Outer Canning Exploration Drilling Program

Environment Plan Summary

Drilling and Completions

30 April 2014

Status: Rev 1

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1. INTRODUCTION

1.1 Background and Purpose

Woodside Energy Ltd. (Woodside), as operator and on behalf of a Joint Venture also comprising Shell Development (Australia) Pty Limited, proposes to drill up to eight exploration wells in Commonwealth waters in Petroleum Exploration Permit Areas WA-462-P, WA-464-P and WA-466-P (hereafter referred to as the Outer Canning Exploration Drilling Program). The drilling program is part of a commitment work program for the exploration permits issued under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) (Cwth). The drilling program objective is to explore for new hydrocarbon resources in an unproven area.

The Outer Canning Exploration Drilling Program Environment Plan Revision 2 (the EP) was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (the Environment Regulations). The Program was also referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the referral decision was that it was not a controlled action if undertaken in a particular manner (EPBC Act referral 2012/6618).

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

2. DESCRIPTION OF THE ACTIVITY

2.1 Location of the Activity

The Outer Canning Exploration Drilling Program area is located offshore in Commonwealth waters (North-west Marine Bioregion), approximately 290 km north-west of Broome and is in Petroleum Exploration Permit Areas WA-462-P, WA-464-P and WA-466-P (Figure 2-1). The preliminary coordinates for the first three wells, of the eight well program, (referred to as Hannover South A, Detmold A and Anhalt A), are shown in Table 2-1, along with the proposed surface coordinates, water depth relative to lowest astronomical tide (LAT) and licence area. The location of the remaining five wells has not been finalised; however the environmental risk assessment undertaken considered the drilling of these wells at any location within the exploration program area defined in Figure 2-1.

Table 2-1: Preliminary Coordinates and Water Depth for initial three wells of the Outer Canning Exploration Drilling Program

Well	Water Depth (m LAT)	Longitude	Latitude	Permit Area
Hannover South-A	812	119° 43’ 56.669” E	16° 21’ 02.953” S	WA-466-P
Detmold-A	1440	118° 25’ 41.496” E	17° 09’ 27.996” S	WA-464-P
Anhalt-A	907	119° 12’ 51.773” E	16° 37’ 03.985” S	WA-462-P

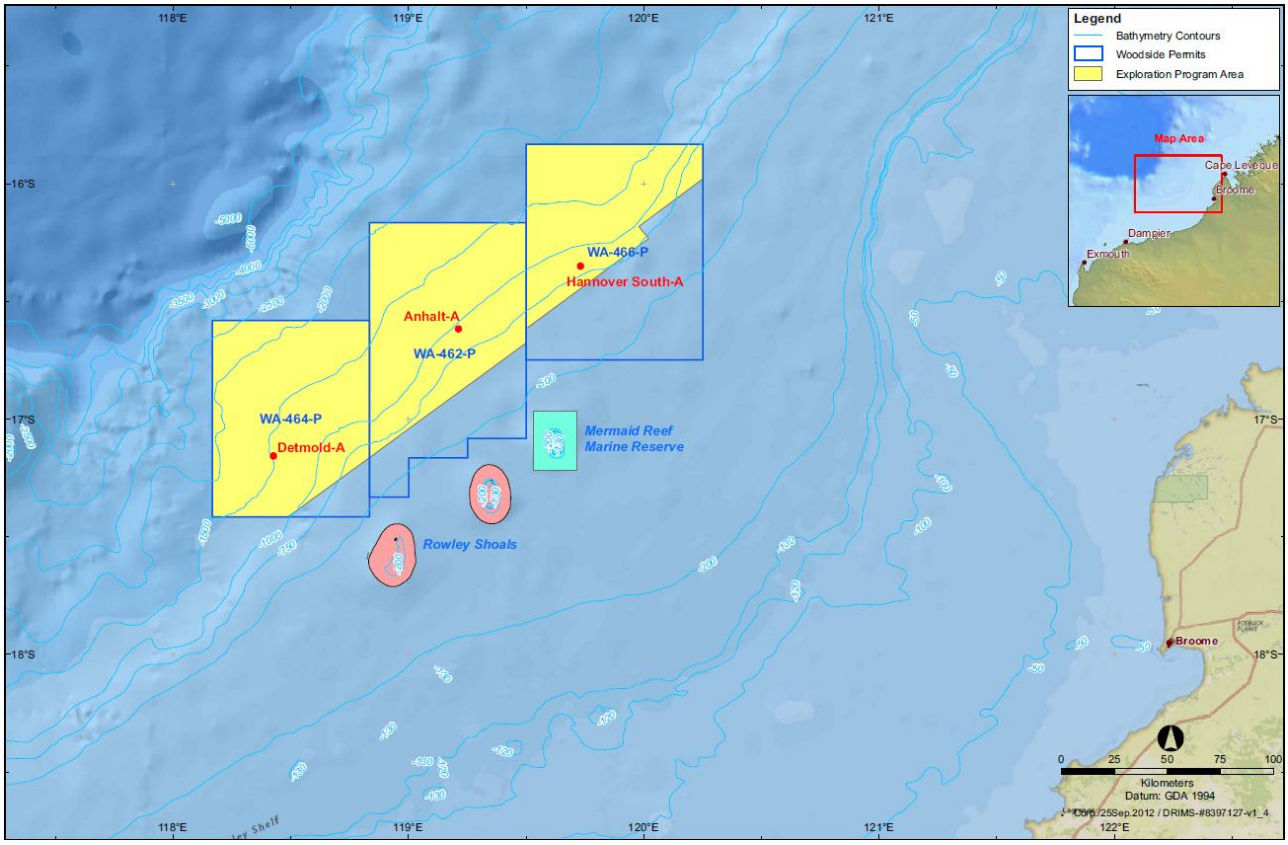

Figure 2-1: Location of the proposed Outer Canning Exploration Drilling Program with indicative locations of the first three wells.

2.2 Timing of the activity

The Outer Canning Exploration Drilling Program is scheduled to begin in 2014 with the drilling of the first three wells. It is anticipated that each well will take approximately 110 days to complete. This schedule and timeframe may be subject to change due to operational requirements and external influences such as drillship availability.

2.3 Drilling Program

The Outer Canning Exploration Drilling Program will be drilled by a Mobile Offshore Drilling Unit (MODU) using a combination of water-based and non water-based mud. During the activities, the drillship will be supported by at least two support vessels which will be used to transport equipment and materials between the drillship and the supply base located at Broome.

Well construction activities may include the following steps:

1. The drillship arrives and establishes position over the well site
2. Drilling of the top-hole sections are drilled riser-less using seawater with pre-hydrated bentonite sweeps/guar gum sweeps
3. Installation and cementing of the conductor and casing
4. Testing and installation of the blow out preventer on the wellhead
5. Connection of a marine riser between the blow out preventer and the MODU
6. The drilling fluid system is adjusted to a weighted water based mud (WBM) or non-water based mud (NWBM) drilling fluid
7. Drilling of bottom hole sections to the planned depth
8. Well evaluation using a combination of formation evaluation while drilling, coring and wireline tools
9. Casing/liners are inserted as required and cemented in place by pumping cement into the annular space.

10. Plugging and abandonment.

These activities are subject to change.

3. DESCRIPTION OF THE ENVIRONMENT

The Outer Canning Exploration Drilling Program area is located in the Commonwealth marine waters of the Canning Basin within the North-west Transition (NWT) Province and partly in the Timor Province. Water depths in the area range from 620 to 2500 m. The NWT and Timor provinces are part of the wider North-west Marine Bioregion (NWMB) and are located off the continental shelf between the Dampier Archipelago and Lacepede Islands.

3.1 Physical Environment

The region has an arid-subtropical climate and tropical monsoonal conditions with two distinct seasons: hot and wet summers and cool and dry winters, with transitional periods in the months of April and September. The cyclone season is November to April, with most cyclones moving down the north-west coast. Tropical cyclones in the area may occur three to six times per cyclone season.

The offshore waters of the NWT Province are largely influenced by Indonesian Through Flow (ITF): a warm, low salinity flow of water that forms from a system of currents linking the Pacific and Indian oceans through the Indonesian seas. The ITF is strongest in winter and exists as a deep overlying surface layer throughout the entire NWMB and flows westward.

The Outer Canning Exploration Drilling Program area is located on the continental slope to the north-west of the Rowley Shoals and extends over an area to the southwest of the canyons linking the Argo Abyssal Plain and Scott Plateau. Sediments of the exploration program area are likely to be predominately unconsolidated coarse to fine sands that progressively alter to finer silt and muds from the shallow to deep continental slope area and abyssal plain (Baker *et al.*, 2008).

3.2 Biological Environment

No Critical Habitats or Threatened Ecological Communities, as listed under the EPBC Act, occur within the exploration program area. The Outer Canning Exploration Drilling Program area comprises an offshore, oceanic ecosystem within a generally low productive environmental setting. The canyons linking the Argo Abyssal Plain with the Scott Plateau and the Commonwealth waters surrounding the Rowley Shoals (closest to the Outer Canning Area) are areas of enhanced productivity. The Outer Canning Exploration Drilling Program Area does not overlap with either of these features.

Benthic communities of the deep waters of the exploration program area are likely to comprise sparse epifauna and infauna, represented by scattered sessile filter-feeding benthos such as seapens and infauna predominately comprising polychaete worms and isopods (Brewer *et al.,* 2007). Benthic communities of notable diversity and abundance of nearest proximity to the exploration program area are associated with the oceanic (shelf edge) reefs of the Rowley Shoals (namely Mermaid, Clerke and Imperieuse reefs). These reef formations contain a variety of reef habitats including outer reef slopes and enclosed lagoonal systems, which support biodiverse reef and pelagic communities such as hard and soft coral communities that are species-rich, with a high diversity of associated sessile and mobile invertebrates (echinoderms, molluscs and crustaceans) and a variety of EPBC Act species being residents of or visiting these reefs, such as migratory seabirds, marine reptiles and cetaceans (Director of National Parks, 2013).

The EPBC Act Protected Matters Search Tool includes a total of 8 listed threatened marine fauna species and 17 listed migratory species (which includes threatened species) that may potentially occur within the Outer Canning Exploration Drilling Program area and within a 10km buffer area.

The EPBC Act Protected Matters Search Tool lists 22 cetacean species that may occur in or relate to the Outer Canning Exploration Drilling Program Area, however there are no known critical habitats (including

breeding, calving or feeding grounds) for any listed threatened or migratory cetacean species within or in the immediate vicinity.

The EPBC Act Protected Matters Search Tool lists 5 marine turtles that may occur in or relate to the Outer Canning Exploration Drilling Program Area. The offshore, deepwater environment does not support any critical habitats (including breeding, nesting or foraging habitats), with the shallow water reefs of the Rowley Shoals being the nearest location of turtle occurrences.

The Outer Canning Exploration Drilling Program Area may be occasionally visited by migratory and oceanic birds but there are no critical habitats for any EPBC-Act-listed avian species.

3.3 Socio-economic Environment

The Outer Canning Exploration Drilling Program area intersects four Commonwealth and two State fisheries, with others located nearby. The Australian Fisheries Management Authority and commercial fishing groups did not raise concerns during stakeholder consultation undertaken for the activity. Feedback from the Department of Fisheries was received during consultation, and comments were considered during the development of the environmental plan. Woodside will continue to accept feedback during the drilling program.

The region supports significant commercial shipping activity, mostly associated with the mining and oil and gas industries. International shipping routes in the area are located to the east and west of the Rowley Shoals and link Australian and Indonesian ports.

4. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Outer Canning Exploration Drilling Program (planned and unplanned activities) to ensure that risks are reduced to a level 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 Outer Canning Exploration Drilling Program 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 implemented to reduce environmental risk to ALARP and ensure that risks will be of an acceptable level.

5. MANAGEMENT APPROACH

The Outer Canning Exploration Drilling Program will be managed in compliance with the *Outer Canning Exploration Drilling Program 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 activities (during both planned and unplanned activities) are identified, reduced to ALARP and are of an acceptable level.

The EP details specific objectives and standards for each environmental aspect that was identified and assessed in the Environmental Risk Assessment (Section 5 of the EP). For each environmental aspect the range of controls to be implemented (consistent with the standards) to achieve the performance objectives are detailed. The EP then establishes the specific measurement criteria that will be used to demonstrate that the performance objectives and standards have been achieved.

The implementation strategy detailed in the 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 activities. The EP details the types of monitoring and auditing that will be undertaken and the reporting requirements for environmental incidents and reporting on overall compliance of the activities with the EP.

Any changes to the scope of the activity described in the EP will be managed in accordance with Woodside's Management of Change Operating Standard and Woodside's risk methodology framework which requires a risk assessment to be undertaken for all proposed changes in scope to assess the potential impacts of the change. Risk assessment outcomes will be reviewed with regard to Regulation 17 of the Environment Regulations which requires that any new activity, or any significant modification, change or new stage of the existing activity not provided for in the EP to be reassessed by NOPSEMA for acceptance under Regulation 21 of the Environment Regulations. While a revision is being assessed, any activities adequately addressed under the existing accepted EP will still occur.

Woodside's risk methodology framework also requires a review of risks to be conducted annually to maintain currency. This review supports continuous improvement and includes consideration of risk decision making, rating and control effectiveness.

6. CONSULTATION

Woodside conducted a stakeholder assessment for the proposed activity to identify relevant and interested stakeholders based on the well location, proposed activities and timing.

A consultation fact sheet was sent electronically to all identified stakeholders prior to lodgement of the EP with NOPSEMA for assessment and acceptance. The fact sheet was supported by engagement with potentially affected stakeholders.

Woodside received feedback on the proposed activity from a range of government agencies. Where relevant, Woodside has implemented or adjusted controls and mitigation measures in response to stakeholder feedback. Woodside will continue to accept feedback from stakeholders during the Drilling Program.

7. CONTACT DETAILS

For further information about this activity, please contact:

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8. REFERENCES

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Brewer DT, Lyne V, Skewed TD & Rothlisberg P 2007, T*rophic Systems of the North West Marine Bioregion*, *Report to the Department of the Environment, Water, Heritage and the Arts*. CSIRO Marine and Atmospheric Research, Cleveland, Australia. 156 pp.

Director of National Parks 2013, *Draft North-west Commonwealth Marine Reserves Network management plan 2014-24*. Director of National Parks, Canberra. Viewed 16/06/13 <http://www.environment.gov.au/marinereserves/north-west/consultation/pubs/nw-draftmanagement-plan.pdf>.

APPENDIX A: SUMMARY OF KEY ENVIRONMENTAL HAZARDS AND CONTROL MEASURES TO BE APPLIED DURING THE OUTER CANNING EXPLORATION DRILLING PROGRAM ACTIVITIES

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Planned (Routine and Non Routine) Activities		
Proximity to other vessels: Interference with commercial/recreational fishing operations and shipping activities	Interference with/exclusion of fishing/shipping/charter boat operations	Compliance with Australian Maritime Safety Authority administered marine safety regulations and marine notification requirements.
Generation of noise from vessel operations	Disturbance to marine fauna, particularly cetacean species, potentially as physical damage or as behavioural effects	The interaction of the support vessels with cetaceans will be consistent with Part 8 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth).
Generation of acoustic signals during vertical seismic profiling of the well	Minor and temporary disturbance to marine fauna, particularly cetacean species, potentially as physical damage or as behavioural effects	Vertical seismic profiling (VSP) procedure includes controls in accordance with *EPBC Act Policy Statement 2.1 (Interaction between offshore seismic exploration and threatened and migratory cetaceans).*
Routine discharge of drill cuttings to the marine environment	Localised burial of smothering of benthic habitats from deposition of cuttings from sea surface discharge. Water quality (turbidity) effects on marine fauna. Toxic effects to marine fauna (NWBM).	Riser-in-place cuttings will be processed using solids control equipment prior to discharge. Cuttings must be discharged below the water line as per Woodside Standards. As per Woodside Standards, WBM shall be used as the first preference in all cases. Where Water Based Muds (WBM) cannot meet required specifications, Non Water Based Muds (NWBM) may be used following a formal written commercial and/or technical NWBM justification process. Overboard disposal of NWBM is not permitted. NWBM cuttings will be treated and processed to contain on average less than 10% oil by weight prior to discharge as per Woodside Standards. NWBM system set up as per Woodside checklists to ensure appropriate containment and controls in place and audited. Woodside procedure used to assess chemicals (in standard discharge scenarios) which can fall into the following assessment types: no further assessment (good OCNS environmental performance); further assessment required (lower OCNS environmental performance or not OCNS registered); or ALARP justification required (if an environmentally sound alternative cannot be found). Bulk operational discharges conducted under the drillship's Permit to Work system (to operate discharge valves/pumps) or risk assessed using the MODU contractors risk assessment prompt cards.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Routine discharge of drilling, cementing and subsea fluids to marine environment	Localised short-term decrease in water quality and toxic effects to marine biota	Woodside procedure used to assess chemicals (as above). Bulk operational discharges conducted under the drillship's Permit to Work system (to operate discharge valves/pumps) or risk assessed using the MODU contractors risk assessment prompt cards.
Atmospheric emissions from fuel combustion	Contribution to global greenhouse gas emissions; and consumption of non-renewable natural resources	Compliance with *International Convention for the Prevention of Pollution from Ships 1973* as modified by the protocol of 1978 *(MARPOL 73/78) Annex VI* (as implemented in Commonwealth waters by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*); and AMSA Marine Orders – Part 97 Marine Pollution Prevention – Air Pollution requirements for emissions, as required by vessel class.
Routine discharges of sewage, grey water and putrescibles wastes to the marine environment	Nutrient enrichment to localised environment outside the mixing zone (200m) Localised adverse effects to marine biota	Compliance with MARPOL 73/78 - as implemented under *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; AMSA Marine Orders - Part 95 & 96: Marine Pollution Prevention – Sewage and Garbage as required by vessel class.
Routine discharge of water (deck, bilge and mud tank wash residue) to the marine environment	Nutrient enrichment to localised environment outside the mixing zone (200m) Localised adverse effects to marine biota	Compliance with MARPOL 73/78 - as implemented 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.
Unplanned Activities (Accidents/Incidents)		
Hydrocarbon release to the marine environment due to a loss of well integrity	Minor disruption or impact on a significant portion of the population. Minor impacts on critical habitat or activities. No threat to overall population viability. Large scale and long-term effects. Recovery >10 years or permanent. Localised but long term effect on community/habitat structure. Community maintains ecological integrity though an unacceptable change in species composition may occur Significant long term contamination above background and/or national/international quality standards and/or known biological effect concentrations on	**Preventative** Well design and construction is managed and controlled by Woodside's Well Lifecycle Management Process (WLMP). The WLMP consists of six phases of activity which cover work requirements from the outset of individual Basis for Well Design creation to the point at which the well is finally abandoned or suspended and all documentation is closed out. Further information will be provided in the WOMP for each well of the Petroleum Activities Program which addresses: Basis for Well Design phase; Detailed Design phase; and Well Construction Operations phase (including suspension). The performance standards below are reflective of this process. *Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011*: Accepted Well Operations Management Plan (WOMP) & application to drill. As per Woodside Standards: • all permeable zones penetrated by the well bore, containing hydrocarbons or over-pressured water, shall be isolated from the surface environment by a minimum of two barriers (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow hazard study). • discrete hydrocarbon zones shall be isolated from each other (to prevent cross flow) by a minimum of one barrier. • all normally pressured permeable water-bearing formations shall be isolated from the surface by a minimum of one barrier.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
	scale >2 km. Significant long term effect on one or more of protected area values.	• barriers shall be effective over the lifetime of well construction or production. • effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance). • cement minimum specifications for cementing conductor, casings and liners to maintain well integrity. As per Woodside procedures: Fluid barrier comprising of drilling fluid of a suitable weight, composition and volume to counter pore pressure & over pressure zones when drilling. Subsea BOP specification in accordance with: • Original Equipment Management (OEM) Standards. • Woodside Standards and procedures. • API Standard 53 4th Edition (API RP53). **Spill Response:** Spills to sea will be managed as per the Outer Canning Oil Spill Preparedness and Response Strategy Selection and Evaluation, Woodside's Corporate Oil Spill Contingency Plan and the Broome Regional Oil Spill Response Plan. Monitoring/observation of the spill will be undertaken to inform the spill response strategies, which may include: • Ongoing monitoring and evaluation • Containment and recovery • Shoreline assessment • Shoreline protection • Shoreline cleanup Subsea first response toolkit & capping stack available for use. Mutual Aid MoU (for relief well drilling) is in place.
Collision between support vessels or drillship with marine fauna	Potential injury or mortality to protected marine fauna.	The interaction of the support vessels with cetaceans will be consistent with Part 8 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth).
Deck spills to the marine environment	Minor and temporary reduction in water quality and toxic effects on marine fauna.	Compliance with MARPOL 73/78 - as implemented under *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; AMSA Marine Orders - Part 91 & 94 Marine Pollution Prevention – Oil and Packaged Harmful Substances where required by vessel class. The management of chemical storage, hoses and deck drainage will be consistent with applicable Woodside engineering standards. Adequate number of spill kits positioned in strategic locations on deck.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Hydrocarbon spill to the marine environment during bunkering activities	Minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds. Localised minor and/or temporary contamination of water which may lead to toxic effects to marine biota.	Compliance with MARPOL 73/78 - as implemented under *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; AMSA Marine Orders - Part 91 Marine Pollution Prevention – Oil where required by vessel class. The management of transfer hoses and deck drainage will be consistent with applicable Woodside engineering standards.
Hydrocarbon spill to the marine environment due to loss of vessel structure integrity	Minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds. Localised minor and/or temporary contamination of water which may lead to toxic effects to marine biota.	Establishment and enforcement of a 500 m safety/exclusion zone around the drillship. Use of support vessels to warn third parties and inform of exclusion zone Compliance with AMSA Marine Orders - Part 91, 30 & 21 Marine Pollution Prevention-Oil, Prevention of collisions and Safety of navigation and emergency procedures.
Accidental discharge of NWBM to the marine environment during transfers	Minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds.	The management of transfer hoses and deck drainage will be consistent with applicable Woodside engineering standards.
Accidental discharge of NWBM to the marine environment due to failure of slip joint packers and emergency disconnect system	Minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds. Localised minor and/or temporary contamination of water which may lead to toxic effects to marine biota.	Slip joint packers and emergency disconnect system will be compliant with applicable Woodside engineering standards.
Accident loss of solid wastes to the marine environment	Pollution and contamination of the environment and secondary impacts on marine fauna (e.g. ingestion or entanglement).	Compliance with MARPOL 73/78 - as implemented under *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; AMSA Marine Orders - Part 95 Marine Pollution Prevention – Garbage where applicable.
Dropped objects to the marine environment	Localised short-term damage of benthic subsea habitats in the immediate location of the dropped object.	Equipment and material dropped to the marine environment will be recovered where safe and practicable to do so. Operational procedures will be in place to prevent and retrieve dropped objects on-board drill ships and supporting vessels.