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Ragnar-1 Exploration Well Environment Plan Bridging Document Summary

Drilling and Completions

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) proposes to undertake drilling activities in the Carnarvon Basin, in the licence area WA-430-P, using the Ocean America semi-submersible drill rig, operated by Diamond Offshore. Drilling activities are planned to commence in November 2011 and to continue through until February 2012.

The well is part of the exploration drilling activities in the Carnarvon Sub-Basin. The environmental risks and management thereof are described in the Exmouth Sub-Basin Drilling and Completions Environment Plan, Revision 1 (ESB EP), accepted by the Department of Mines and Petroleum (DMP) in February 2011. The Ragnar-1 Exploration Well Environment Plan Bridging Document (EPBD) - serves as a bridging Environment Plan to the ESB EP, and describes the well specific details such as well location, rig to be used, fluid systems, cuttings volumes and cuttings disposal methods. This document serves as a summary of the Ragnar-1 Exploration Well and relevant parts of the EPBD and ESB EP.

2. DESCRIPTION OF THE ACTION

The Ragnar-1 exploration well is situated in permit area WA-430-P (Figure 2-1) and is located approximately 55 km from Ningaloo Reef (Commonwealth Waters), 64 km from Ningaloo Reef Marine Park (Western Australia Department of Conservation) and 78 km from the Murion Islands Management Area.

The well will be drilled with a water-based drilling fluid system, as detailed in the Ragnar-1 Exploration Well Environment Plan Bridging Document, accepted by the DMP in October 2011. On completion of drilling and evaluation logs, the well will be permanently plugged and abandoned and the subsea wellheads removed.

Table 2-1 summarises the well details including surface coordinates, water depth, permit area and timing for the proposed well. This schedule is subject to change due to operational requirements and external influences such as cyclones.

Table 2-1: Co-ordinates, Water Depth and Timing (GDA 94, MGA zone 50).

Water Depth (m LAT)	Longitude	Latitude	Permit Area	Timing
1160	113° 36' 32.37" E	21° 20' 7.74" S	WA-430-P	Q4 2011– Q1 2012

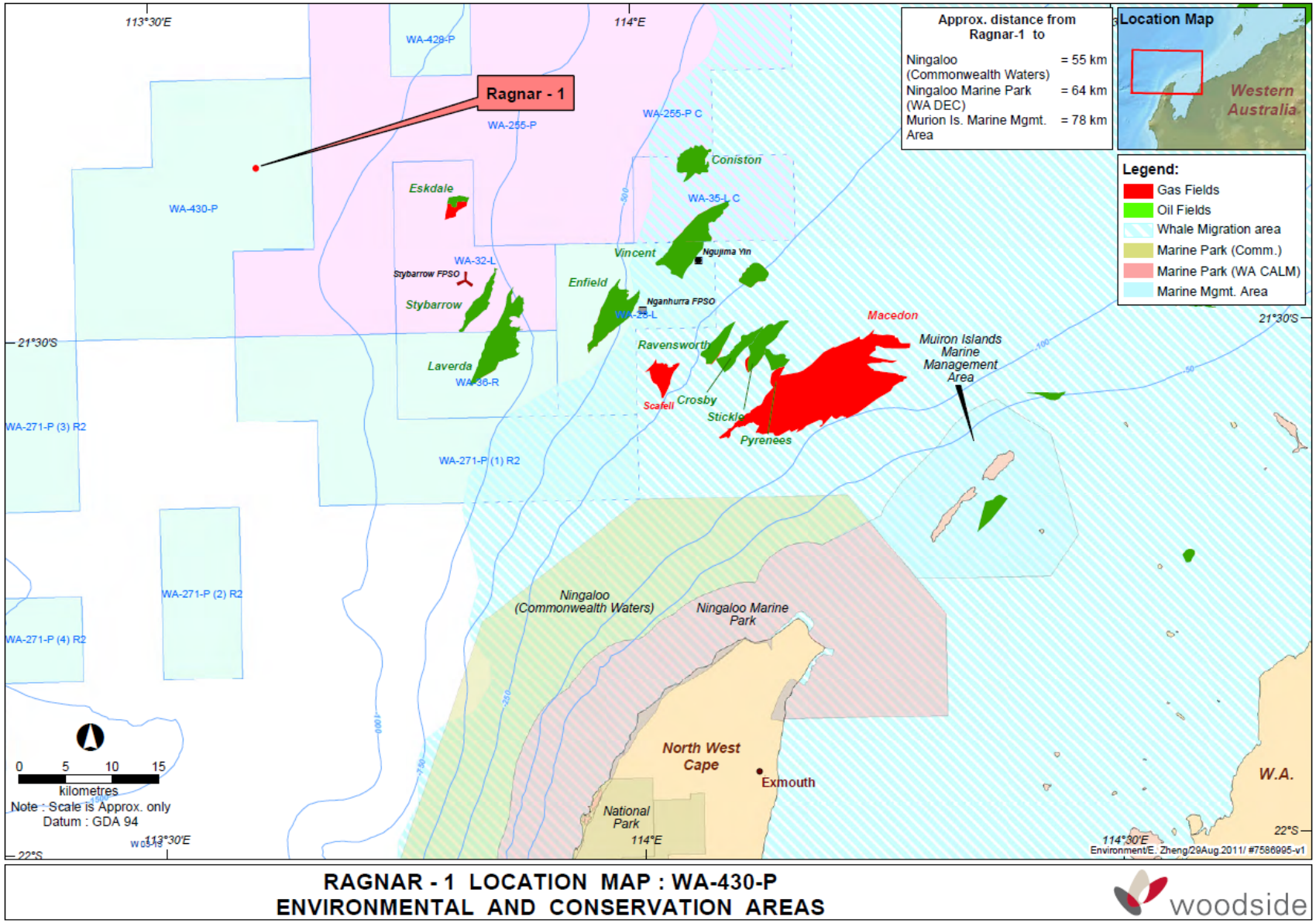

Figure 2-1: Drilling location map for Ragnar-1 Exploration Well

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The North West Cape exists in an arid (mainly summer rain), subtropical environment with a tropical cyclone period from November to April. Winds in the area blow predominantly from the south-west and south-east quarters. Tides are semi-diurnal (four current reversals a day). The Leeuwin Current, which originates in the region, runs southward along the edge of the continental shelf and is primarily a surface flow (up to 150 m deep) which is strongest during winter. The Ningaloo Current flows in the opposite direction to the Leeuwin Current, running northward along the outside of Ningaloo Reef and across the inner shelf from September to mid-April. Regional sea surface temperatures in summer range from 26 – 31°C and in winter from 19 – 24°C. Water temperatures near the seabed across the Exmouth Sub-Basin range seasonally from 5 - 10°C.

3.2 Biological Environment

The habitats and species associated with the fringing Ningaloo Reef and shallow coastal waters are relatively accessible and better understood than the deeper water shelf environments off North West Cape. As part of Woodside's environmental assessment, an extensive program of investigation and studies has been conducted on deepwater marine environments (described in detail in the WA-271-P EIS and the Vincent EIS).

The most significant regional coastal habitat is Ningaloo Reef, which extends 260 km southward of North West Cape. The reef is considered to be in generally pristine condition and supports diverse biological communities including corals, other invertebrates and fish. Small mangrove communities are present on the west coast of the Exmouth Peninsula and are more extensively developed on the eastern shore of Exmouth Gulf. Various sandy beaches on the coastal areas and islands in this region support significant turtle nesting areas.

Soft sediment tends to dominate the continental slope in the Exmouth Sub-Basin, and is inhabited by a sparse seabed community. The benthic macrofauna and infauna are well represented throughout the continental shelf and the region. The community members mainly consist of urchins, crustaceans, sea stars and burrowing invertebrates.

Limited patches of outcropping rock are found at a range of depths, although these occur mainly along scarp and canyon features to the south-west portion of Exmouth Sub-Basin in water depths greater than 500m. These hard, rocky surfaces support a locally diverse accumulation of species. While some unusual species were recorded during sampling of the deeper water environments, the collection of species that typically inhabits the seafloor and burrows in seafloor sediments are generally found to be widespread and well represented along the continental shelf and upper slopes in this region.

An EPBC Act Protected Matters Report (PMR) generated in 2010 found 24 cetaceans potentially being present in the area. The list included three threatened and seven migratory species that may pass through Woodside's area of activity, including Blue, Southern Right and Humpback Whales.

Survey information indicates that Humpback Whales are the most abundant whale species recorded, these being present during the year between June and November. Individuals were recorded up to 80 km offshore and showed differences in distribution patterns during the northern, southern and transition periods. A peak in average numbers was recorded during the year over a three-week transition period, commencing in late August, when the northern and southern migrations overlap.

Whale Sharks (Rhincodon typus) are found to aggregate off Ningaloo Reef, generally between April and June each year. Observations indicate most encounters in the northern area of Ningaloo

Marine Park have occurred between Jurabi Point and Ned's Camp, with relatively fewer sightings to the north and south. Whale Sharks are also regularly observed in the area between Point Maud and Point Cloates, generally in May. Most sightings occur close to the reef front and within three nautical miles (nm) of the shoreline. The local population is estimated to be 200–300 individuals.

Five marine turtle species occur in the region, and are listed as 'Migratory' in the PMR; Hawksbill, Flatback, Green, Loggerhead and Leatherback. Individuals of any of the above may pass through the Woodside's area of activity on their way to and from nesting beaches on the mainland and adjacent islands. At sea, the concentration of these animals is low.

Sea snakes are frequently observed in Exmouth Gulf, around the outer islands and the waters of the shelf. The frequency of occurrence in deeper offshore, Woodside's area of activity, are low.

3.3 Socio-Economic Environment

The nearest town to the Woodside's activities within the Exmouth Sub-Basin is Exmouth. The Exmouth Shire covers an area of approximately 5,700 km^2 in the North West Cape region of Western Australia, and is located about 1,300 km north of Perth. The two nearest towns to Exmouth are Carnarvon, approximately 370 km to the south-east and Onslow, approximately 410 km to the north-east. The resident population in the Shire of Exmouth is approximately 2,000 people, though there are large short-term fluctuations in population due to the high number of tourists that visit the area.

Tourism is one of the major industries of the town and contributes significantly to the local economy in terms of both income and employment. Around 104,000 tourists (about 70% domestic and 30% international) stay overnight in Exmouth each year. Traditional tourist activities have centred around recreational fishing and boating, but more recently nature-based tourism has become more popular, centred around Ningaloo Reef, Cape Range National Park, and seasonal attractions such as the humpback whales, whale sharks and turtle nesting. The main marine nature-based tourist activities are snorkelling and scuba diving, whale shark encounters, whale watching and tours of turtle hatching beaches.

Learmonth Airport is the major airport in the region, servicing both civilian and defence force aircraft. There are also small airstrips in Exmouth and Coral Bay, as well as private airstrips on most pastoral stations in the region.

The main commercial activities associated with Exmouth include prawn fisheries, tourism and defence-related activities.

A number of offshore oil production facilities are located in the region, these being the Nganhurra FPSO (WA-28-L), Maersk Ngujima-Yin FPSO (WA-28-L), Stybarrow Venture FPSO (WA-32-L), Pyrenees FPSO (WA-42-L) and Ningaloo Vision FPSO (WA-35-L).

While there are no defined shipping lanes in the North West Cape region, there are general shipping routes running in a north-south direction along the coast which become north to easterly to the north of Exmouth. Approximately 1,200 vessels per year pass through the area off North West Cape, with approximately 550 ships passing through Woodside's area of activity each year (WA-271-P EIS and Vincent EIS).

Other significant socio-cultural features include the Ningaloo Marine Park (Commonwealth and State Waters), Muiron Islands Marine Management Area and Cape Range National Park.

4. ENVIRONMENTAL HAZARDS

The environmental risks and potential environmental impacts of the proposed D&C activities have been determined on the basis of Woodside's previous experience in the region and the outcomes of an environmental risk assessment.

The risk assessment indicates that the potential impacts arising for the proposed Ragnar-1 exploration well can be categorised as having Low to High risk levels.

A summary of the key sources of environmental risk (aspects) for the proposed activity include:

- deployment and retrieval of anchors and equipment used for the activity;
- generation of acoustic signals;
- light generation from rigs and vessels;
- emissions to atmosphere from rigs and vessels;
- discharge of ballast water and vessel biological fouling;
- routine discharge of wastewater to ocean from rigs and vessels;
- accidental discharge of hydrocarbons and chemicals to ocean from wells, rigs and vessels;
- interactions with shipping and commercial and recreational fishing activities.

The Ragnar-1 exploration well program activities are adequately addressed by the ESB EP and the relevant environmental management controls detailed in the ESB EP will be maintained by Woodside and the relevant contractors. Considering the controls in place to prevent spills occurring, the magnitude of the spill scenarios modelled, distance offshore from sensitive environments (e.g. coral reefs) and the probabilities of hydrocarbons contacting shorelines for expected offshore activities, it can be concluded that a significant hydrocarbon spill to the ocean during Ragnar-1 program activities and impact to sensitive environmental receptors is unlikely.

Any spills will be managed according to the oil spill arrangements and procedures outlined in the approved Woodside Carnarvon Basin (WA) Oil and other Noxious and Hazardous Substances Spill Contingency Plan (ERP-3250) as revised from time to time.

5. SUMMARY OF MANAGEMENT APPROACH

Woodside's environmental management strategies and procedures to be used during drilling activities include responsibilities, training and inductions, reporting frameworks, mitigation and response activities and monitoring and auditing procedures. Commitments associated with these will be used to reduce environmental risk to As Low As Reasonably Practicable (ALARP).

The key management objectives and commitments to be applied to the Ragnar-1 Exploration Well are summarised in Table 5-1 below. Note that this is not a comprehensive list of all commitments outlined in the ESB EP.

Table 5-1: Management Objectives and Commitments for Ragnar-1 well drilling activities

Objectives	Commitments
Disturbance to Marine Habitats	
Minimise disturbance to marine habitat from anchoring.	• Adherence to the rig contractor's anchoring procedures and anchor plan to minimise the potential for accidental anchor drag or rig dragging off location. • Transponder clump weights to be retrieved or inert materials to be used for clump weights not retrieved.
Disturbance to Marine Fauna	
Minimise disturbance to marine fauna from acoustic disturbance	• Sightings of marine mammals and whale sharks will be recorded and reported at 6 monthly intervals to Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) at cet.sightings@environment .gov.au
Reduction in Air Quality from Atmospheric Emissions	
Minimised reduction in air quality from atmospheric emissions from combustion of hydrocarbons (engines and well testing)	• Compliance with MARPOL 73/78 Annex VI (Prevention of Air Pollutions from Ships) requirements.
Introduction of Invasive Marine and Terrestrial Species	
Minimise the risk of the introduction of invasive marine species from ballast water, biofouling, international movements and cargo	• Adherence to the Australian Quarantine and Inspection Service (AQIS) Australian Ballast Water Management Requirements. • Woodside's IMS risk assessment process will be applied to all vessels, rigs and immersible equipment planning to enter and operate within nearshore waters around Australia. Nearshore areas include all waters within 12 nautical miles of land and in all waters less than 50 metres deep at Lowest Astronomical Tide. • All international cargo will be managed through AQIS inspection and quarantine procedures.
Marine Pollution from Routine Discharges	
Minimise marine pollution from routine discharge of sewage and putrescible wastes, deck drainage and produced formation water (PFW)	• All sewage and putrescible wastes will be managed 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*). • Discharged Produced Formation Water will contain ≤ 15 ppm oil in water.
Minimise marine pollution from routine discharge of drill fluids, drill cuttings, wellbore cleanout and completions fluids, cementing fluids and sub-sea control fluids	• Water Based Mud (WBM) will be used as first preference. If the use of Non Water Based Mud (NWBM) is required for technical reasons, the NWBM system will be assessed against DMP's Petroleum Guidelines – Drilling Fluids Management. • All potentially hazardous materials and chemicals will be reviewed and approved

Objectives	Commitments
	through Woodside's Chemical Selection, Assessment and Approval Process. • All hazardous substances (as defined in NOHSC:1008 (2004) – Approved Criteria for Classifying Hazardous Substances) will have an Material Safety Data Sheet (MSDS) available on board.
Waste Management	
Minimise the impact on the marine environment from waste disposal	• Management of wastes in accordance with Woodside's D&C Waste Management Plan. • Records of waste types and volumes maintained and reviewed on a quarterly basis.
Marine Pollution from Accidental Discharges	
Minimise marine pollution from accidental discharge of hazardous materials	• All hazardous substances (as defined in NOHSC: 1008 (2004) – Approved Criteria for Classifying Hazardous Substances) will have a Material Safety Data Sheet (MSDS) available on board. • All potentially hazardous materials and chemicals will be reviewed and approved through Woodside's Chemical Selection, Assessment and Approval Process.
Minimise marine pollution from fuel and oil spills - Fluid Transfers, Failure of Slip Joint Packer System, Vessel Collision, Damage to Subsea Equipment, Loss of Well Control	• Bulk transfers will commence during daylight hours and when sea conditions are appropriate as determined by the master of the supply vessel. • Preventative maintenance system is in place and effective to ensure the integrity of hoses, dry break couplings and other equipment used for fluid transfers. • The rig and vessels will have a Shipboard Oil Pollution Emergency Plan (as per MARPOL 73/78) for managing spills onboard. • The slip joint packer system will have at least two packers, and an automatic activation of the second packer if the primary packer fails. • Maintain a 500 m safety exclusion zone around the drill rig. • All D&C activities will be carried out in accordance with Woodside's Engineering Operating Standards. • Spills to sea will be managed as per the Carnarvon Basin (WA) Oil and other Noxious and Hazardous Substances Spill Contingency Plan (OSCP). The Carnarvon Basin OSCP will be revised and updated periodically.
Disturbance to Social and Community Values	

Objectives	Commitments
Minimise disruption to commercial and recreational fishing activities, shipping and navigation	• Compliance with Australian Maritime Safety Association (AMSA) administered marine safety regulations and marine notification requirements. • Pre-drilling notification/consultation with stakeholders, as required. • Maintain a 500 m safety exclusion zone around the drill rig.
Minimise disruption to heritage and conservation values	• Pre-drilling notification/consultation with stakeholders, as required.
Implementation, Reporting and Consultation	
Competence and Training	• All new personnel arriving on the rig (or vessel) are required to undertake a site induction before commencing work. This induction covers health, safety and environmental requirements for the rig (or vessel) and environmental information specific to the well location. • Environmental incidents will be reviewed and awareness material presented on a regular basis to ensure ongoing environmental awareness.
Auditing and Assurance	• Actions as a result of inspections will be documented and tracked via the Campaign Action Register. The register will be monitored onboard the vessel on a regular basis by the Woodside On-Site Representative.

6. CONSULTATION

Woodside has an extensive history undertaking drilling and completions activities on the Exmouth Sub-Basin. Over this time, Woodside has developed a sound understanding of potential stakeholder concerns that may arise during drilling activities and has implemented appropriate management strategies in the ESB EP to address key environmental aspects.

To ensure Woodside's understanding of potential stakeholder concerns remains current, stakeholder consultation for drilling activities includes the following:

- Consultation, as appropriate, with key stakeholders during the preparation of the Ragnar-1 Exploration Well Environment Plan Bridging Document to identify and manage specific environmental issues.
- Distribution of electronic notification to a broader stakeholder group prior to the commencement of the activity.

7. CONTACT DETAILS

For further information about the Ragnar-1 exploration well, please contact:

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