

Angel AP2, AP3 and AP4 Production Wells Drilling Environment Bridging Document Summary

This summary of the Angel AP2, AP3 and AP4 Production Wells Drilling Environment Bridging Document has been submitted to comply with Regulation 11(7)(8) of the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.

1. Project Description

Woodside Energy Ltd (Woodside) proposes to conduct drilling operations for the Angel Development Project using the semi-submersible drill rig the Ocean Bounty, operated by Diamond Offshore. A total of three production wells will be drilled. The wells are located within production permit WA-3L, in 70 – 100 m of water, approximately 150 km off the Dampier Coast.

2. Coordinates of Activity

| Well/Platform | GDA 1994 MGA Zone 50 | |
|---------------|----------------------|--------------|
| | Northing N | Easting E |
| AP2 | 459 113.3E | 7 845 652.9N |
| AP3 | 458 571.2E | 7 842 615.7N |
| AP4 | 456 675.6E | 7 841 394.1N |

3. Description of the Receiving Environment

The Angel wells are located within the North West Shelf (NWS) of Western Australia (WA) which is subject to extensive petroleum exploration and production activities. As a consequence of this activity, the environmental profile of the NWS area has been well characterised.

Physical Environment

The water depth on the continental shelf of the NWS area ranges between 50 and 1,500 m isobaths, although most of the area lies between 50 and 500 m water depth. Two significant banks are present on the gently inclined shelf, the Rankin Bank and Glomar Shoal. The seabed is generally characterised by deep (>5 m) soft, silty sediments which become deeper, softer and finer with increasing depth.

Generally wind patterns in the region are monsoonal with a marked seasonal pattern. Wind direction is predominantly from the SE and NE during April to September with an average wind of speed of 5 - 6 knots. During October to March the prevailing wind direction is from the SW, W and NW and the average wind speeds are less than 10 knots. Tropical cyclones occur in the area typically three to four times per year, most commonly between December and April. Swells of up to 2 m can be expected year round, with April being the calmest month, and January and June the roughest. Wave direction predominantly follows wind direction (ESE in winter, WSW in summer), except during cyclone or storm conditions.

Biological Environment

Sampling of the benthic zone has consistently shown that the soft sediments of NWS support a low abundance, high diversity invertebrate fauna population, largely comprising burrowing polychaete worms (*Phylum annelida*) and crustaceans (*Phylum crustacea*). Echinoderms, bivalves and molluscs also contribute significantly to the faunal composition of the area.

Five species of turtle listed under the *Environmental Protection and Biodiversity Act* (EPBC Act) are known to occur in the region, Flatback, Leatherly, Green, Hawksbill and Loggerhead Turtles. A number of whale species may be encountered in the region, including Pygmy, Blue, Sperm and Humpback Whales. The Humpback Whale is listed as Vulnerable under the EPBC Act. The Group IV Humpback Whale (*Megaptera novaeangliae*) population migrates across the NWS during the annual migration. During June, July and early August the whales follow a northward route across the NWS, that appears to follow the edge of the continental shelf to the calving grounds off the Kimberley Coast. Cow-calf pairings tend to occur in the area from Sept-Oct. Research undertaken by the Centre for Whale Research indicates that cow-calf pairings generally remain in the proximity of the close shore during the southern migration following a relatively narrow route that passes close to the Dampier Archipelago and Montebello Islands.

Surveys off the NWS indicate that seabird distribution is generally very patchy except near islands where shelter and anomalies in surface water concentrate food seasonally. Most of the birds encountered offshore forage in flocks of 20 to more than 200 individuals, often of different species, and are commonly associated with schools of pelagic fish, such as tuna. Foraging groups typically comprise Sooty Terns (*Sterna fuscata*), Wedge-tailed Shearwaters (*Puffinus pacificus*) and the occasional Frigatebird (*Fregata* spp).

Socio-Economic Environment

The offshore NWS supports one open fishery and three offshore fisheries, extending northwards and eastwards from the North West Cape out to the limits of state jurisdiction at a depth of 200 m. The main fisheries in this area include, the Pilbara Trawl Fishery, Pilbara Trap Fishery, Western Tuna and Billfish Fishery and the Northern Shark Fishery. There are no recreational fisheries in the vicinity of any of the permit areas on the NWS.

4. Major Environmental Hazards

An environmental risk assessment undertaken identified environmental risks and potential environmental effects of drilling activities associated with rig deployment, well drilling and operation of standby vessels.

The main environmental aspects of the above activities are:

- Physical disturbance associated with anchoring, rig movements and rig operations;
- Discharge of drilling fluid, drill cuttings and cementing fluids;
- Discharge of deck drainage;
- Discharge of sewage and putrescible domestic wastes;
- Emissions to atmosphere from operating equipment and flaring;
- Hydrocarbon losses resulting from damage to existing subsea equipment from dropped objects, anchor drags and vessel collisions;
- Accidental hydrocarbon and/or hazardous material spills during routine drilling activities;
- Accidental hydrocarbon spills from failure of mechanical/physical barriers eg blowout preventers or casing strings; and
- Accidental hydrocarbon and/or hazardous material spills during transfer from standby vessels.

5. Summary of Management Approach

The following table identifies the key management objectives, standard and criteria to achieve these objectives.

| Objectives | Standards | Criteria |
|---|---|---|
| No significant impact to seabed and benthic habitats. | <ul style="list-style-type: none"> Woodside Environmental Standards and Aspirations Site specific mooring plan Rig Anchoring Procedures Standby Vessel Marine Operations Procedures | <ul style="list-style-type: none"> Anchoring/deployment and retrieval is done according to procedures to minimise anchor damage and chain drag. Recording and reporting of items lost overboard. |
| No introduction of exotic marine species. | <ul style="list-style-type: none"> AQIS Australian Ballast Water Management Requirements <i>Quarantine Act 1980</i> | <ul style="list-style-type: none"> Rig and vessels adhere to AQIS Australian Ballast Water Management Requirements and quarantine requirements. |
| No significant impact to transient marine life. | <ul style="list-style-type: none"> Woodside Environmental Standards and Aspirations EBPC Amendment Regulations 2006 DEH Guidelines for Minimising Disturbances to Whales | <ul style="list-style-type: none"> Guidelines to minimise whale disturbance followed. Required safe distance of 300 m from cetaceans maintained by standby vessels. |
| No significant impact on marine environment from drill fluids and cuttings. | <ul style="list-style-type: none"> Woodside Environmental Standards and Aspirations Rig Preventative Maintenance System (PMS) Woodside's Well Engineering Drilling Fluid Selection Procedure (TP03). | <ul style="list-style-type: none"> Use of approved, low toxicity water based mud Fluid and cuttings control equipment inspected and operating correctly prior to commencement of operations. |
| No significant impact on marine environment from routine discharges. | <ul style="list-style-type: none"> Woodside Environmental Standards and Aspirations MARPOL 73/78 Annex IV | <ul style="list-style-type: none"> Sewage and putrescible waste systems are fully operational prior to commencement of drilling operations and includes maceration to less than 25 mm diameter. Check for marine mammals within the vicinity of the rig undertaken before discharge of residual water based mud or cement. Deck drainage contaminated by hydrocarbons or chemicals is contained and disposed onshore unless monitored and oil in water content meets MARPOL requirement. |
| No significant environmental impact from solid and hazardous wastes. | <ul style="list-style-type: none"> Woodside Environmental Standards and Aspirations Woodside Waste Management Plan. MARPOL 73/78 Annex IV | <ul style="list-style-type: none"> Waste Management Plan is in place and adhered to. Hazardous wastes documented and tracked according to requirements. MSDS sheets readily available. Waste log maintained and quantities of wastes transported ashore recorded. Recording and reporting of all items lost overboard. |

| Objectives | Standards | Criteria |
|--|--|---|
| No hydrocarbon or chemical spills to the marine environment. | <ul style="list-style-type: none"> • Woodside Environmental Standards and Aspirations • Western Australia and Dampier Sub-Basin Oil Spill Contingency Plan (ERP-3210) • Rig SOPEP • Rig Fuel Transfer Procedure • Rig Emergency Response Plan • Rig HSE Management System • Rig Preventative Maintenance System (PMS) • MARPOL 73/78 Annex I | <ul style="list-style-type: none"> • BOP in place. • Approved Oil Spill Contingency Plan in place. • Rig crew induction covers spill response procedures and spill response exercise conducted. • Re-fuelling procedures are in place and followed for rig and standby vessels. • JHA for bulk transfer of diesel and drilling fluids reviewed before transfers. • At sea refuelling supervised by Vessel Master or nominated Officer. • Dry break couplings used on transfer hoses. • Records kept of inspections and preventative maintenance. • All valves, couplings and transfer hoses checked for integrity prior to use. • Approval is sought and provided prior to all dispersant applications. |
| No hydrocarbon spills to the marine environment during well test. | <ul style="list-style-type: none"> • Woodside Environmental Standards and Aspirations • Woodside Production Test Guidelines for Exploration and Appraisal Wells • Well Test Programme • Western Australia and Dampier Sub-Basin Oil Spill Contingency Plan (ERP-3210) | <ul style="list-style-type: none"> • Design features and management measures are in place to maximise operating efficiency and to reduce risk to environment and reputation. • Well test is undertaken in compliance with Well Test Programme requirements. • Well Test Pre-Flow Checklist completed before well testing commences. • Produced water treatment and monitoring equipment incorporated into test separator package. • Approved Oil Spill Contingency Plan in place. • Approval is sought and provided prior to all dispersant applications. |
| Minimise emissions to atmosphere during well test. | <ul style="list-style-type: none"> • Woodside Environmental Standards and Aspirations • Woodside Production Test Guidelines for Exploration and Appraisal Wells • Well Test Programme | <ul style="list-style-type: none"> • High efficiency burner booms are in place to maximise operating efficiency and to reduce environmental effects during flaring. • Well Test Pre-Flow Checklist completed before well testing commences. |
| No significant impact on recreational vessels, commercial fishing, and shipping. | <ul style="list-style-type: none"> • Woodside Environmental Standards and Aspirations • Rig Emergency Response Plan • AMSA requirements | <ul style="list-style-type: none"> • Functional rig navigational lighting in place and in use. • Consultation with local fishermen, fishing industry groups and management agencies as needed. Operations carried out in a manner that does not interfere with navigation and fishing to a greater extent than is necessary. • Marine notices broadcast according to Standard Maritime Safety Procedures (AMSA), via the Rescue Co-ordination Centre (RCC). |

6. Consultation

Woodside has undertaken consultation as part of the planning and environmental approvals process for the Angel development. Woodside has developed an environment communication strategy and consultation has been undertaken with identified stakeholders which are DEH, DoIR and WA Fishing Industry Council. This consultation has included providing information on the upcoming drilling programme. The WA Fishing Industry Council

has been provided with information about the proposed drilling activities and has been asked to make this information available to any interested fishing bodies. Updated information will be sent prior to drilling activities commencing.

Contact Details

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