



Exmouth Sub-basin Gas Well Program Environment Plan Summary

Drilling and Completions

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1. INTRODUCTION

1.1 Background and Purpose

Woodside Energy Limited (Woodside), as operator and on behalf of its Joint Venture with Mitsui Exploration and Production Pty Limited, proposes to undertake the drilling of two gas exploration wells and one gas appraisal well in Exploration Permits WA-430-P and WA-271-P respectively. The three wells collectively are referred to as the Exmouth Sub-basin Gas Well Program (the Drilling Program).

The Exmouth Sub-basin Gas Well Environment Plan Revision 1 (the EP) has been prepared in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Environment Regulations). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in accordance with Regulation 11 of the Environment Regulations

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

2. DESCRIPTION OF THE ACTIVITY

2.1 Location of the Activity

The two exploration and one appraisal well that are part of the Drilling Program are named Toro-A, Sedan-A and Ragnar. The wells are located in Commonwealth waters in Exploration Permits WA-430-P and WA-271-P (see **Figure 2-1**). **Table 2-1** summarises the well details including proposed surface coordinates, water depth relative to lowest astronomical tide (LAT) and licence area.

Table 2-1: Exmouth Sub-basin Gas Well Proposed Coordinates and Water Depths

Well	Water Depth (m LAT)	Longitude	Latitude	Licence Area
Toro-A	1,160	113° 25' 35.358" E	21° 25' 51.680" S	WA-430-P
Sedan-A	1,205	113° 32' 37.518" E	21° 43' 51.882" S	WA-271-P
Ragnar	1,190	113° 36' 49.27" E	21° 19' 23.87" S	WA-430-P

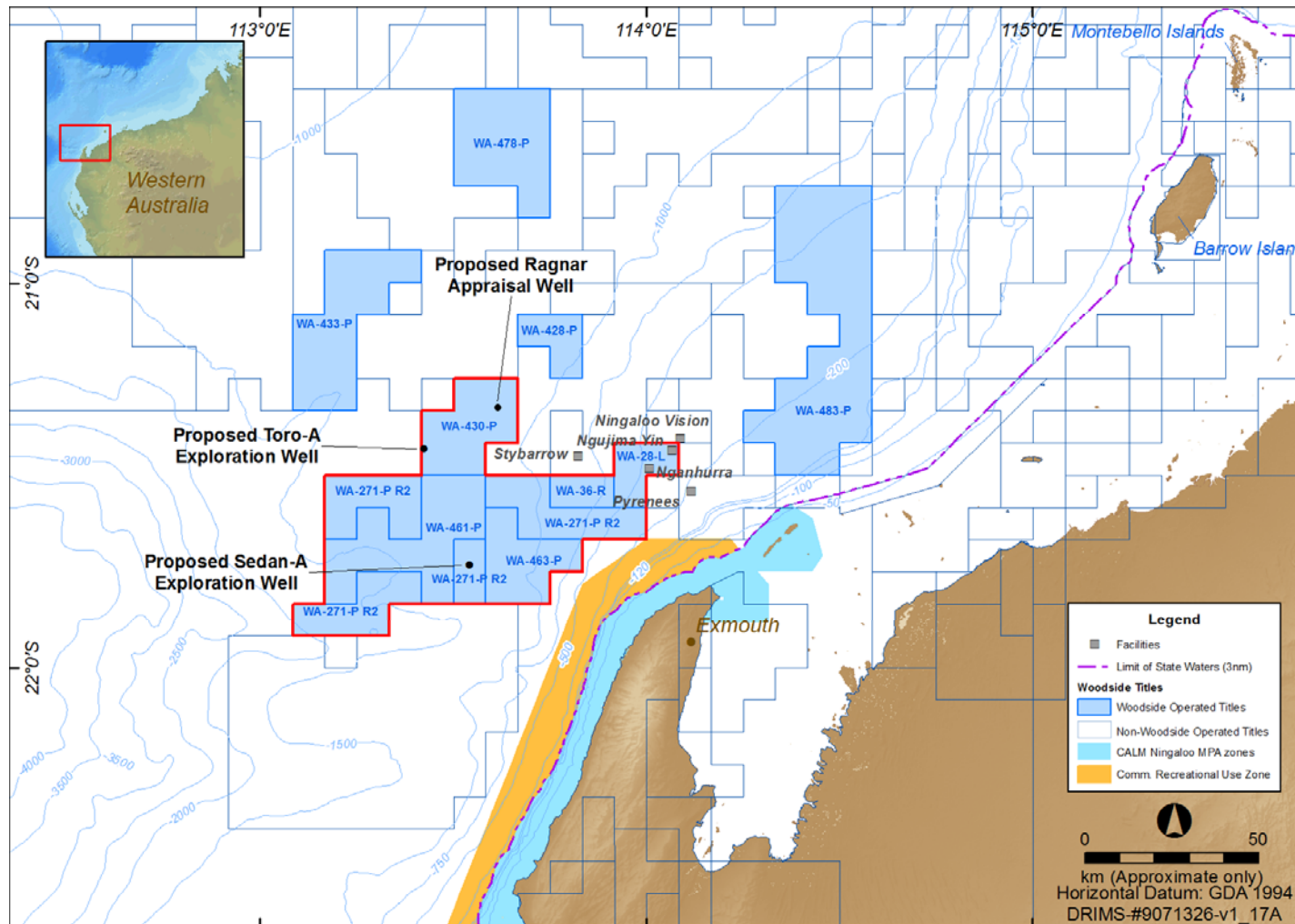


Figure 2-1: Location of the Drilling Program area, including the proposed locations of the Toro and Sedan gas exploration wells and Ragnar gas appraisal well

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2.2 Timing of Activity

The Drilling Program will commence with the drilling of the first gas exploration well (Toro-A proposed) during the first quarter of 2014. It is expected that each well will take approximately 30-80 days to complete and drilling may be undertaken at any time during the year.

2.2.1 Drilling Program

The Drilling Program will be undertaken using a mobile offshore drilling unit (MODU) using a combination of water based and non water based mud. Once drilling is completed, the wells will be plugged and abandoned.

Vessels will be used to support the MODU during drilling activities. Support vessel roles include the transfer of equipment and materials between the MODU and supply bases, and provision of safety and emergency support. Under normal operations, a minimum of one support vessel will be on standby located in the vicinity of the MODU.

Well construction activities may include the following steps:

1. Mooring of the mobile offshore drilling unit (MODU), if required
2. Drilling of the top holes sections using seawater and pre-hydrated bentonite sweeps
3. Installation and cementing of the drill string 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. Displacement of the top hole section to the target depth of the well using water based mud or non-water based mud
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. Plugging and abandonment.

These activities are subject to change.

3. DESCRIPTION OF THE ENVIRONMENT

The Drilling Program area is located in the North West Marine Region (NWMR) within Commonwealth waters, approximately 40km from Exmouth (at its closest point) and in water depths ranging from approximately 300 to 2,000 m. The area is known as the North West Province, which is a bioregion within the NWMR. The North West Province lies entirely on the continental slope.

3.1 Physical Environment

The climate in the region is dry tropical, including hot dry summers and mild winters. Transition periods between summer and winter are characterised by relatively low winds. Cyclonic events may be experienced during summer periods, with cyclones originating closer to the equator and potentially moving through the region.

Water circulation in the NWMR is dominated by the south flowing Leeuwin Current, which originates in Indonesia and flows along the edge of the continental shelf at speeds of up to 0.3 m/s, bringing warm water down the coast. The flow of the Leeuwin Current is strongest in the winter months. The Ningaloo Current flows in the opposite direction to the Leeuwin Current and closer to shore.

Based on the well locations and surveys in the region, the general seabed habitat composition of the proposed well sites is expected to comprise unconsolidated, soft sediments. Based on Geoscience Australia data, Sedan-A well site is located on the edge of a canyon feature, Toro-A well site is located on the continental slope over 16 km from the nearest canyon feature, and the Ragnar well site is located in a trench/trough geomorphic feature.

3.2 Biological Environment

No Critical Habitats or Threatened Ecological Communities, as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), occur within the Drilling Program area. The closest of the three drilling locations to the Ningaloo Marine Reserve is Sedan-A, which is approximately 20km from the Commonwealth boundary of the Reserve.

Benthic habitats of the North West Province comprise predominantly bare, unconsolidated, muddy substrates (Baker *et al.* 2008). This habitat is broadly represented in the region and typically hosts a sparse assemblage of filter and deposit-feeding epibenthic fauna (Woodside 2005). Given the depth of the Drilling Program area, the general lack of hard substrate, reduced light and nutrient loading, the soft sediment benthic communities expected at the proposed Toro-A and Ragnar well locations are considered to be of relatively low environmental sensitivity.

The proposed Sedan-A well is located in or close to a canyon feature which may include hard substrate habitat with potential for more diverse deepwater benthos. This benthos is expected to have a patchy but possibly widespread distribution associated with such areas of hard substrate throughout the canyon features.

The Commonwealth Protected Matters database includes a total of 14 threatened marine species and 21 migratory species (as listed under the EPBC Act) which may potentially occur in the Exmouth Sub-basin Gas Well Program Area.

The Commonwealth protected matters database identifies 27 cetacean species which may occur or relate to the Drilling Program area, however there are no known critical habitats (including breeding, calving, feeding grounds or constricted migratory pathways) within the immediate vicinity.

Five marine turtles may occur in the Drilling Program area and adjacent waters. The deepwater environment does not support any critical habitats (including breeding, nesting or foraging habitats).

Whale sharks may traverse the Drilling Program area during their annual migrations to and from Ningaloo Reef; however their presence is expected to be of short duration and in low numbers.

3.3 Socio-Economic Environment

The Drilling program area intersects four Commonwealth and one State fishery, with others located nearby. The Department of Fisheries, Australian Fisheries Management Authority and commercial fishing groups did not raise concerns during stakeholder consultation undertaken for the activity. Woodside will continue to accept feedback during the drilling program.

There are various existing production facilities in the Drilling Program area; however there is no infrastructure within the operational area (500 m radius) of any of the proposed Exmouth Sub-basin Gas Wells.

The region supports significant commercial shipping activity, mostly associated with the mining and oil and gas industries. Major shipping routes in the area are utilised for entry to the Port of Dampier and Barrow Island.

4. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the 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 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 Exmouth Sub-basin Gas Well Program will be managed in accordance with the 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 ensure that potential adverse impacts on the environment associated with the Drilling Program (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.

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 stakeholders, including government agencies, recreational fishing organisations and conservation groups. 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

Further information about the Drilling Program can be obtained from:

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APPENDIX A: SUMMARY OF KEY ENVIRONMENTAL HAZARDS AND CONTROL MEASURES TO BE APPLIED DURING THE EXMOUTH SUB-BASIN GAS WELL PROGRAM DRILLING 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 and MODU 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 <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> (Cth)
Generation of acoustic signals during VSP 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 <i>EPBC Act Policy Statement 2.1 (Interaction between offshore seismic exploration and whales)</i>
Well site and MODU anchoring (if moored, semi-submersible drill rig used)	Disturbance to benthic habitat	Compliance with Woodside procedures to identify well specific hazards. Anchoring analysis undertaken and findings implemented
Routine discharge of drill cuttings (NWBM) to the marine environment	Localised burial of smothering of benthic habitats from deposition of cuttings from sea surface discharge Toxic effects to marine fauna	The management of drill cuttings will be consistent with applicable Woodside engineering standards
Routine discharge of drill cuttings (WBM) to the marine environment	Localised burial of smothering of benthic habitats in the immediate vicinity of the discharge point	The management of drill cuttings will be consistent with applicable Woodside engineering standards
Routine discharge of drilling, cementing and subsea fluids to marine environment from the MODU	Localised short-term decrease in water quality and toxic effects to marine biota	Woodside's environmental chemical selection, assessment and approval procedure will be applied

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Atmospheric emissions from fuel combustion	Contribution to global greenhouse gas emissions; and consumption of non-renewable natural resources	Compliance with <i>International Convention for the Prevention of Pollution from Ships 1973</i> as modified by the protocol of 1978 (<i>MARPOL 73/78 Annex VI</i>) (as implemented in Commonwealth waters by the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>); (Cth)) requirements for emissions, as required by vessel class
Routine discharge of sewage, grey water and putrescible wastes to marine environment	Nutrient enrichment to localised environmental outside the mixing zone (200m) Localised adverse effects to marine biota	Compliance with MARPOL 73/78 - as implemented under <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> ; AMSA Marine Orders - Part 96: Marine Pollution Prevention – Sewage as required by vessel class
Routine discharge of water (deck and bilge) to marine environment	Nutrient enrichment to localised environmental outside the mixing zone (200m) Localised adverse effects to marine biota	Compliance with MARPOL 73/78 - as implemented under <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> ; 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	Toxic effects to marine biota, particularly sessile benthos in the shallow sub-tidal and intertidal zones of coral reefs. Oiling of marine mammals, reptiles and birds	<p><i>Preventative</i></p> <ul style="list-style-type: none"> - Use of a range of industry standard well barrier equipment, materials and procedures as part of the well design, construction and abandonment - Barriers and testing requirements will be consistent with applicable Woodside engineering standards and procedures <p><i>Spill Response</i></p> <ul style="list-style-type: none"> - Spills to sea will be managed as per Woodside's Corporate Oil Spill Response Plan and the Exmouth Sub-basin Gas Well Program First Strike Oil Spill Action Plan - Monitoring/observation of the spill to inform the spill response - Recovery and containment undertaken to minimise potential environmental impact - Mutual Aid Memorandum in place with other operators to facilitate cooperation in relief well drilling
Collision between support vessels or MODU 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 <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> (Cth)

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
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 <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> ; AMSA Marine Orders - Part 91 Marine Pollution Prevention – Oil 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
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 <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> ; 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 structural 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 Localised short term damage of benthic subsea habitats in the immediate location of the dropped object.	Establishment and enforcement of a 500 m safety zone around the MODU Use of support vessels to warn third parties and inform of exclusion zone Compliance with relevant Marine Orders for navigation and prevention of collisions
Accidental discharge of NWBM to the marine environment during bulk transfer	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 from failure of slip joint packers or 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
Accidental loss of solid wastes to the marine	Pollution and contamination of the environment and secondary impacts on marine fauna (e.g. ingestion)	Compliance with MARPOL 73/78 - as implemented under <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> ; AMSA Marine

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
environment (excludes Sewage, Grey Water, Putrescible Waste and Bilge Water)	or entanglement).	Orders - Part 95 Marine Pollution Prevention – Garbage where applicable
Dropped objects to the marine environment	Localised minor and/or temporary contamination of water which may lead to toxic effects to marine biota	Equipment and material dropped to the marine environment will be recovered where practicable Rig contractor policies and initiatives in place to prevent dropped objects

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