There are no known sites of Indigenous or European cultural or heritage significance within the vicinity of the GWF-2 GPTS operational area. The nearest declared wreck site is at Trial Rocks (DSEWPaC 2012b), just north of the Montebello Islands (located approximately 55 km from the operational area).

No tourism activities take place specifically within the GWF-2 GPTS 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 GWF-2 GPTS 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). Recreational /charter boat fishing has grown exponentially with the expanding regional centres and increasing residential and fly in/fly out work force, particularly in the Pilbara region. Occasional recreational/charter boat fishing occurs at Glomar Shoals (located approximately 81 km from the operational area) and Rankin Bank (in the operational area).

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 Resve) 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) is approximately 10 km from the GWF-2 GPTS operational area (**Figure 2-1**).

4. DESCRIPTION OF THE ACTION

The purpose of the GWF-2 GPTS is to evaluate development options for commercialising NWS gas discoveries through the existing Goodwyn A (GWA) production facilities. The activity consists of two scopes of work: a geophysical and a geotechnical survey. Each of these scopes of work will most likely require different vessels, due to the nature of each activity. In the event two separate vessels are used all pre-mobilisation inspection measurement criteria related to the vessel will be reinspected.

Geophysical Survey

The objective of the surveys is to acquire data to support concept selection and engineering design.

The geophysical survey includes a 25 km pipeline route corridor nominally 2,000 m wide with proposed line spacing of 100 m intervals. The GWF-2 geophysical survey lines are proposed to be surveyed with the following conventional geophysical techniques:

- Multi Beam Echo Sounder (MBES);
- Side Scan Sonar (SSS);
- Sub Bottom Profiler (SBP).

A survey vessel together with a towfish (which will support the SSS) and catamaran (which will support the SBP) will undertake measurements of seafloor characteristics, imaging and profiling.

Geotechnical Survey

The geotechnical survey will consist of *in situ* testing and the recovery of soil and rock samples at locations of the proposed subsea infrastructure. The geotechnical survey will be undertaken in water depths between approximately 80 m to over 130 m. The geotechnical survey will involve the following activities:

- Soil/rock sampling and in situ testing at approximately thirty (30) locations along the proposed pipeline route to a depth of approximately 3 m below seafloor.
- Soil/rock sampling and *in situ* testing at approximately four (4) proposed subsea manifold locations to depths ranging from approximately 10 m to 20 m below seafloor. However, one (1) of these locations may be increased to a maximum depth of 100 m below seafloor.
- Soil sampling at approximately three (3) locations along the proposed pipeline route to a depth of approximately 0.5 m below seafloor.

The final geotechnical program (number and location of samples) will be determined by the results of the GWF-2 geophysical survey.

4.1.1 Survey Vessels

The contract for the GWF-2 GPTS is yet to be awarded therefore the exact geophysical and geotechnical survey vessels cannot be defined. The geophysical survey will be undertaken by a general purpose vessel (approximately 30 – 70 m in length). The geotechnical survey will be undertaken by either a dedicated geotechnical drilling vessel or a general purpose vessel approximately 60 – 100 m in length

The geophysical and geotechnical surveys will not be occurring simultaneously and therefore there will only be one vessel operating at the survey area at any given time. No support vessels are required for either survey. The geophysical and geotechnical vessels will mobilise and demobilise in Dampier or an alternative contractor nominated port.

No bunkering is anticipated, due to the short duration of the surveys. Any additional unplanned bunkering will be performed during a port call. No bunkering at sea will be performed. Port calls may be required in order to perform crew changes for survey personnel working on fixed rotations. No helicopter transfers are planned.

The survey vessels are required to pass a Woodside Marine Assurance Inspection Audit (to audit compliance with safety management requirements and marine compliance laws) and operate in accordance with Woodside's HSE policies.

5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the GWF-2 GPTS 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 GWF-2 GPTS 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 GWF-2 GPTS will be managed in compliance with the *Greater Western Flank – Phase II – Geophysical and Geotechnical 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 GWF-2 GPTS, during both routine and non-routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

The GWF-2 GPTS 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 GWF-2 GPTS 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 GWF-2 GPTS 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 GWF-2 GPTS

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 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).
Transfer of ballast water	Introduction and establishment of invasive marine species from ballast water	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; • 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.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
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	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 in the event of an emergency.* Geophysical and Geotechnical survey activities are not to be undertaken outside of the operational area. No geotechnical or geophysical survey activities to be undertaken within 500 m of the 30 m depth contour associated with Rankin Bank.
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.
Disturbance to seabed as a result of geotechnical and geophysical activities	Smothering of benthic communities and increased localised turbidity	The geophysical survey will attempt to identify a feasible pipeline route across seabed (avoiding geohazards and seafloor obstructions such as coral outcrops, pock-mark clusters, depressions, etc.). The geophysical survey results will be used to optimise the number of geotechnical sampling and *in situ* testing locations. ** The geotechnical sampling and in situ test locations will be selected based on the impact that the seabed features on the selected pipeline route could have on the design and installation of the proposed subsea infrastructure.*

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		No geotechnical or geophysical survey activities to be undertaken within 500 m of the 30 m depth contour associated with Rankin Bank.
Routine discharge of drilling fluids to the marine environment	Localised contamination of the water column; and localised adverse affect to the marine biota	• Woodside Procedure - Management of Hazardous Substances (WM1040PF5925420) are used to select, assess and approve all drilling fluids. • Water Based Mud (WBM) drilling fluid will be used during the geotechnical survey.
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 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 loss of significant geophysical or geotechnical equipment	Damage to benthic communities	• No geotechnical or geophysical survey activities to be undertaken within 500 m of the 30 m depth contour associated with Rankin Bank. • 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

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		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. • Geophysical and geotechnical equipment (sub bottom profiler catamaran, towed fish and geotechnical equipment) to be fitted with a USBL beacon, which records the position of the equipment. • AMSA/AHO/potentially affected stakeholders (as identified in **Section 8 of EP**) 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.
Discharges from survey equipment to the marine environment	Localised contamination of the water column; and localised adverse affect to the marine biota	• Subsea equipment utilising hydrocarbons will be maintained to reduce the risk of loss of hydrocarbon containment to the marine environment. • In ocean 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. • Subsea hydraulic fluid use will be monitored and recorded and any discrepancies will be investigated to identify unplanned use and possible integrity issues.
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 adove 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. **Spill Response:** Spill response bins/kits are maintained and located in close proximity to hydrocarbon storage areas and deck areas for use

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		to contain and recover deck spills.
Hydrocarbon release caused by loss of structural integrity	Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, and fisheries	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). 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. Implementation of the GWF-2 GPTS First Strike Action Plan and Shipboard Oil Pollution Emergency Plans (SOPEP) when a hydrocarbon spill has occurred.