Greater Western Flank Phase 1: Drilling and Completions Environment Plan Summary

Drilling and Completions

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1. INTRODUCTION

1.1 Background and Purpose

Woodside Energy Limited (Woodside), as operator, proposes to undertake a drilling and completions campaign that is part of the Greater Western Flank Phase 1 Project (GWF-1) located in Commonwealth waters in Production Licence Area WA-5-L.

The Greater Western Flank Phase 1: Drilling and Completions Environment Plan Revision 6 (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(4)(a).

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 five development wells that are part of the GWF-1 drilling and completions campaign are GDA-01 and GDA-02 (the Goodwyn development wells), TPA-01, TPA-02 and TPA-03a (the Tidepole development wells). The wells are located in Commonwealth waters in Production Licence Area WA-5-L (see **Figure 2-1**). This production licence is approximately 130 km north-west of Karratha and within an area of mature oil and gas operations. **Table 2-1** summarises the well details including surface coordinates, water depth relative to lowest astronomical tide (LAT) and licence area.

Table 2-1: GWF1 Development Well Coordinates and Water Depths in WA-5-L

Well	Water Depth (m LAT)	Longitude	Latitude
GDA-01	125	115° 52’ 31.999” E	019° 42’ 24.325” S
GDA-02	125	115° 52’ 33.222” E	019° 42’ 24.107” S
TPA-01	111	115° 53’ 25.256” E	019° 45’ 44.652” S
TPA-02	111	115° 53’ 23.982” E	019° 45’ 44.996” S
TPA-03a	111	115° 53’ 23.745” E	019° 45’ 43.714” S

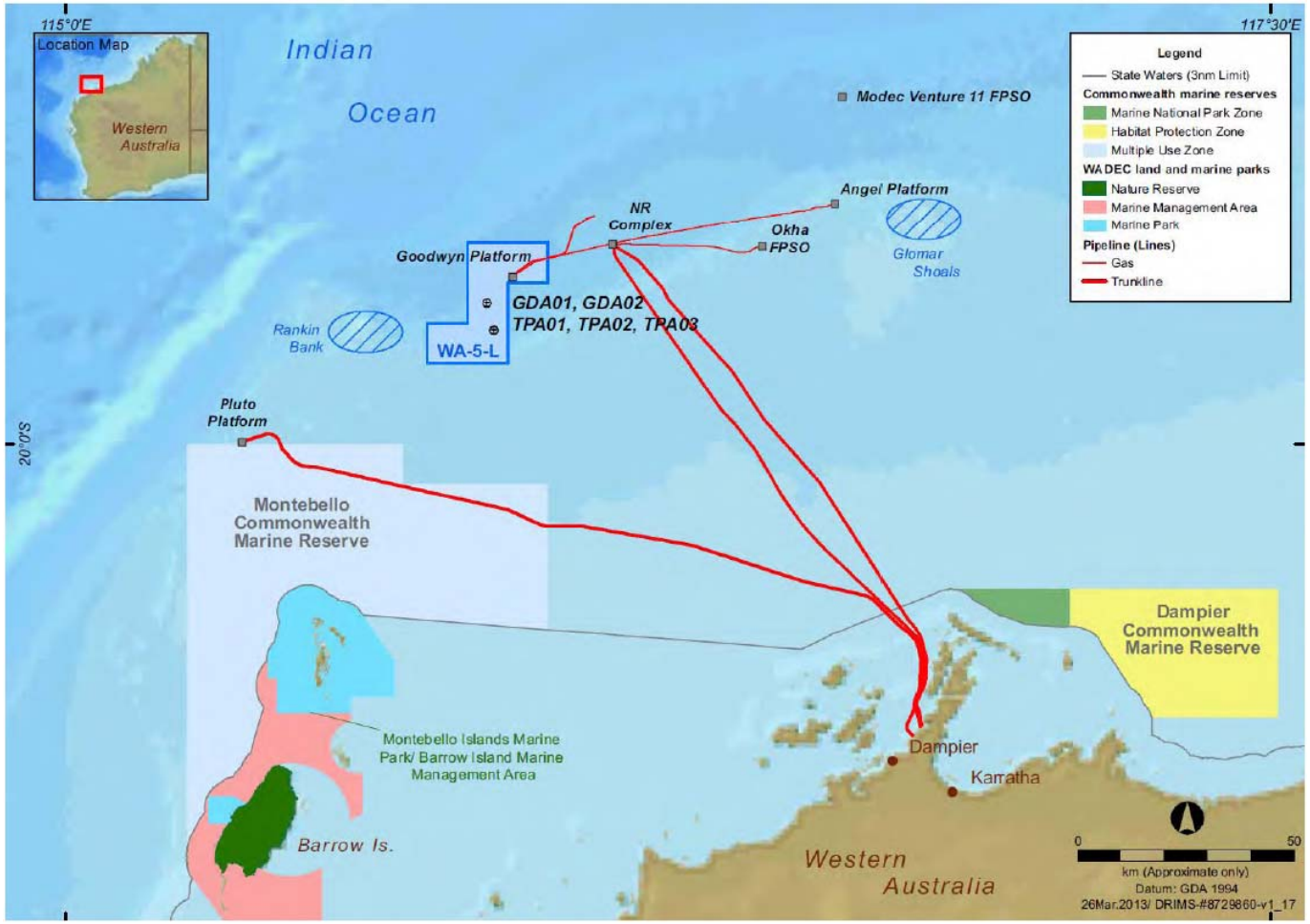

Figure 2-1: Location of Goodwyn development wells (GDA-01 and GDA-02) and Tidepole development wells (TPA-01, TPA-02 and TPA-03a)

2.2 Timing of Activity

The Goodwyn development wells drilling and completions program will take approximately 70 to 120 days and is currently scheduled to be undertaken between August and December 2013. The Tidepole development wells drilling and completions program will take approximately 120 to 160 days and is currently scheduled for 2015. The schedule is subject to change due to operational requirements and external influences such as cyclones.

2.3 Development Wells Drilling and Completions Programs

Summaries of the activities to be undertaken for the Goodwyn and Tidepole development wells are included below. The activities mainly relate to installation of subsea infrastructure and installation of equipment in previously drilled holes.

2.3.1 Goodwyn Development Wells

The drilling and completions of the two Goodwyn development wells (GDA-01 and GDA-02) are similar and planned to be undertaken as batch activities. The activities include:

1. Mooring of the mobile offshore drilling unit (MODU)
2. Installation of the tubing head spool (may be accomplished using support vessel or MODU) ;
3. Installation of the blow out preventer on the wellhead;
4. For GDA-02 only: Drill out part of the cement plug to access the monitoring zone;
5. Cleaning up the casing to remove debris and residual drilling chemicals;
6. Perforation of the monitoring zone and installation of the sump packer;
7. Perforation of the lower zone and installation of the lower completion, with associated gravel pack;
8. Installation of the upper completion;
9. Connection and pressure testing of the tubing hanger;
10. Pressure and inflow testing;
11. Recovery of the blow out preventer (BOP) and riser;
12. Installation of the Xmas tree;
13. Well unloading tests; and
14. Suspension of wells.

2.3.2 Tidepole Development Wells

The drilling and completions of the three Tidepole development wells (TPA-01, TPA-02 and TPA-03a) are similar and planned to be undertaken as batch activities. The activities include:

1. Mooring of the MODU;
2. Installation of the tubing head spool (may be accomplished using support vessel or MODU);
3. Installation of the blow out preventer on the wellhead;
4. Drilling of the 8 ½" section to total depth and perform logging;
5. Cleaning up the casing to remove debris and residual drilling chemicals;
6. Ultrasonic borehole imaging;
7. Installation of expandable sand screens and intermediate completions;

8. Installation of the upper completion;
9. Connection and pressure testing of the tubing hanger;
10. Pressure and inflow testing;
11. Recovery of the BOP and riser;
12. Installation of the Xmas tree;
13. Well unloading tests; and
14. Suspension of wells.

These activities are subject to change.

3. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Environment

The GWF-1 development wells are located on the North West Shelf (NWS), within the North-West Marine Region. The North West Shelf experiences a tropical monsoon climate, with distinct wet and dry seasons and the presence of tropical cyclones between November and April. Large scale circulation is primarily influenced by the Indonesian Throughflow which feeds into the Leeuwin Current, which flows to the South-West through the area. In summer, tidal disturbance to the highly stratified water column can generate internal waves along the thermocline which induce strong currents on the sea bed.

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 GWF-1 drilling and completions operational area. It is acknowledged that critical life stage activities for a number of EPBC Act (for example turtle nesting) occur in the wider region, outside of the operational area.

A number of targeted surveys to investigate epibenthos and infauna of offshore NWS shelf and slope environments have been carried out by Woodside. These surveys indicated that infauna is of low abundance with high variability and diversity. Polychaetes and crustaceans dominated the infauna composition.

The timing of the GWF-1 drilling and completions program will overlap with the northern and southern humpback whale migration periods. Migratory humpback whales may transit the operational area but numbers are expected to be low, given the offshore location and the documented migratory route location which is inshore of the operational area.

Whale sharks may traverse offshore NWS waters including the GWF-1 drilling and completions operational area during migrations to and from Ningaloo reef. It is not expected that significant numbers of whale sharks will be present in the operational area at the time of the activity.

With consideration of the distance (100 km) from the primary nesting locations (such as Dampier Archipelago), water depth (approximately 100 to 130 m), at the GWF-1 drilling and completions operational area and absence of potential nesting or foraging sites (i.e. no emergent islands, reef habitat or shallow shoals), the operational area is not considered an important habitat for marine turtles.

3.3 Socio-Economic Environment

The GWF-1 development wells are located within four Commonwealth and six State fisheries. 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 and completions program.

There are no existing production facilities within the operational area (500 m radius) of the GWF-1 development wells. There are various existing production facilities on the NWS, the nearest being the Goodwyn Platform which is located in the same permit area (Production Licence Area WA-5-L).

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 GWF-1 drilling and completions 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 GWF-1 drilling and completions 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 GWF-1 drilling and completions 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 GWF-1 drilling and completions program, 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 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-compliance, 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. This advice 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. No material concerns were raised by stakeholders.

Woodside will continue to accept feedback from stakeholders during the drilling and completions program.

7. CONTACT DETAILS

Further information about the GWF-1 Drilling and Completions program can be obtained from:

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APPENDIX A: SUMMARY OF KEY ENVIRONMENTAL HAZARDS AND CONTROL MEASURES TO BE APPLIED TO THE GWF-1 DRILLING AND COMPLETIONS PROGRAM (MOORING, INSTALLATION OF TUBING HEAD SPOOL AND CASING CLEAN UP)

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Planned (Routine and Non Routine) Activities		
Interference with commercial shipping, commercial fishing and charter boat activities in the area.	Localised, temporary and minor interference to commercial shipping activities in the area.	Compliance with Australian Maritime Safety Authority administered marine safety regulations and marine notification requirements. Pre-activity notification/consultation with stakeholders.
Generation of noise from MODU and support vessel operation	Potential disturbance to threatened and migratory cetacean species listed under the EPBC Act, including behavioural changes or displacement.	The interaction of the support vessels with cetaceans will be consistent with Part 8 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth).
Disturbance to seabed from ROV operation and MODU mooring	Localised and temporary disturbance to the seabed and soft sediment/ sensitive benthic habitats.	Compliance with Woodside procedures to identify well specific hazards. Anchoring analysis undertaken and implemented to minimise the potential for accidental anchor drag or the MODU dragging off location.
Emissions from flaring during well un-loading	Atmospheric emissions generated during flaring may result in a localised, temporary reduction in air quality.	Compliance with Woodside requirements for flare system design, including measures to maximise flare efficiency and process controls.
Routine discharge via the managed drain system on the MODU	Localised short term decrease in water quality and toxic effect to marine biota.	Compliance with *MARPOL 73/78* - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983; AMSA Marine Orders - Part 91 Marine Pollution Prevention – Oil, where applicable. Compliance with Woodside standards.
Routine discharge of drilling and completions fluids to the marine environment from MODU	Localised short term decrease in water quality and toxic effect to marine biota.	In compliance with Woodside procedures, all fluids that will be discharged from drilling and completions operations will be subject to a chemical selection, assessment and approvals process.
Routine discharge of drill cuttings to the marine environment	Localised burial and smothering of benthic habitats in the immediate vicinity of the discharge point of the well	Management of drill cuttings will be consistent with applicable Woodside engineering standards.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Discharge of atmospheric emissions from fuel and waste combustion engines on MODU, and support vessels	Localised temporary reduction in 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.
Discharge of bilge, sewage, grey water and putrescible wastes to the marine environment	Nutrient enrichment to a localised environment outside the mixing zone (200 m).	Compliance with MARPOL 73/78 - as applied in Australia under *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983*; AMSA Marine Orders - Part 96: Marine Pollution Prevention – Sewage, - as required by vessel class.
Unplanned Activities (accidents/Incidents)		
Collision between support vessels and marine fauna	Potential injury or mortality to cetaceans due to vessel strike.	Support vessels will comply with the Woodside Marine Charter Instructions (WEL Doc No. WM6070MV7005269)], which detail the EPBC Regulations 2000 Part 8 (Regulation 8.05).
Accidental loss of drilling/ marine equipment and materials to the marine environment (impacting benthic environments rather than subsea infrastructure)	Localised and short term damage of the benthic subsea habitats in the immediate location.	Equipment and material dropped to the marine environment will be recovered where practicable. Rig contractor policies and initiatives in place to prevent dropped objects. Vessels will comply with SOLAS Chapter II-1 - Construction - Subdivision and stability, machinery and electrical installations.
Unplanned discharge of general 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).	Compliance with MARPOL 73/78 Annex V - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983; AMSA Marine Orders - Part 95 Marine Pollution Prevention – Garbage, where applicable.
Unplanned minor spills to the marine environment.	Minor and temporary reduction in water quality and toxic effects on surrounding marine flora and fauna.	Compliance with *MARPOL 73/78* as applied in Australia under the *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983* - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), where required. Compliance with Woodside standards.
Accidental object dropped from the MODU onto existing	Minor and temporary reduction in water quality and toxic effects on	Simultaneous operations plan in place.

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
pipeline infrastructure	surrounding marine flora and fauna.	Compliance with Woodside and Rig Contractor standards.
Accidental chemical release to the marine environment during transfer activities	Localised minor and/or temporary contamination of water which may lead to toxic effects to marine biota.	Compliance with Woodside standards and guidelines for safe management of offshore supply. Rig Contractor procedures for bulk transfer.
Accidental hydrocarbon spill during bunkering activities to the marine environment or accidental discharge of base oil to marine environment from MODU	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.	MARPOL 73/78 as applied in Australia under the Commonwealth *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), where required. The management of transfer hoses and deck drainage will be consistent with applicable Woodside engineering standards.
Accidental hydrocarbon release to the marine environment due to loss of vessel structural integrity	Localised minor and/ or temporary contamination of water which may lead to toxic effects to marine biota. Oiling of marine mammals, reptiles and seabirds. Minor and temporary disruption to protected species that may migrate through the area.	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. Simultaneous operations plan in place.
Accidental hydrocarbon release to the marine environment due to loss of well integrity	Toxic effects to marine biota Oiling of marine mammals, reptiles and seabirds Toxic effects to coastlines, islands and coral reefs	*Preventative* - 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 *Spill response* - Spills to sea will be managed as per Woodside's Corporate Oil Spill Response Plan and the GWF-1 First Strike Action Plans - Monitoring and observation of the spill to guide the spill response - Recovery and containment undertaken to minimise potential environmental impact