# Goodwyn North-1 Exploration Well Environment Plan Summary

**Drilling and Completions**

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# TABLE OF CONTENTS

# 1. INTRODUCTION

Woodside Energy Ltd (Woodside), as operator of the North West Shelf Project, will be drilling the Goodwyn North-1 exploration well located in the Carnarvon Basin in Commonwealth waters in Production Licence WA-1-L.

The Goodwyn North-1 Exploration Well Environment Plan (EP) has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Environment Regulations). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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

# 2. LOCATION OF THE ACTIVITY

The Goodwyn North-1 exploration well location is in Commonwealth waters in Production Licence WA-1-L (Figure 2-1) in approximately 134 m (Lowest Astronomical Tide) water depth. This Production Licence is approximately 140 km northwest of Dampier. Table 2-1 summarises the well details including surface coordinates, water depth and permit area.

**Table 2-1: Goodwyn North-1 Exploration Well Coordinates and Water Depth**

| Well | Water Depth (m LAT) | Longitude | Latitude | Permit Area |
|---|---|---|---|---|
| Goodwyn North-1 | 134 m | 116° 00’ 11.664"E | 19° 33’ 58.751” S | WA-1-L |

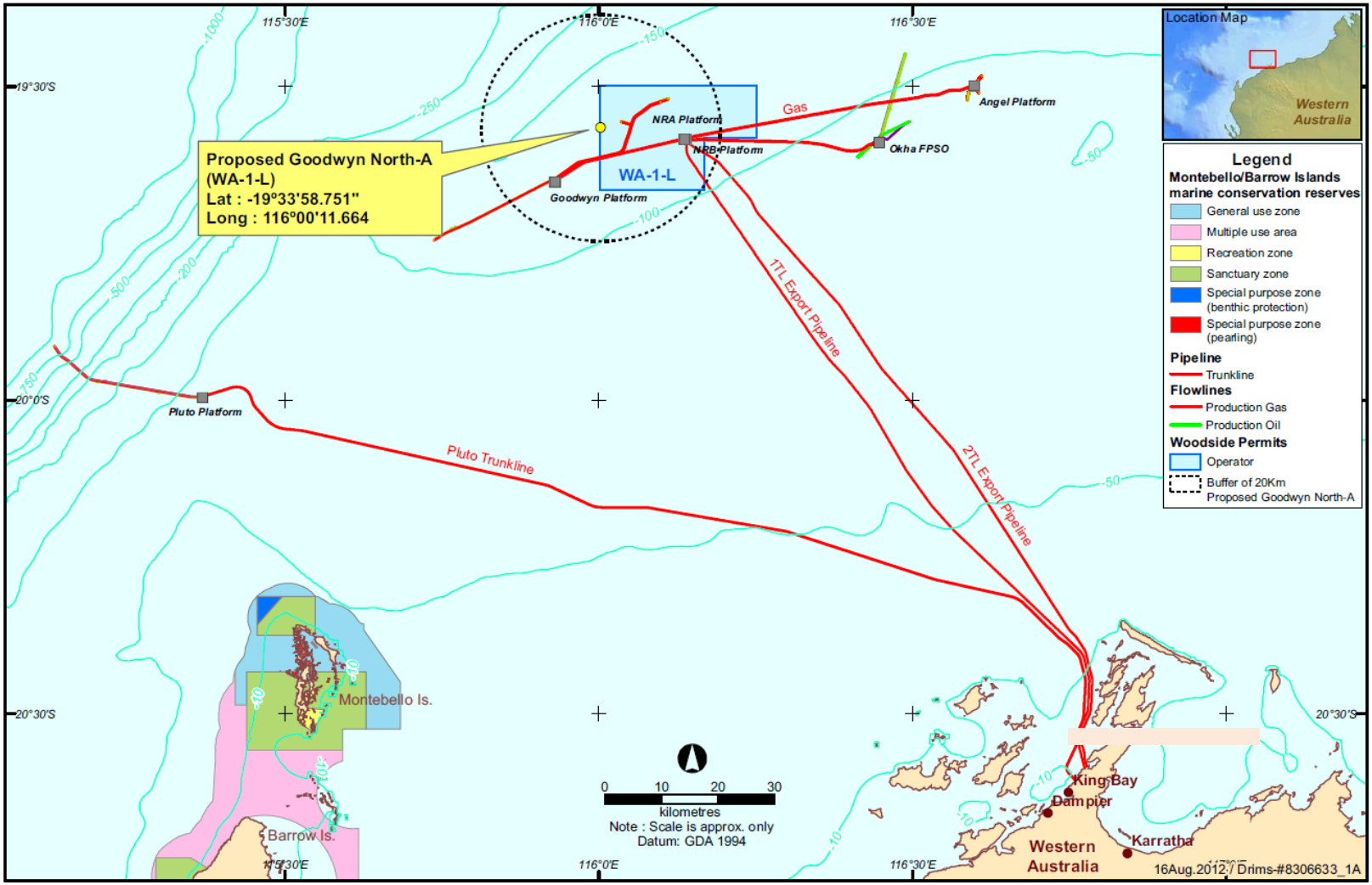


**Figure 2-1: Drilling Location Map for the Goodwyn North-1 Exploration Well**

# 3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

## 3.1 Physical Environment

The Goodwyn North-1 exploration well will be located within the North West Marine Bioregion (NWMR) on the outer continental slope region in 134 m water depth. The Indonesian Throughflow is the dominant current through the majority of the NWMR, while the Leeuwin Current is dominant in the south of the NWMR.

## 3.2 Biological Environment

Regional studies on the North West Shelf indicate that the seabed material is likely to be predominantly flat and featureless and comprises thick, unconsolidated fine grained sands. The sediments support soft sediment benthic communities dominated by infauna (mobile burrowing species including molluscs, crustaceans and worms) and isolated larger fauna (free swimming cnidarian, demersal fish and benthic crustaceans). The large water depths at the site mean that benthic communities including seagrass, algae and scleractinian (reef building) corals are not present.

The Commonwealth Protected Matters database lists eight marine species as 'threatened' and 15 species as 'migratory' under Commonwealth legislation that may occur in low abundance within, or pass through, the Goodwyn North-1 exploration well operational area. The area does not provide critical habitat for feeding, breeding or resting, or have constricted migratory pathways, for these species.

The Goodwyn North-1 exploration well operational area (see **Section 4** of this summary) is located on the outer north-western edge of the humpback whale migration route and to the south-east of the blue whale migration pathway, which follows the 500 m – 1,000 m depth contour. The timing of the Goodwyn North-1 exploration well operations overlaps with the south bound migration of pygmy blue whales; however, the well site lies within a broad migratory pathway (>100 km wide).

The abundance of threatened and migratory species is expected to be low. The presence of the operating drilling unit may result in localised behavioural avoidance; however, this is not considered significant and is not expected to impact the population of these species.

## 3.3 Socio-economic Environment

The Goodwyn North-1 exploration well operational area is located within the state fisheries management areas that cover the area out to the 200 m isobath; however, none have significant catches beyond the 50 m isobath, with the exception of the North West Slope Trawl Fishery (Commonwealth fishery). The operational area is located in Management Zone 2, Area 6 of the Pilbara Trawl Fishery which lies between the 100 m and 200 m isobaths. It is one of two management areas in Zone 2 that are closed to the trawl fishery.

The region supports significant commercial shipping activity; however, the Goodwyn North-1 location is not located within any major shipping fairways.

The Goodwyn North-1 exploration well operational area is located approximately 140 km northwest from Dampier and is rarely visited for tourism activities (recreational fishing and boating and charter boats operations) which instead tend to be centred around nearshore waters, islands and coastal areas.

There are a number of producing oil and gas fields in the North West Shelf region, with facilities including the Goodwyn, North Rankin and Angel platforms, and the Okha floating production storage and offloading facility. These facilities are accessed regularly by tankers and support vessels that may be anchored or moving through the fields.

The Goodwyn North-1 exploration well operational area is located approximately 65 km from the outer boundary of Montebello Islands Marine Park/Barrow Island Marine Management Area (WA waters). There are no known areas of cultural heritage significance in this area.

# 4. DESCRIPTION OF THE ACTION

The Goodwyn North-1 exploration well will be drilled with a mobile offshore drilling unit (MODU) using a water-based mud to a target depth of approximately 3 km below the seabed. Once the drilling is completed the well will be plugged and abandoned.

Two supply vessels will be supporting the MODU during the drilling operations. At least one vessel will be on standby in the vicinity of the MODU at all times. A third vessel may be called to assist during specific operational periods.

The Goodwyn North-1 exploration well will take approximately 28 days and is planned to be undertaken between December and January 2013.

Drilling of the Goodwyn North-1 exploration well includes the following steps:

1. Drilling of the top-hole sections using seawater and pre-hydrated bentonite sweeps
2. Installation and cementing of the drill casing string
3. Testing and installation of the blow out protector on the conductor pipe
4. Installation of the marine riser
5. Displacement of the top-hole section with water based mud
6. Drilling of the intermediate-hole section using water-based mud
7. Installation and cementing of the drill casing string
8. Drilling of the bottom-hole section using water-based mud to the target depth of the well
9. Plugging and abandoning the well.

# 5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Goodwyn North-1 exploration well (planned and unplanned activities) to ensure they are reduced to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level using a method consistent with Woodside standards.

The key environmental hazards and control measures to be applied to the Goodwyn North-1 exploration well activities are shown in **Appendix A**. These are consistent with Woodside corporate and project-specific objectives, standards and criteria. All control measures associated with the hazards will be implemented to reduce environmental risk to ALARP and will be of an acceptable level.

# 6. MANAGEMENT APPROACH

The Goodwyn North-1 exploration well drilling activities will be managed in compliance 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 Goodwyn North-1 exploration well drilling activities, during both planned and unplanned activities, are identified, are 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 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-compliance, emergency response (oil spills) 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.

# 7. CONSULTATION

Woodside conducted a stakeholder assessment to identify potentially affected 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 approval. This was supported by engagement with potentially affected stakeholders, relevant regulators and industry associations.

The stakeholder groups identified to be potentially most affected were State fisheries. The Goodwyn North-1 exploration well operational area is located in Management Zone 2, Area 6 of the Pilbara Trawl Fishery which lies between the 100 m and 200 m isobaths. It is one of two management areas in Zone 2 that are closed to the trawl fishery. Woodside did not receive any feedback from fisheries representative groups.

Woodside did not receive any material concerns from stakeholders prior to or after lodgement of the EP for assessment and approval. Woodside will continue to accept feedback from stakeholders during the drilling program.

# 8. CONTACT DETAILS

Further information about the Goodwyn North-1 exploration well activity can be obtained from:

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## APPENDIX A: Summary of Key Environmental Hazards and Control Measures to be applied to the Goodwyn North-1 Exploration Well Drilling Activities

| Source of Risk (Hazard) | Potential Environmental Impact | Control/Mitigation Measures |
|---|---|---|
| **Planned (Routine and Non Routine) Activities** | | |
| Timing of the drilling activity | Disturbance to marine fauna in critical habitat | • Planning/location of activity to avoid/ minimise disturbance to marine fauna |
| | Displacement of fishing activities in the area | • Maintain a 500 m radius petroleum safety zone around the MODU as required under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) (OPGGSA)<br>• Compliance with Australian Maritime Safety Authority administered marine safety regulations and marine notification requirements<br>• Pre-drilling notification/consultation with stakeholders |
| | Interference with other sea users | |
| Vessel/ MODU/ Helicopter movement and noise | Acoustic disturbance to whales - behavioural | • The interaction of the support vessels and helicopters with cetaceans will be consistent with Part 8 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) |
| | Injury/mortality of whales | |
| MODU anchoring | Damage to benthic habitat | • Anchoring analysis undertaken and implemented to minimise the potential for accidental anchor drag or the MODU dragging off location |
| Atmospheric emissions from the use of MODU, supply vessel and machinery engines | Reduced local air quality from atmospheric emissions | • 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 *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*) (Cth)) requirements for emissions. |
| Routine operational discharge of waste to marine environment | Toxic effects to marine biota | • All sewage and putrescible wastes will be handled and disposed of in accordance with *MARPOL 73/78 Annex IV* (as implemented in Commonwealth waters by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth); and Marine Orders - Part 96: Marine Pollution Prevention - Sewage) |
| Routine discharges from deck drainage and bilge water to | Toxic effect on marine biota | • Compliance with *MARPOL 73/78 Annex I* (as implemented in Commonwealth waters by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth)) |

| Source of Risk (Hazard) | Potential Environmental Impact | Control/Mitigation Measures |
|---|---|---|
| marine environment | | • Management of deck drainage will be consistent with applicable Woodside engineering standards |
| Routine operational discharges to marine environment | Toxic effect on marine biota<br>Localised burial and smothering of benthic habitats from cuttings pile<br>Localised reduction in water quality (turbidity increase) | • The management of drilling fluids, drill cuttings, cementing fluids and subsea control fluids will be consistent with applicable Woodside engineering and operating standards and procedures<br>• All potentially hazardous materials and chemicals will be reviewed and approved through relevant Woodside procedures |
| **Unplanned Activities (Accidents/ Incidents)** | | |
| Transport/introduction of invasive marine species (IMS) on hull, internal niches and in-water equipment | Introduction and establishment of IMS and displacement of native marine species | • An IMS risk assessment will be undertaken for all vessels, MODU and immersible equipment planning to enter and operate within nearshore waters around Australia (i.e. nearshore areas include all waters within 12 nautical miles of land and in all waters less than 50 metres deep (at Lowest Astronomical Tide)<br>• Based on the outcomes of each IMS risk assessment, management measures commensurate with the risk will be implemented to minimise the likelihood of IMS being introduced and established<br>• Vessels in compliance with Australian Quarantine and Inspection Service (AQIS) requirements |
| Accidental loss of drilling equipment to the marine environment | Damage to sensitive benthic habitats | • Pre-spud remotely-operated vehicle (ROV) survey undertaken to increase the likelihood that areas of hard substrate and high structural complexity will be avoided.<br>• Post-well ROV seabed survey to identify any dropped objects on the seabed and recover where practicable. |
| Accidental discharge of waste to marine environment | Toxic effects to marine biota | • All wastes (oil, packaged harmful substances and garbage (other wastes) will be handled and disposed of in accordance with *MARPOL 73/78 Annex IV* (as implemented in Commonwealth waters by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth); and Marine Orders – Part 91: Marine Pollution Prevention – Oil, Part 94: Marine Pollution Prevention – Packaged Harmful Substances and Part 95: Marine Pollution Prevention – Garbage) |

| Source of Risk (Hazard) | Potential Environmental Impact | Control/Mitigation Measures |
|---|---|---|
| | | • Compliance with Woodside Waste Management Plan |
| Accidental discharge of hydrocarbons/ chemicals to marine environment – Deck spill | Toxic effect on marine biota | • All potentially hazardous materials and chemicals will be reviewed and approved through relevant Woodside procedures<br>• Fuels, oils and chemicals will be stored with secondary containment<br>• Spill response bins/kits will be well stocked, readily available and personnel trained in their use |
| Accidental discharge of hydrocarbons/ chemicals to marine environment – Refuelling/ breach of vessel tanks (vessel collision/ grounding) | Toxic effect and oiling on marine biota | • Bulk transfers will commence during daylight hours and when sea conditions are appropriate as determined by the master of the supply vessel<br>• Bulk transfer hoses for diesel will have adequate floatation and dry-break couplings<br>• Bulk transfers of diesel will be undertaken in accordance with procedures which include constant visual monitoring of gauges, hoses, fittings and sea surface, and radio communication between the MODU and support vessel<br>• Internal transfers of diesel will be undertaken in accordance with procedures, which include constant visual monitoring of gauges, hoses and fittings<br>• Preventative maintenance system is in place and effective to ensure the integrity of hoses, dry break couplings and other equipment used for fluid transfers<br>• Maintain a 500 m radius petroleum safety zone around the drill MODU as required under the OPGGSA<br>• Supply vessels to transit along pre-planned routes between the Goodwyn North-1 exploration well site and port where possible to avoid navigation hazards<br>• Vessels will use approved navigations systems and depth sounders<br>• Adherence to Australian standard maritime safety/navigation procedures<br>In the event of a loss of containment:<br>• The MODU and vessels will have a Shipboard Oil Pollution Emergency Plan (as per *MARPOL 73/78 Annex I*) for managing spills aboard<br>• Spill kits will be well stocked and readily available with personnel trained in their use<br>• Spills to sea will be managed as per Woodside's Corporate Oil Spill Response Plan |

| Source of Risk (Hazard) | Potential Environmental Impact | Control/Mitigation Measures |
|---|---|---|
| | | and the Goodwyn North-1 Exploration Well Oil Spill Action Plan |
| Accidental discharge of hydrocarbons from a loss of well integrity resulting in loss of gas and condensate | Toxic effect and oiling on marine biota and coastlines/ islands/ coral reefs. | Preventative<br>• Use of a range of industry standard well barrier equipment, materials and procedures as part of the well design, construction and abandonment<br>• Barriers and testing requirements will be consistent with applicable Woodside engineering standards and procedures<br>Spill Response<br>• Spills to sea will be managed as per Woodside's Corporate Oil Spill Response Plan and the Goodwyn North-1 Exploration Well Oil Spill Action Plan<br>• Monitoring/observation of the spill to guide the spill response<br>• Recovery and containment undertaken to minimise potential environmental impact |