Pyxis and Braastad Exploration Drilling Environment Plan Summary

Exploration
Revision 1
January, 2015

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1. INTRODUCTION

Woodside Energy Ltd and Woodside Burrup Pty Ltd (Woodside), as Titleholder and nominated Titleholder respectively, under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (referred to as the Environment Regulations), propose to undertake the drilling of two exploration wells, one within exploration permit WA-404-P (Woodside Energy Ltd) and one within production licence WA-34-L (Woodside Burrup Pty Ltd), and hereafter, referred to as the Petroleum Activities Program, where relevant to do so.

The purpose of the proposed Petroleum Activities Program is to explore for new commercial hydrocarbon resources. The exploration well drilling in WA-404-P (Braastad) is also a commitment under exploration permit area requirements, issued under the *Offshore Petroleum Greenhouse Gas Storage Act 2006* (Cwth).

This Environment Plan (EP) Summary has been prepared to meet the requirements of Regulations 11(3) and 11(4) under the Environment Regulations, as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). This document summarises the Pyxis and Braastad Exploration Drilling Environmental Plan, accepted by NOPSEMA under Regulation 10A of the Environment Regulations.

2. LOCATION OF THE ACTIVITY

The proposed Petroleum Activities Program is located in production licence WA-34-L (Pyxis) and exploration permit WA-404-P (Braastad) in Commonwealth waters, located approximately 170 and 260 km (respectively) north-west of Dampier and approximately 66 and 137 km (respectively) north, north-west from the nearest shoreline (Montebello Islands) (**Figure 2-1**). **Table 2-1** provides location details for the Petroleum Activities Program. Collectively, the two permit areas are referred to as the Program Area (where relevant to do so).

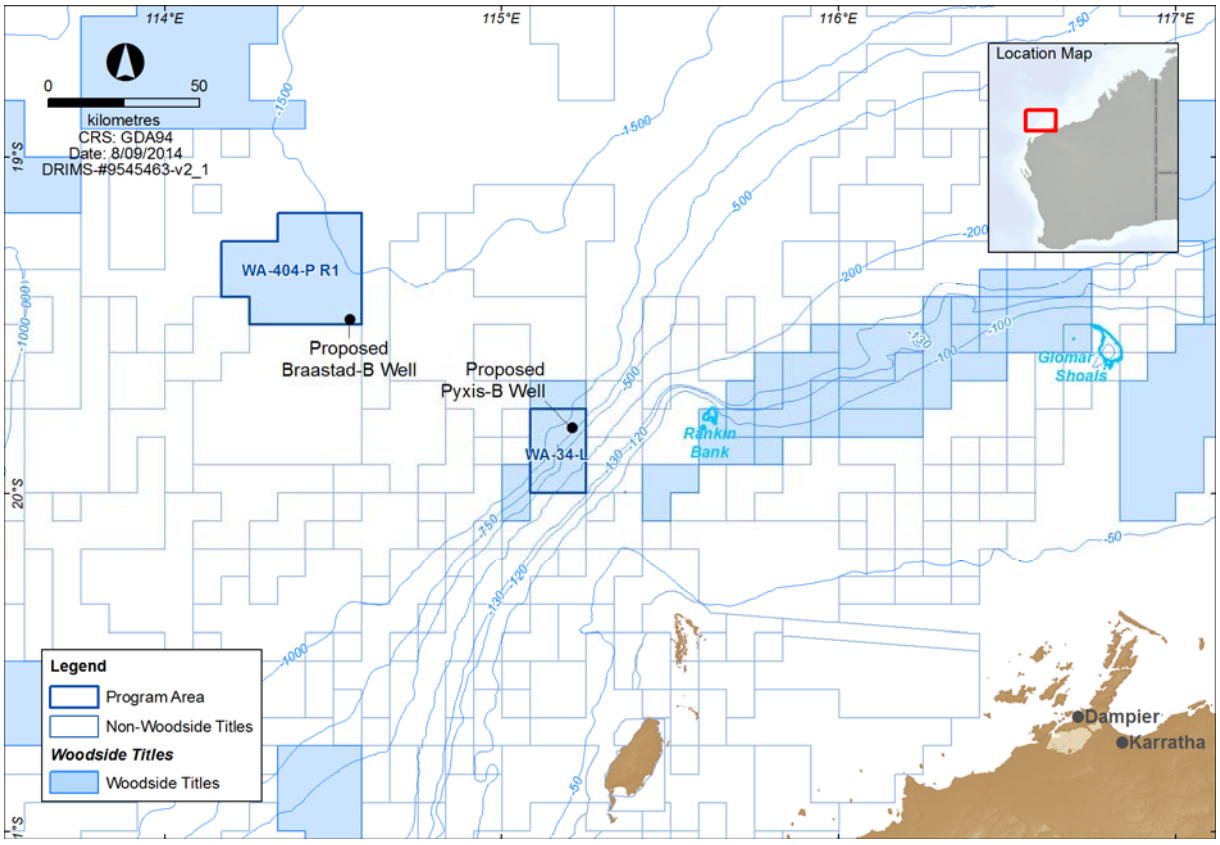

Figure 2-1: Location of Petroleum Activities Program

Table 2-1: Location details for the Petroleum Activities Program

Exploration Well	Water Depth (~m)	Latitude	Longitude	Permit
Pyxis (WA-34-L)	980	115° 12' 36.276"E	19° 48' 15.864"S	WA-34-L
Braastad (WA-404-P)	1439	114° 33’ 01.248”E	19° 28’ 58.967”S	WA-404-P

An Operational Area will be implemented around each well location. The Operational Area defines the spatial boundary of the Petroleum Activities Program that will be managed under the EP. For a dynamically positioned (DP) drill rig/drillship, the Operational Area encompasses a radius of 500 m from each well centre. If a moored drill rig undertakes the drilling program, the Operational Area comprises a radius of 2500 m from the well centre, to allow for the installation of moorings.

Transit to and from an Operational Area by support vessels and drill rig/drillship; and port activities associated with the support vessels, is not within the scope of the EP

3. DESCRIPTION OF THE ACTIVITY

The exploration wells will be drilled by either a semi-submersible drill rig that is moored or operates under DP or a DP drillship, with associated support vessels.

Key activities are as follows:

1. Drilling of the top-hole sections using seawater with high viscosity sweeps
2. Installation and cementing of steel casing in the hole
3. Installation of the blow out preventer (BOP) on the wellhead and testing
4. Connection of a marine riser between the BOP and the drill rig/drillship to provide a closed loop system for the recirculation of drilling fluids and drill cuttings from the well to the drill rig/drillship
5. Drilling of bottom hole sections to the planned depth
6. Well evaluation using Vertical Seismic Profiling (VSP)
7. Further installation and cementing of steel casing/liners
8. On completion, plugging and abandonment of the well.

Drill cuttings generated during drilling of the top hole section will be discharged at the sea bed. For the bottom hole section, once the marine riser has been installed, drill cuttings will be discharged at the sea surface.

The reference drilling fluid case for the Petroleum Activities Program is a water based mud (WBM) drilling fluid system, however, a non-water-based mud (NWBM) drilling fluid system may be required to meet technical requirements for sections of the wells, if identified during detailed well design.

3.1 Timing of the Activities

The Petroleum Activities Program is scheduled to commence in 2015. The current drilling sequence plan requires that only one well will be drilled at any given time (i.e. no planned concurrent drilling operations under the EP). The schedule and timeframe may be subject to change due to operational requirements and external influences such as MODU availability, weather conditions and oceanic conditions. The EP has risk assessed the drilling of gas wells throughout the year (all seasons) to provide operational flexibility for mobile offshore drilling unit (MODU) schedule changes and availability.

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 Physical

The Production Licence WA-34-L, within which the Pyxis well is located, lies within the Commonwealth waters of the North West Province (NWP) and on the outer edge of the North West Shelf (NWS). The Exploration Licence WA-404-P, within which the Braastad well is located, is situated further offshore and entirely within the NWP. The NWP and NWS are part of the wider North West Marine Region (NWMR). The climate within the region is dry tropical, exhibiting a hot summer season from October to April and a milder winter season between May and September.

Water circulation is primarily influenced by the Indonesian Through Flow (ITF) and the Leeuwin Current. Both of these currents are significant drivers of the region's ecosystems and are strongest during late summer and winter. The Leeuwin Current runs southward along the edge of the continental shelf and is primarily a surface flow (up to 150 m deep). Offshore waters of the region are generally very clear. Turbidity is primarily influenced by sediment transport by oceanic swells and primary productivity. In nearshore areas, turbidity is highly variable due to storm runoff, wind generated waves and large tidal ranges.

The bathymetry of the NWMR is characterised by four distinct zones: the inner continental shelf (0 – 30 m), the middle continental shelf (30 – 120 m), the outer shelf/continental slope (occurs at approximately 120 m) and the abyssal plain (occurs beyond the shelf break). The WA-34-L licence area is located on the outer continental slope at a depth of approximately 980 m where the seabed slopes steeply in a north-west south-east direction. The seabed composition comprises soft sediment (on the continental slope), with only limited areas of deep water hard substrate observed. Studies in the Pluto gas field (approximately 12 km from the Pyxis well location) observed rock pinnacles at a depth of 300 to 500 m on the continental slope, exposed cliff-like features of banded sedimentary rock at around 1000 m deep and mudstone outcrops at approximately 900 to1000 m, where the continental slope meets the abyssal plain. Exposed cliffs of sedimentary rock have been recorded at other locations in the region. The WA-404-P permit area is located beyond the shelf break and is predominantly flat/featureless in water depths of approximately 1400 m. The marine sediment in this area is expected to consist of fine grained sands and silts with an absence of hard substrate.

4.2 Biological

The offshore environment of the region contains environmental assets/receptors of high value or sensitivity, including habitats and species that are vulnerable or that provide valuable ecological services such as Key Ecological Features (KEFs). Other high value environmental receptors include coastal waters and habitats such as the Montebello/Barrow Island group and the associated resident, temporary or migratory marine fauna, including EPBC Act species such as marine mammals, turtles and birds. The marine environment of these offshore locations is pristine and many sensitive receptor locations (all of which occur outside of the Program Area) are protected as part of Commonwealth and State managed areas including the 2012 proclaimed network of North West Marine Bioregion Commonwealth Marine Reserves (CMR).

There are no protected marine environments within the proposed Operational Areas. However, three KEFs were identified within the permit areas. The 'Ancient Coastline occurring along the 125 m Depth Contour' and the 'Continental Slope Demersal Fish Communities' were identified within the WA-34-L permit area and the Exmouth Plateau was identified within the WA-404-P permit area. Values and sensitivities of the established and proposed marine protected areas and other sensitive areas in the wider regional setting (potentially affected by the loss of hydrocarbons) are listed in **Table 4-1**. The closest sensitivity is the boundary of Montebello CMR (**Figure 4-1**).

Table 4-1: Summary of Relevant Established and Proposed Marine Protected Areas (MPAs) and other Sensitive Locations in the Region (outside of the Program Area)

	Closest Point from WA-34-L over water (km)	Closest Point from WA-404-P over water (km)	IUCN Protected Area Category
Commonwealth Marine Reserves (CMR)			
Montebello CMR	0 km (Adjacent)	93	VI – Multiple use Zone
Dampier CMR	168	255	II – Marine National Park Zone IV – Habitat Protection Zone
Gascoyne CMR	180	155	II – Marine National Park Zone IV – Habitat Protection Zone VI – Multiple use Zone
Ningaloo CMR	205	244	II – Marine National Park Zone
Argo-Rowley Terrace CMR	259	273	II – Marine National Park Zone VI – Multiple use Zone
Shark Bay CMR	521	554	II – Marine National Park Zone VI – Multiple use Zone
Carnarvon Canyon CMR	554	535	IV – Habitat Protection Zone
Abrolhos CMR	702	684	II – Marine National Park Zone
State Marine Parks and Nature Reserves			
Established			
Montebello/ Barrow Island Marine Conservation Reserves	40	132	VI – Multiple use Zone
Montebello Islands / Barrow Island Marine Management Area	40	132	Ia – Sanctuary Zone
Lowendal Islands Nature Reserve	75	162	Ia – Nature Reserve
Dampier Archipelago Nature Reserve	125	218	N/A
Muiron Islands Marine Management Area*	189	232	VI – Multiple use Zone
Ningaloo Marine Park*	205	244	II – Marine National Park Zone

Proposed			
Proposed Dampier Archipelago Marine Park	125	218	N/A
World Heritage Areas			
Ningaloo Coast WHA	214	230	N/A
Shark Bay WHA	589	596	N/A
Other Sensitive Areas (including KEFs)			
Rankin Bank	38	116	N/A
Pilbara Southern Islands Groups	138	201	N/A
Glomar Shoals (KEF)	159	231	N/A

*Murion Islands (Marine Management Area) is managed under the same management plan as the State Reserve of Ningaloo

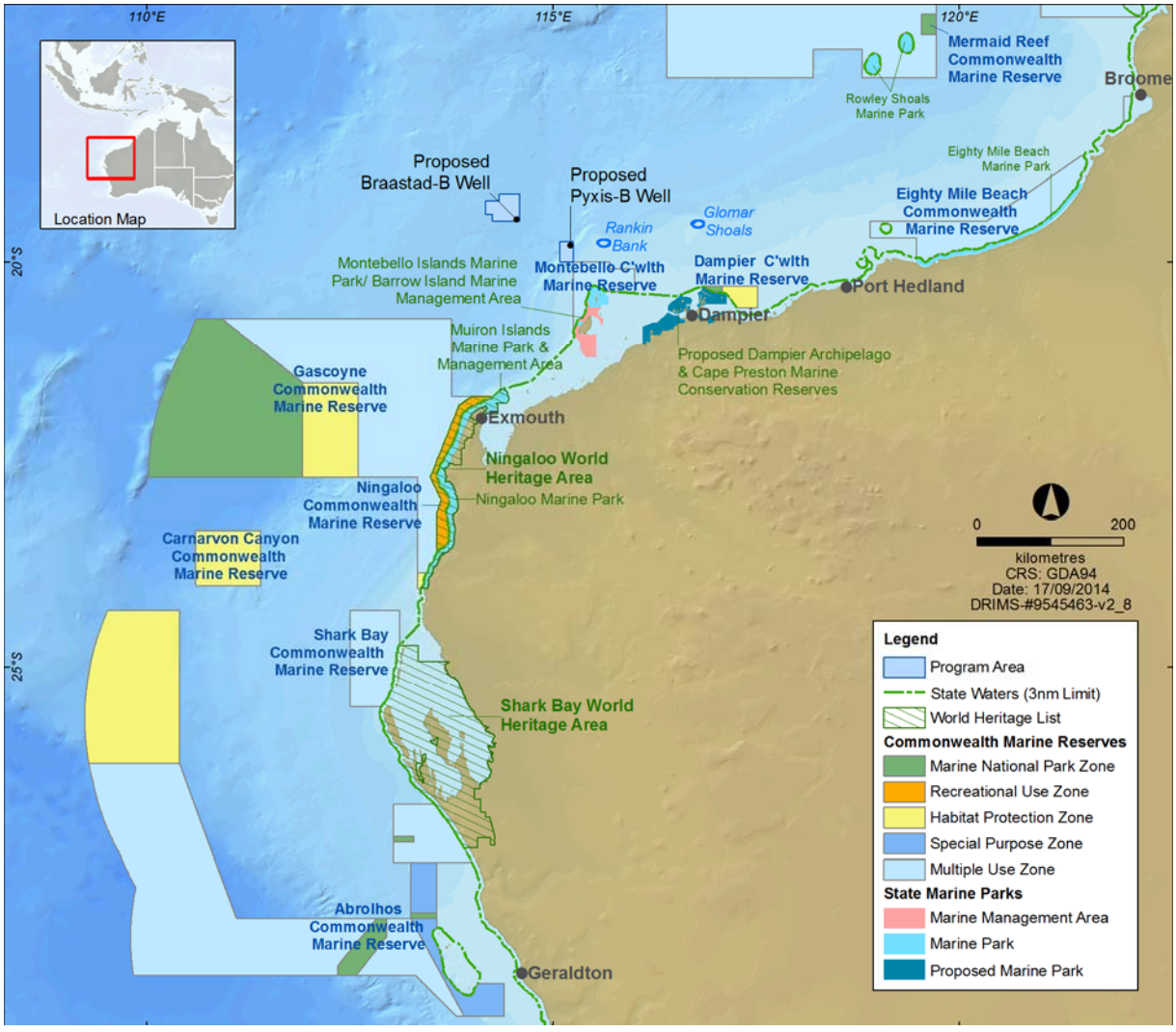

Figure 4-1: Established and Proposed Commonwealth and State Marine Protected Areas in relation to the Petroleum Activities Program

No Critical Habitats or Threatened Ecological Communities, as listed under the EPBC Act, are known to occur within the proposed Operational Areas.

Habitats

Sea floor communities in deeper shelf waters receive insufficient light to sustain ecologically sensitive primary producers such as seagrasses, macroalgae or *zooxanthellate scleractinian* (reef building) corals. Given the depth of water of the Program Area (ranging from approximately 980 to 1400 m), these benthic primary producer groups are unlikely to occur in the Operational Areas.

Benthic Habitats

Sedimentary infauna associated with soft unconsolidated sediments of the WA-34-L and WA-404-P permit areas are expected to be sparse, highly variable and dominated by polychaetes, nemerteans, sipunculids and crustaceans. Epifaunal groups in the WA-34-L permit area are expected to vary in abundance with depth, and include deep-water cnidarians, crustaceans (mostly decapods), bony fish and sponges. Rock pinnacles in the vicinity of the WA-34-L permit area provide habitat for fish, shrimp, hydroids and anemones and mudstone outcrops are dominated by glass sponges. Exposed cliffs in the WA-34-L permit area provides for attachment of sessile organisms and associated fauna such as fish. The absence of hard substrate at WA-404-P is considered a limiting factor for the recruitment of epibenthic organisms.

Resident/Demersal fish populations

The 'Continental Slope Demersal Fish Communities' was identified as a KEF in the vicinity of WA-34-L. The diversity of demersal fish assemblages on the continental slope between North West Cape and the Montebello Trough is the highest in Australia (>500 species of which 76 are endemic). Demersal fish species occupy two distinct demersal community types (biomes) associated with the upper continental slope (water depth of 225 to 500 m) and the mid continental slope (750 to 1000 m) relying on bacteria and detritus-based systems comprised of infauna and epifauna, which in turn, become prey for a range of teleost fish, molluscs and crustaceans.

Species

Nineteen marine species listed as threatened and/or migratory may occur within the Operational Areas.

The endangered pygmy blue whale (*Balaenoptera musculus brevicauda*) and vulnerable humpback whale (*Megaptera novaeangliae*) all migrate seasonally both north bound and south bound through the region for breeding and feeding. The Operational Areas may be visited by other cetacean species, but it is likely to be in infrequent, low numbers and of a transitory nature.

There are five species of marine turtle listed as threatened and migratory, however, the Operational Areas are not considered important habitat for turtles due to the distance offshore; the deep water location and the absence of potential turtle nesting or foraging sites (i.e. no emergent islands, reef habitat of shallow shoals).

Five shark species listed as threatened and/or migratory are identified as potentially occurring within the Operational Areas. These are the whale shark (*Rhincodon typus*), grey nurse shark (*Carcharias taurus*), great white shark (*Carcharodon carcharias*), shortfin mako (*Isurus oxyrinchus*) and longfin mako (*Isurus paucus*).

The Operational Areas may be occasionally visited by migratory and oceanic birds, but do not contain critical habitats (roosting, nesting or feeding) for any species.

4.3 Socio-Economic and Cultural

There are no known sites of Indigenous or European cultural or heritage significance, including shipwrecks, within the vicinity of the Operational Areas.

Species of pelagic fish (such as skipjack tuna, blue marlin and broadbill swordfish) occur in the offshore ocean environment, many of which are an important resource for commercial fisheries. Both WA-34-L and WA-404-P are located within three Commonwealth fisheries including the North West Slope Trawl Fishery, the Southern Bluefin Fishery and the Western Tuna and Billfish Fishery. The North West Slope Trawl Fishery traditionally targets scampi and deepwater prawns in water depths of up to 600 m, which may include areas adjacent to the Operational Area of WA-34-L, however, the WA-34-L permit area is located in a 'closed to fishing area'. Records of effort for the Southern Bluefin Fishery and the Western Tuna and Billfish Fishery show that no fishing activities for these pelagic fisheries take place near the Program Area.

The WA-34-L permit area is located within three State fisheries and the WA-404-P permit area is located in one State fishery. WA-34-L is located within the North Coast Demersal Scalefish Fisheries and the Onslow Prawn Managed Fishery. Both WA-34-L and WA-404-P are located within the West Australian Mackerel Fishery.

The North Coast Demersal Scalefish Fisheries comprises Pilbara Trawl, Trap and Line Fisheries. These fisheries typically operated in waters between 50 to 200 m water depth, however, the Pilbara Line and Trap Fisheries have reported fishing effort within the WA-34-L permit area. The Onslow Prawn Managed Fishery operates in nearshore to offshore waters of the Pilbara region and overlaps a portion of the WA-34-L permit area, however, trawling activity is only permitted in nearshore areas therefore, there is no spatial overlap of the Onslow Prawn Managed Fishery with the permit area. Part of the WA-34-L permit area overlaps with the Pilbara managed fishing area within the West Australian Mackerel Fishery. However, the majority of fishing occurs around coastal reefs and takes places over the six months or so when the mackerel are abundant in coastal areas.

With the exception of the North West Slope Trawl Fishery, none of these fisheries have significant catches within or in the deepwater adjacent to the Program Area (i.e. beyond the 50m isobath).

No tourism activities take place specifically within the Program Area, however, it is acknowledged that there are growing tourism and recreational sectors in Western Australia and these sectors have expanded in the area over the last couple of decades. Due to water depths and distance offshore, recreational fishing is unlikely to occur in the Operational Area. There are no designated traditional/ customary, fisheries within the Program Area or known recreational fishing areas of activity, as these are typically restricted to shallow coastal waters and/or areas with structure such as reefs.

The region supports significant commercial shipping activity, the majority of which is associated with the mining, oil and gas industry. The nearest shipping fairway is 40 km west of WA-404-P.

5. ENVIRONMENTAL IMPACTS AND RISKS

5.1 Risk Identification and Evaluation

Woodside undertook an environmental risk assessment to identify the potential environmental impacts and risks associated with the Petroleum Activities Program and identification of the control measures to manage the identified environmental impacts and risks to as low as reasonably practicable (ALARP) and an acceptable level. This risk assessment and evaluation was undertaken using Woodside's Risk Management Framework.

The key steps of Woodside's Risk Management Framework are shown in **Figure 5-1**. A summary of each step, and how it is applied to the Petroleum Activities Program is provided below.

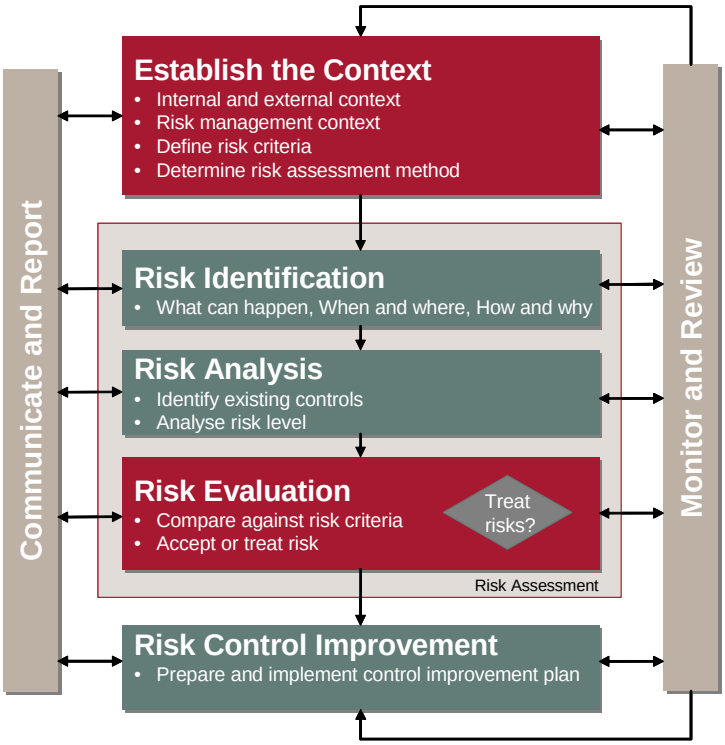

Figure 5-1: Key steps in Woodside's Risk Management Framework

1. Establish the Context

The objective of a risk assessment is to identify risks and associated impacts of an activity, so that they can be assessed and appropriate control measures applied (see Step 3) to eliminate, control or mitigate the risk to ALARP and to determine if the risk is acceptable.

Environmental Hazard identification (ENVID) workshops aligned with NOPSEMA's Hazard Identification Guidance Note (N-04300-GN0107) were undertaken by multidisciplinary teams made up of relevant personnel with sufficient breadth of knowledge, training and experience to reasonably assure that risks and associated impacts were identified and assessed.

2. Risk Identification

The purpose of an ENVID workshop for the Petroleum Activities Program is to understand the level of risk exposure a given activity presents to the environment. The ENIVD was used to identify risks with the potential to harm the environment. Risks were identified for both planned (routine and non-routine) and unplanned (accidents/incidents) activities. Potential environmental impacts are then determined based on the stressor type.

3. Risk Analysis (Decision Support Framework)

Risk analysis further develops the understanding of a risk. Risk analysis for the Petroleum Activities Program considered previous risk assessments for the facility, review of relevant studies, review of past performance, external stakeholder consultation feedback and review of the existing environment.

To support the risk assessment process, Woodside applied the UKOOA (1999) Industry Guidelines on a Framework for Risk Related Decision Support (HS006) during the ENVID workshops to determine the level of supporting evidence that may be required to draw sound conclusions regarding risk level and whether the risk is acceptable and ALARP.

This is to confirm:

- Activities do not pose an unacceptable environmental risk
- Appropriate focus is placed on activities where the risk is anticipated to be tolerable and demonstrated to be ALARP

- Appropriate effort is applied to the management of risks based on the uncertainty of the risk, the complexity and risk rating.

Identification of Control Measures

Woodside applies a hierarchy of control measures when considering Good Practice and Professional Judgement. The hierarchy of control is applied in order of importance as follows; elimination, substitution, engineering control measures, administrative control measures and mitigation of consequences/impacts.

Risk Rating Process

The risk rating process is undertaken to assign a level of risk to each impact measured in terms of consequence and likelihood. The assigned risk level is the residual risk (i.e. risk with controls in place) and is therefore, determined following the identification of the decision type and appropriate control measures.

The Consequence Level is selected by determining the worst case credible outcomes associated with the selected event assuming some controls (prevention and mitigation) have failed. Where more than one impact applies (e.g. environmental and legal/compliance), the consequence level for the highest severity impact is selected. The Likelihood Level is selected by determining the description that best fits the chance of the selected consequence actually occurring, assuming reasonable effectiveness of the prevention and mitigation controls.

The risk assessment for the Petroleum Activities Program identified 21 sources of environmental risk. These risks are divided into two broad categories: planned (routine and non-routine); and unplanned (accidents/incidents) activities.

Generally, the sources of risk from planned activities present a lower environmental consequence compared to the potential impact from unplanned accident or incident events. The EP contains a variety of mitigation and control measures which ensure potential impacts and risks will be reduced to ALARP and will be of an acceptable level. A summary of the key environmental risks and control measures have been presented in **Appendix A**.

4. Risk Evaluation

Environmental risks, as opposed to safety risks, cover a wider range of issues, differing species, persistence, reversibility, resilience, cumulative effects and variability in severity. The degree of environmental risk and the corresponding threshold for whether a risk/impact has been reduced to ALARP and is acceptable has been adapted to include principles of ecological sustainability (given as an objective in the Environment Regulations and defined in the EPBC Act), the Precautionary Principle and the corresponding environmental risk threshold decision-making principles used to determine acceptability.

Demonstration of ALARP

In accordance with Regulation 10A(b) of the Environment Regulations, Woodside demonstrates risks are reduced to ALARP where:

The residual risk is low:

- good industry practice or comparable standards have been applied to control the risk, because any further effort towards risk reduction is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.

The residual risk is medium or high:

- good industry practice is applied for the situation/risk
- alternatives have been identified and the control measures selected reduce the risks and impacts to ALARP. This may require assessment of Woodside and industry benchmarking, review of local and international codes and standards, consultation with stakeholders etc.

Demonstration of Acceptability

In accordance with Regulation 10A(c) of the Environmental Regulations, Woodside applies the following process to demonstrate acceptability:

- Low residual risks are 'Broadly Acceptable', if they meet legislative requirements, industry codes and standards, regulator expectations, Woodside Standards and industry guidelines
- Medium and High residual risks are ‘Acceptable’ if ALARP can be demonstrated using good industry practice and risk based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained
- Severe residual risks are ‘Intolerable’ and therefore unacceptable. These risks require further investigation and mitigation to reduce the risk to a lower and more acceptable level. If after further investigation the risk remains in the severe category, the risk requires appropriate business sign-off to accept the risk.

5.2 Planned (Routine and Non-routine) Activities

The majority of the sources of environmental risk identified for the Petroleum Activities Program relate to those activities which are planned and either undertaken on a routine or non-routine basis. These sources of risk include:

- Proximity of drill rig/drillship and support vessels to third party vessels (commercial shipping and fishing)
- Drill rig anchoring, DP station holding (transponders), ROV use near the seabed
- Generation of noise from drill rig/drillship, vessels and ROV during normal operations (excluding VSP)
- Generation of acoustic signals from VSP
- Internal combustion engines on drill rig/drillship and support vessels
- Discharge of sewage, grey water and putrescible wastes to the marine environment
- Discharge of deck and bilge water to marine environment
- Routine discharge of cooling water or brine to the marine environment
- Non-routine discharge of wash water from mud pits
- Routine discharge of drill cuttings to the seabed and the marine environment
- Routine discharge of drilling fluids (WBM), cement, cementing fluids and sub-sea control fluids to the seabed and the marine environment.

5.3 Unplanned (Accidents/Incidents) Activities

During the risk assessment process a number of potential environmental impacts which may occur from unplanned activities were also identified. These sources of risk range from small scale chemical spills with a low environmental consequence to large scale hydrocarbon spill events with high environmental consequence. These sources of risk include:

- Loss of hydrocarbons to marine environment due to loss of well control
- Loss of hydrocarbons to marine environment due to a vessel collision (e.g. support vessels or other marine users)
- Loss of hydrocarbons to marine environment during bunkering activities
- Accidental discharge of other hydrocarbons / chemicals from drill rig/drillship or support vessel deck activities and equipment (e.g. cranes)
- Unplanned venting of gas during drilling (well kick)
- Accidental loss of hazardous or non-hazardous wastes to the marine environment (excludes sewage, grey water, putrescible waste and bilge water)
- Accidental discharge of NWBM (or base oil) from loss due to bulk transfer, failure of slip joint packer or from the riser during an emergency disconnect sequence

- Accidental collision between support vessels and threatened and migratory whale species
- Dropped objects overboard.

6. ONGOING MONITORING OF ENVIRONMENTAL PERFORMANCE

The Petroleum Activities Program will be managed in compliance with the Pyxis and Braastad Exploration Drilling EP, 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 identify, mitigate and manage potentially adverse environmental impacts associated with the Petroleum Activities Program, during both planned and unplanned operations, to ALARP and an acceptable level.

For each environmental aspect (risk), and associated environmental impacts (identified and assessed in the Environmental Risk Assessment of the EP) a specific environmental performance outcome, environmental performance standards and measurement criteria have been developed. The performance standards are control measures (available in **Appendix A**) that will be implemented (consistent with the performance standards) to achieve the environmental performance outcomes. The specific measurement criteria provide the evidence base to demonstrate that the performance standards (control measures) and outcomes are achieved.

The implementation strategy detailed in the Pyxis and Braastad Exploration Drilling 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.

Woodside and its contractors undertake a program of periodic monitoring during the Petroleum Activities Program, starting at mobilisation of each activity and continuing through the duration of each activity until activity completion. This information is collected using appropriate tools and systems, developed based on the environmental performance outcomes, performance standards and measurement criteria in the EP. The tools and systems collect, as a minimum, the data (evidence) referred to in the measurement criteria. The collection of this data (and assessment against the measurement criteria) forms part of the permanent record of compliance maintained by Woodside and the basis for demonstrating that the environmental performance outcomes and standards are met, which is then summarised in a series of routine reporting documents.

Monitoring of environmental performance is undertaken as part of the following:

- Annual Environmental Compliance and Performance Reports which are submitted to NOPSEMA to assess and confirm compliance with the accepted environmental performance objectives, standards and measurement criteria outlined in the EP
- Activity based inspections undertaken by Woodside's environment function to review compliance against the Pyxis and Braastad Exploration Drilling EP, verify effectiveness of the EP implementation strategy and to review environmental performance
- Environmental performance is also monitored daily via daily progress reports during the proposed Program
- Senior management regularly monitors and reviews environmental performance via a monthly report which detail environmental performance and compliance with Woodside standards.

Woodside employees and contractors are required to report all environmental incidents and non-conformance with environmental performance outcomes and standards in the EP. Incidents will be reported using an Incident and Hazard Report Form, which includes details of the event, immediate action taken to control the situation, and corrective actions to prevent reoccurrence. An internal computerised database is used for the recording and reporting of these incidents. Incident corrective actions are monitored to ensure they are closed out in a timely manner.

The EP is supported by an assessment of the environmental impacts and risks associated with potential oil spill scenarios and oil spill preparedness and response measures in relation to the risk assessment and the identified oil spill scenarios. A summary of Woodside's response arrangements in the oil pollution emergency plan is provided in **Appendix B**.

6.1 Environment Plan Revisions

If required, revision of the Pyxis and Braastad Exploration Drilling EP will be undertaken in accordance with the requirements outlined in Regulations 17, Regulation 18 and Regulation 19 of the Environment Regulations. Woodside will submit a proposed revision of the Pyxis and Braastad Exploration Drilling EP to NOPSEMA, as a result of the following:

- When any significant modification or new stage of the activity that is not provided for in the EP is proposed
- Before, or as soon as practicable after, the occurrence or identification of any significant new or significant increase in environmental risk(s) or impact(s) not provided for in the original documents
- At least 14 days before the end of each period of five years commencing on the day in which the original and subsequent revisions of the EP is accepted under Regulation 11 of the Environment Regulations
- Change in titleholder
- As requested by NOPSEMA.

7. CONSULTATION

7.1 Engagement Activities

Woodside conducted a stakeholder assessment based on the proposed activity location, timing and potential impacts, and engaged with relevant stakeholders to inform decision-making and planning for the proposed activity.

For the purposes of this Plan and consistent with Section 11A of the Environment Regulations, Woodside considers relevant stakeholders for routine operations as those that undertake normal business or lifestyle activities in the vicinity of the existing facility (or their nominated representative) or have a State or Commonwealth regulatory role.

Woodside also made available advice about to the proposed activity to other stakeholders who have previously expressed an interest in being kept informed about Woodside's activities in the region.

Woodside made available information about the proposed activity on its web site at http://www.woodside.com.au/Our-Approach/Pages/Consultation-Activities.aspx and typically provides stakeholders about 30 days to provide feedback.

Woodside provided information about the Petroleum Activities Program to the following stakeholders.

Stakeholder
Department of Industry
Department of Mines and Petroleum
Australian Maritime Safety Authority
Australian Hydrographic Service (AHS)
Department of Fisheries (Western Australia)
Commonwealth fisheries • Western Tuna and Billfish Fishery • North West Slope Trawl Fishery • Western Skipjack Fishery • Southern Bluefin Tuna.
Western Australian Fisheries • Mackerel • Onslow Prawn • Pilbara Trap and Trawl.

Department of Defence – Defence Property Services Group
Department of Transport (marine pollution)
Department of Parks and Wildlife
Australian Customs Service – Border Protection Command
Commonwealth Fisheries Association
Western Australian Fishing Industry Council
Pearl Producers Association
Recfishwest
WWF
Australian Conservation Foundation
Wilderness Society
International Fund for Animal Welfare
APPEA
AMOSC

Woodside received feedback on the proposed activity across a number of topic areas. This feedback and Woodside's consideration of this feedback is summarised in **Appendix C**.

7.2 Ongoing consultation

The following stakeholders will be notified prior to the commencement and following completion of drilling activities as outlined the Environment Plan at the request of stakeholders and as part of Woodside's ongoing consultation program for the region.

Stakeholder
Australian Maritime Safety Authority – Rescue Coordination Centre
Australian Hydrographic Service (AHS)
Department of Fisheries (Western Australia)
Commercial fishing associations – Commonwealth and State
Commercial fishing operators

Woodside will continue to accept feedback from all stakeholders throughout the duration of the accepted Environment Plan.

8. TITLEHOLDER NOMINATED LIAISON PERSON

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APPENDIX A: ENVIRONMENTAL IMPACTS AND RISKS

Source of Risk (Hazard)	Potential Environmental Impact	Control Mitigation Measures
Planned (routine and non-routine) Activities		
Proximity of drill rig and support vessels to third party vessels (commercial shipping and fishing)	Short-term, localised interference with or displacement of other sea users (e.g. fishing and shipping).	Compliance with Marine Orders 30 (prevention of Collisions) Compliance with Marine Orders 21 (Safety of Navigational and Emergency Procedures) Notify AMSA of drill rig/drillship and support vessels prior to commencement of activity Notify AMSA Rescue Coordination Centre (RCC) of activity prior to commencement and on completion of activity. Notify AHS to generate Maritime Safety Information Notifications and Notice to Mariners Send consultation Factsheet to State and Commonwealth fisheries Maintain (actively enforce) 500m safety/exclusion zone around drill rig/drillship
Drill rig anchoring, DP station holding (transponders), ROV use near the seabed	Temporary and localised damage to the seabed and disturbance of soft sediments from anchoring, location of transponders and ROV activities.	Woodside Well Location and Site Appraisal Data Sheet (WLSADS) completed for well locations to summarise the likelihood of potential well specific hazards and drilling constraints Mooring Analysis Design Report completed and implemented during anchor deployment as per *Woodside Anchor Handling and Marine Operations Standard* and *Woodside Engineering Standard – Rig Equipment* and *Woodside Engineering Standard Mobile Offshore Drilling Unit Mooring Design* Consultation with AHO, in the event that the wellhead assembly cannot be removed, to establish any charting requirements
Generation of noise from drill rig/drillship, vessels and ROV during normal operations (excluding VSP)	Temporary and minor behavioural disturbance (e.g. avoidance or attraction) to fauna, including protected species.	Compliance with *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with cetaceans
Generation of acoustic signals from VSP	Temporary and minor behavioural disturbance (e.g. avoidance of local area 500 m from source) to fauna, including protected species.	Compliance with *EPBC Act policy Statement 2.1* (*Interaction between offshore seismic exploration and whales: Industry guidelines*) to manage Potential interactions between VSP and threatened and migratory cetacean species listed under the EPBC Act. Crew undertake specific training for cetacean observation
Internal combustion engines on drill rig/drillship and support vessels	Reduced local air quality from atmospheric emissions.	Compliance with Marine Order 97 (marine pollution prevention – air pollution)

Source of Risk (Hazard)	Potential Environmental Impact	Control Mitigation Measures
Routine and non-routine discharges: drill rig/drillship and vessels	Localised and temporary eutrophication of the water column and localised and temporary adverse effect to marine biota. Localised and temporary effects to water quality and marine biota.	Compliance with Marine Orders 95 (pollution prevention – Garbage). Compliance with Marine Orders 96 (pollution prevention – Sewage). Vessel sewerage system capacity suitable for full crew as per *Woodside's Engineering Standard – Rig Equipment* Management of bilge water – if bilge is contaminated with hydrocarbons it must be contained and disposed of onshore unless oil content is less than 15 ppm (without dilution) or an approved oil/water separator is used for treatment Management of wash water from mud pits, less than 1% by volume oil content
Routine discharge of drill cuttings to the seabed and the marine environment.	Localised burial and smothering of benthic habitats. Localised and temporary minor effects to water quality (e.g. turbidity increase) and marine biota in offshore waters.	Use of solids control equipment (SCE): Shale shakers and centrifuges prior to discharge Discharge cuttings below the water line (to reduce carriage by surface currents to keep impacts localised) as per *Woodside Engineering Standard – Rig Equipment* NWBM cuttings treated to reduce oil on cuttings to less than 10% by weight prior to discharge
Routine discharge of drilling fluids (WBM), cement, cementing fluids and sub-sea control fluids to the seabed and the marine environment.	Localised and temporary effects to water quality and marine biota within 200 m of discharge point.	NWBM only used following a formal written commercial and/or technical NWBM justification process Woodside NWBM checklists for MODU and SCE and audit of set up of NWBM system Implement Woodside's *Environment Procedure Offshore Chemical Assessment, Environmental Performance Standards: Operating Standard, and D&C Engineering Standard – Drilling and Completions Fluids* Bulk operational discharges conducted under drill rig/drillships Permit to Work (PTW) system (to operate discharge valves/pumps) or risk assessed using the drill rig/drillship contractors risk assessment prompt cards. Bulk operational discharges conducted under MODU's PTWsystem (to operate discharge valves/pumps) or risk assessed using the MODU contractors risk assessment prompt cards. Overboard disposal of NWBM is not permitted. Opportunities for reuse of drilling fluids at the end of Petroleum Activities Program reviewed across other Woodside drilling activities
Unplanned (accidents or incidents) Activities		

Source of Risk (Hazard)	Potential Environmental Impact	Control Mitigation Measures
Loss of hydrocarbons to the marine environment due to loss of well control	Contamination of water leading to toxic effects to marine biota, particularly sessile benthos in the shallow sub-tidal and intertidal zone of the coral reefs. Oiling of marine mammals, reptiles and seabirds. Potential medium-term interference with or displacement of other sea users (e.g. fishing and shipping). Potential interference with activities of other regional petroleum Operators.	Accepted Well Operations Management Plan (WOMP) and application to drill as per Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 Prevention: Control as per *Woodside's Engineering Standards: Well Barriers, Well Control Manual, Well Cementation* and international standards Subsea BOP specification and function/pressure testing in accordance with internal Woodside Standards and international requirements Mitigation: Subsea first response toolkit and capping stack via global service provider Mitigation: Relief well via Mutual Aid MoU Well Blowout Contingency Plan as per *Well Blowout Contingency Planning* (WEL Doc No. DC0000PD8168152) Prevention: Control as per *Well Acceptance Criteria Procedure* (Wel Doc. No. DC0000PD7561721)
Loss of hydrocarbons to marine environment due to a vessel collision (e.g. support vessels or other marine users).	Minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds. Minor and/or temporary contamination of water which may lead to toxic effects on marine biota.	Compliance with Marine Order 30 (Prevention of Collisions) and Marine Order 21(Safety of navigation and emergency procedures) Notify AHS of activities and movements and consultation fact sheets Notify AMSA RCC of activities and movements Maintain (actively enforce) 500 m safety/exclusion zone around MODU Implement *Woodside Marine – Charters Instructions* which define the role of support vessels
Loss of hydrocarbons to 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 Marine Order 91 (Marine pollution prevention – oil) Implement *Woodside Engineering Standard – Rig Equipment* for bunkering hoses, spill kits, etc. Implement *Woodside's Engineering Operating Standard – Standard – Rig Equipment* for bunkering procedures
Accidental discharge of other hydrocarbons / chemicals from drill rig/drillship or support vessel deck activities and equipment (e.g. cranes)	Localised and minor temporary effects to water quality and marine biota in offshore waters.	Compliance with Marine Order 91 (Marine pollution prevention – oil) Implement *Woodside's Environment Procedure Offshore Chemical Assessment* Implement *Woodside's Environmental Performance Operating Standard: Storage* Implement engineered barriers as per *Woodside's Engineering Standard – Rig Equipment* Deck bunding and spill response kits

Source of Risk (Hazard)	Potential Environmental Impact	Control Mitigation Measures
Unplanned venting of gas during drilling (well kick).	Localised and temporary reduction in air quality as the gas vents to the atmosphere. Contribution to global greenhouse gas emissions.	Prevention: Control as per *Woodside's Engineering Standards: Well Barriers, Well Control Manual, Well Cementation* and international standards Prevention: *Control as per Well Acceptance Criteria Procedure* (Wel Doc. No. DC0000PD7561721) In accordance with *Woodside Engineering Manual – Well Control Manual* (Doc No. DC0000PD101151): Calculation of kick tolerance , if less than specified well design Hazard Assessment undertaken
Accidental discharge of NWBM (or base oil) from loss due to bulk transfer, failure of slip joint packer or from the riser during an emergency disconnect sequence	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	Implement *Woodside Engineering Standard – Rig Equipment* for bunkering hoses, spill kits, etc. Woodside NWBM checklists for drill rig/drillship and SCE and audit of set up of NWBM system North West European Area (NWEA) Guidelines: for transfers Deck bunding, locked pit dump valve, valve line check
Accidental loss of hazardous or non-hazardous wastes to the marine environment (excludes sewage, grey water, putrescible waste and bilge water).	Pollution and contamination of the environment and secondary impacts on marine fauna (e.g. ingestion or entanglement, toxicity).	Compliance with Marine Orders 95 (pollution prevention – Garbage) and Marine Orders 94 (packaged harmful substances) Implement Woodside's D&C Waste Management Plan or relevant equivalent Recovery of solid wastes lost overboard where safe to do so
Accidental collision between support vessels and threatened and migratory whale species.	Potential injury or fatality of an individual or a number of fauna (including listed threatened to cetaceans due to vessel strike.	Compliance with *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with cetaceans
Dropped objects overboard.	Localised short-term damage of benthic subsea habitats in the immediate location of the dropped object.	Drill rig/drillship Safe Work Procedures to prevent dropped objects Recovery of dropped objects where possible and associated procedures Dropped object training

APPENDIX B: SUMMARY OF RESPONSE ARRANGEMENTS FROM OIL POLLUTION EMERGENCY PLAN

Woodside's Oil Spill Planning Arrangements

Woodside's Oil Pollution Emergency Plan (OPEP) for the proposed Program consists of the following documents:

Woodside Oil Pollution Emergency Arrangements

This document outlines the emergency and crisis management incident command structure (ICS) and Woodside's response arrangements to competently respond to and escalate an oil spill event. The document interfaces externally with Commonwealth, State and industry response plans and internally with Woodside's ICS.

Woodside's Oil Pollution Emergency Arrangements (Australia) describes Woodside's role as a Control Agency and details the following support arrangements:

- Master services agreement with Australian Marine Oil Spill Centre (AMOSC) for the supply of experienced personnel and equipment, including a subsea first response toolkit and national dispersant stockpiles
- Access to Wild Well Control's capping stack, SFRT equipment and experienced personnel for the rapid deployment and installation of a capping stack, where feasible
- Participating membership with Oil Spill Resources Limited (OSRL), which allows access to OSRL's international holding of response equipment and response capabilities, including incident management expertise and specialist personnel
- The Woodside and Australian Maritime Safety Authority (AMSA) Memorandum of Understanding (MoU) whereby AMSA, as managers of the National Plan for Maritime Environmental Emergencies, will provide support to Woodside such as response equipment from national stockpiles. The equipment stockpiles are located around Australia in strategic locations such as the ports of Dampier, Darwin and Fremantle
- Other support services such as 24/7 oil spill trajectory modelling and satellite monitoring services as well as 'on-call' aerial, marine, logistics and waste management support
- Mutual Aid Agreements with other oil and gas operators in the region for the provision of assistance in an oil spill response.

Pyxis and Braastad Exploration Drilling Activity Oil Pollution First Strike Plan

The Pyxis and Braastad Exploration Drilling Activity Oil Pollution First Strike Plan is an activity specific document providing details on the tasks required to mobilise a first strike response for the first 24 hours of a hydrocarbon spill event. These tasks include key response actions and regulatory notifications. The intent of the document is to provide immediate oil spill response guidance to the Incident Management Team until a full Incident Action Plan specific to the oil spill event is developed.

Woodside's oil spill arrangements are tested on the drill rig within 2 weeks of commencement of drilling each well. Woodside's broader ICS is tested at least every year, whilst exercises involving the various statutory authorities are conducted at least every five years.

Oil Spill Preparedness and Response Mitigation for Pyxis and Braastad Exploration Drilling

Woodside has developed an oil spill preparedness and response position in order to demonstrate that risks and impacts associated with loss of hydrocarbons from the proposed Program would be mitigated and managed to as low as reasonably practicable (ALARP) and would be of an acceptable level.

The following oil spill response strategies were evaluated and subsequently pre-selected for a significant oil spill event (level 2 or 3 under the National Plan) from the proposed Program. Implementation of these response strategies would be re-assessed during a spill event, with consideration of the size of spill, weather conditions and other constraints:

1. Monitor and Evaluate - To gain an understanding of the spill event, its movement and to direct mitigation activities to the optimal locations, the following operational monitoring programs are available for implementation:
    - Predictive modelling of hydrocarbons to assess resources at risk;
    - Surveillance and reconnaissance to detect hydrocarbons and resources at risk;

- Monitoring of hydrocarbon presence, properties, behaviour and weathering in water;
- Pre-emptive assessment of sensitive receptors at risk; and
- Monitoring of contaminated resources and the effectiveness of response and clean-up operations.

2. Source Control (Well intervention) - Woodside's strategy is to minimise the volume of hydrocarbons released from an oil spill event. Woodside plans to deploy the following controls specific to well loss of containment scenarios, if required for the proposed Program:
    - Source control (Subsea First Response Toolkit (SFRT) and well capping); and
    - Well intervention (relief well drilling).
3. Containment and Recovery – Involves the physical containment and mechanical removal of hydrocarbons from the marine environment. Suitable vessels would be drawn from Woodside's integrated fleet, other operators in the region and from the charter market. Open water containment and recovery equipment (e.g. booms and skimmers) would be sourced from Woodside's own equipment, AMSA, AMOSC and OSRL stockpiles.
4. Shoreline Protection – Shoreline protection equipment would be deployed either from a vessel or from the shore, depending on the prevailing conditions, shoreline type and access. Additional resources would be mobilised depending on the scale of the event to increase the number of shorelines being protected.
5. Shoreline Cleanup – Woodside has access to equipment stockpiles to support initial response requirements at priority receptors and would supplement resources, depending on the type of cleanup required, through contractors. Some equipment maybe procured locally on the day with additional equipment being sourced within Western Australia, interstate and internationally, commensurate with the scale and progressive nature of shoreline impact.
6. Oiled Wildlife Response – Staging sites will be established for shoreline or vessel based oiled wildlife response teams. Once recovered to a staging site, wildlife will be transported to the designated oiled wildlife facility for stabilisation and treatment.
7. Waste Management – The objectives of Woodside's waste management response are:
    - To mobilise waste storage and transport resources on day one of a potential oil spill event to support containment and recovery and shoreline protection responses; and
    - Arrange for sufficient waste storage, handling, transport and disposal capability to support continuous response operations.

To achieve these objectives, Woodside has access to waste storage in Exmouth and Karratha as well as waste storage equipment from AMOSC, AMSA and OSRL.

Scientific Monitoring

In addition to the above response strategies, a scientific monitoring program (SMP) will be activated following a significant oil spill (defined as a level 2 or 3 spill). The nature and scale of the spill event would dictate the implementation and operational timing of the SMP. Ten targeted scientific monitoring programs may be implemented to address a range of physical-chemical (water and sediment) and biological receptors (species and habitats) including EPBC Act listed species, environmental values associated with Protected Areas and socio-economic values such as fisheries. The SMPs to be activated are as follows:

- Desk-based review and assessment of hydrocarbons in marine waters;
- Assessment of the presence, quantity and character of hydrocarbons in marine sediments;
- Assessment of impacts and recovery of subtidal and intertidal benthos;
- Assessment of impacts and recovery of mangroves / saltmarsh;
- Assessment of impacts and recovery of seabird and shorebird populations;
- Assessment of impacts and recovery of nesting marine turtle populations;
- Assessment of impacts to pinniped (seal and sea lion) colonies including haul-out site populations;

- Desk-based assessment of impacts to other non-avian marine megafauna;
- Assessment of impacts and recovery of marine fish associated with various habitats; and
- Assessment of physiological impacts to commercially important fish and shellfish species (fish health and seafood quality/safety) and recovery.

APPENDIX C: SUMMARY OF STAKEHOLDER FEEDBACK AND WOODSIDE'S RESPONSE

Topic	Summary of Stakeholder Feedback	Woodside assessment of feedback	Woodside Response
Maritime safety	Stakeholder requested that: • AMSA's Rescue Coordination Centre (RCC) is contacted prior to, and at the end of drilling for promulgation of Auscoast warning • AHS is contacted no less than two weeks prior to drilling to support Notice to Mariners, and • AMSA is informed after the activity of any commercial shipping activity	Woodside acknowledges the requests, which are consistent with requirements for other activities for vessel movements to be reported to the RCC, AHS and AMSA.	Woodside to report activity start and end dates and vessel movements to the RCC, AHS and AMSA as per the requests.
Commercial fishing	Stakeholder recommended that Woodside maintain contact with WAFIC, Recfishwest and directly with fishers about proposed activities. Stakeholder provided contacts for notification in the event of an oil spill or pollutant discharge and requested that should such an event occur that contact is made with 24 hours. In the event of a spill the stakeholder requested collection of baseline marine data to compare against any post-spill monitoring to determine the extent of impact in the event of an oil spill. Stakeholder requested that strategies be included in the EP to mitigate the impact of oil spill on fish spawning grounds and nursery areas. Stakeholder also noted that all vessels undertaking activities in Western Australian waters to undertake measures to minimise the risk of translocating	Section 5 of the EP and Appendix A of this EP Summary outline the risk and impact assessment of the activity, including impacts on commercial fishing, and the controls that will be applied to mitigate and manage impacts. The aspects that have been raised by the Stakeholder in relation to oil spills have been assessed and appropriate controls put in place.	Woodside acknowledges the response and have included the stakeholder on the stakeholder distribution list for ongoing advice during the activity. Woodside will reengage if this activity occurs outside of the 6 month advice window and at least three months prior to the activity commencement. Based on the advice provided by the Stakeholder Woodside provided advice to the Mackerel fishery, WAFIC, Recfishwest and charter boat operators based in Exmouth. Woodside notes the Fish Resources Management Regulations 1995, and assesses and manages invasive marine species risk for all vessels (including MODUs) through the Woodside Invasive Marine Species Management Plan. Appropriate spill response plans are

Topic	Summary of Stakeholder Feedback	Woodside assessment of feedback	Woodside Response
	aquatic pests and diseases. Stakeholder also requests vessel owners and operators to immediately report known or suspected introduced aquatic pests or diseases detected in Western Australian waters. Stakeholder requested that all potential impacts to fisheries, fish and fish habitat are acknowledged in the EP and strategies for minimisation and mitigation defined. Stakeholder indicated that the response is only valid for six months and requested that Woodside re-consult with the Stakeholder, Recfishwest and individual fisheries three months prior to the commencement of the activity, with any objections or claims resolved prior to the commencement of the activity.		in place. Known baseline information related to fish species (including spawning and nursery seasons) and relevant nature and scale of the activities is described in the EP, and in the event of an oil spill scientific monitoring will be undertaken relevant to any potential impacts that may occur, as determined by the operational and scientific monitoring plan and process.
Oil spill preparedness	Stakeholder provided clarification on combat agency responsibility for types of spill.	Woodside currently has a signed Memorandum of Understanding (MoU) with AMSA to support its role as combat agency. For ship-sourced spills (in Commonwealth waters) AMSA retains Combat Agency responsibility for all ship-sourced marine pollution incidents. Woodside will provide support to AMSA. For non ship-sourced spills and in accordance with the MoU, AMSA on formal request of the appointed Incident Coordinator will coordinate the resources of	Woodside acknowledged comments, the Pyxis and Braastad Exploration Drilling Oil Pollution First Strike Plan reflects these roles and responsibilities.

Topic	Summary of Stakeholder Feedback	Woodside assessment of feedback	Woodside Response
		the National Plan.	