Vucko-1 Exploration Well – Phase I: Top-hole Section

Environment Plan Summary

Drilling and Completions

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator proposes to drill the Vucko-1 exploration well located in the Exmouth Sub-basin in Commonwealth waters in Exploration Permit Area WA-433-P.

The Vucko-1 exploration well will be drilled in two separate phases, Phase I: Top-hole Section and Phase II: Bottom-hole Section. The Vucko-1 Exploration Well Environment Plan – Phase I: Top-hole Section (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).

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

2. LOCATION OF THE ACTIVITY

The Vucko-1 exploration well location is in Commonwealth waters in Exploration Permit Area WA-433-P (Figure 2-1) in approximately 1,210 m (Lowest Astronomical Tide) water depth approximately 120 km from the North West Cape (NW Cape) and 133 km from Exmouth. Table 2-1 summarises the well details including surface coordinates, water depth and permit area.

Table 2-1: Vucko-1 Exploration Well Coordinates and Water Depth

Well	Water Depth (m LAT)	Longitude	Latitude	Permit Area
Vucko-1	1 210 m	113° 07’ 43.364"E	21° 10’ 40.681"S	WA-433-P

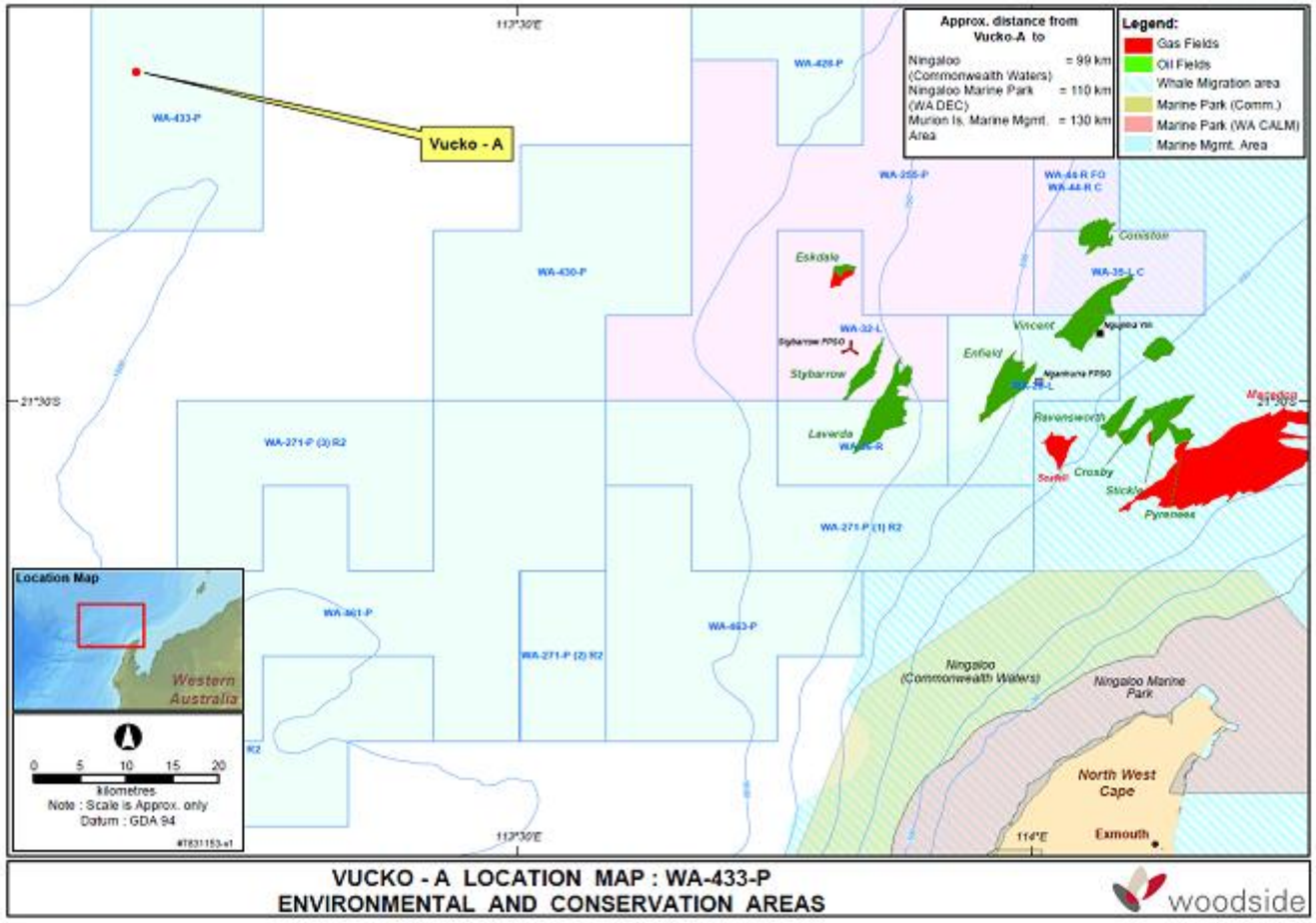

Figure 2-1: Drilling Location Map for Vucko-1 Exploration Well

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The Vucko-1 exploration well is located within the North West Marine Bioregion (NWMR) on the outer continental slope region in 1,210 m water depth. The Indonesian Throughflow is the dominant current through the majority of the region, while the Leeuwin Current is dominant in the south.

3.2 Biological Environment

The seabed in this area comprises flat and featureless unconsolidated fine grained sands that 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 ten marine species as 'threatened' and 15 species as 'migratory' under Commonwealth legislation that may occur in low abundance within, or pass through the Vucko-1 exploration well area. The area does not provide critical habitat feeding, breeding, resting or constricted migratory pathways for these species.

The timing of the Vucko-1 exploration well (see **Section 4** of this summary) is prior to the humpback whale migration period and is located east of the main humpback migration route, which occurs predominately inshore of the 500m isobath. The timing of the Vucko-1 exploration well does overlap with known pygmy blue whale migration between April and July; however, the well site lies within a broad migratory pathway (>100 km wide) off the NW Cape.

The abundance of animals is expected to be low and the presence of the operating drill rig may result in localised behavioural avoidance but this is not considered significant and will not impact the population of these whales or other species.

3.3 Socio-economic Environment

The Vucko-1 exploration well is located within two Commonwealth fisheries management areas that cover large areas between the 200 m isobath out to the outer limit of the Australian Fishing Zone and include the Western Deepwater Trawl Fishery and the Western Tuna and Billfish fishery. Status reports on the fisheries indicate that both fisheries are small (< 5 vessels in each fishery) and total fishing effort is low (in decline over recent years) in the vicinity of the Vucko-1 exploration well and tends to focus on waters south west of the NW Cape, with the trawl fishery targeting species in the 200-700m water depths (DAFF, 2010).

While there are no defined shipping lanes in the NW Cape region, there are general shipping routes running in a north-south direction along the coast that become north to easterly to the north of Exmouth.

The Vucko-1 exploration well is located approximately 120 km off the NW Cape in remote deep offshore waters (approximately 1,210m depth) and is not accessed for tourism activities (recreational fishing and boating and charter boats operations) which tend to be centred around nearshore waters, islands and coastal areas in the vicinity of the NW Cape.

There are a number of operational oil and gas fields in the NW Cape region including the Vincent, Enfield and Stybarrow fields. There are a variety of facilities positioned on the fields such as in-situ Floating Production and Storage Offtake facilities, which are accessed regularly by tankers and support vessels that may be anchored or moving through the fields.

The Vucko-1 exploration well area is 99 km from the outer boundary of Ningaloo Marine Park (Commonwealth waters), 110 km from Ningaloo Reef Marine Park (State waters) and 130 km from the Muiron Islands Marine Management Area (State waters). There are no known areas of cultural heritage significance in this area.

4. DESCRIPTION OF THE ACTION

The Vucko-1 exploration well will be drilled using the Ocean America semi-submersible drill rig, operated by Diamond Offshore Drilling and supported by two support vessels. Personnel will be transferred to and from the rig by helicopter from Learmonth airport.

The Vucko-1 exploration well drilling program will be undertaken over a 48 day duration (Phase I will take approximately 10 days) between April and June 2012.

The first phase of the Vucko-1 exploration well (addressed in this summary) will drill the top-hole sections. This activity includes:

1. Installation (jetted in using seawater) and cementing of the well conductor pipe
2. Drilling of the top-hole sections using seawater and pre-hydrated bentonite sweeps
3. Completion of formation evaluation using logging tools
4. Insert and cement the drill casing
5. Test and install the blow out protector on the conductor pipe
6. Install the marine riser
7. Displace the top-hole section with water based mud.

5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Vucko-1 exploration well (routine and non-routine) to ensure they are reduced to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level using a method consistent with the *Australian/New Zealand Standard AS/NZS ISO 31000:2009 Risk Management* and *HB 203:2006 Environmental Risk Management – Principles and Process*.

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

6. MANAGEMENT APPROACH

The Vucko-1 exploration well drilling activity will be managed in compliance with the *Vucko-1 Exploration Well Environment Plan – Phase I: Bottom-hole Section* 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 Vucko-1 exploration well drilling activities, during both routine and non-routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

The EP details for each environmental aspect (identified and assessed in the Environmental Risk Assessment – **Section 5**) specific performance objectives, standards and identifies the range of controls (**Appendix A**) to be implemented (consistent with the standards) to achieve the performance objectives and identifies the specific measurement criteria used to demonstrate that these performance objectives are 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 activity. The EP details the types of monitoring and auditing that will be undertaken (including start-up audits, pre-well inspections, monitoring during the activity) and the reporting requirements for environmental incidents (recordable and reportable incidents) and reporting on overall compliance of the activity with the EP (i.e. End of Well Report submitted to NOPSEMA within three months of the activity finishing).

7. CONSULTATION

The Vucko-1 exploration well is located 120 km off the NW Cape in remote deep offshore waters that do not overlap any significant areas accessed and utilised by stakeholders. The primary stakeholders identified with a potential interest in the well site area are the Western Deepwater Trawl Fishery and Western Tuna and Billfish Fishery (both small fisheries). However, the Vucko-1 exploration well site area represents a very small portion of the overall fishery areas and the area is rarely accessed and/or fished by these small fisheries.

A fact sheet has been distributed to a broader stakeholder group (**Table 7-1**) prior to commencement of the drilling activity. The fact sheet included a location map, a summary of the activity scope, approximate duration, vessel/s involved and contact details.

Table 7-1: Key Stakeholders – Vucko-1 Exploration Well Phase I Drilling and Completion Activity

Organisation	Consultation Method	Date
Department of Mines and Petroleum	Email/Fact sheet	5 April 2012
Office of the Minister for Mines and Petroleum	Email/Fact sheet	5 April 2012
Dampier Port Authority	Email/Fact sheet	5 April 2012
WA Department of Fisheries	Email/Fact sheet	5 April 2012
Department of Transport	Email/Fact sheet	5 April 2012
Department of Environment and Conservation	Email/Fact sheet	5 April 2012
Department of Sustainability, Environment, Water, Population and Communities	Email/Fact sheet	5 April 2012
Australian Fisheries Management Authority	Email/Fact sheet	5 April 2012
Department of Agriculture, Fisheries and Forestry	Email/Fact sheet	5 April 2012
Australian Maritime Safety Authority	Email/Fact sheet	5 April 2012
Australian Marine Oil Spill Centre	Email/Fact sheet	5 April 2012
Shire of Exmouth	Email/Fact sheet	5 April 2012
Australian Conservation Fund	Email/Fact sheet	5 April 2012
Cape Conservation Group Exmouth	Email/Fact sheet	5 April 2012
Conservation Council of WA	Email/Fact sheet	5 April 2012
World Wide Fund for Nature	Email/Fact sheet	5 April 2012
Western Australian Fishing Industry Council	Email/Fact sheet	5 April 2012

8. CONTACT DETAILS

Further information about the Vucko-1 Exploration Well Phase I activity can be obtained from:

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9. REFERENCES

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY (2010). Fishery Status Report. Australian Government, Canberra

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

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Timing and location of drilling activity	Disturbance to marine fauna in critical habitat (breeding, feeding, resting, migratory corridors)	• Planning/location of activity to avoid/minimise disturbance to marine fauna
	Interference with fishing operations	• Maintain a 500 m radius petroleum safety zone around the drill rig as required under the *Offshore Petroleum Greenhouse Gas Storage Act 2006* (OPGGSA) • Compliance with Australian Maritime Safety Authority administered marine safety regulations and marine notification requirements • Pre-drilling notification/consultation with stakeholders
	Interference with commercial shipping	
	Impacts on marine conservation reserves	• No access by the rig or support vessels under normal operations within any of the marine conservation reserves in the region
Vessel/rig movement and noise	Acoustic disturbance to marine fauna - behavioural	• The interaction of the support vessels and helicopters with cetaceans will be consistent with Part 8 of the Environmental Protection and Biodiversity Conservation Regulations 2000
	Injury/mortality of marine fauna	
Well site	Damage to subsea habitat	• Pre-spud survey undertaken to ensure areas of hard substrate and high structural complexity will be avoided
Rig anchoring	Damage to subsea habitat	• Anchoring analysis undertaken and implemented to minimise the potential for accidental anchor drag or the rig dragging off location
Vessel anchoring	Damage to subsea habitat	• Support vessels are not operationally required or able to anchor in the 1,210 m water depth at the Vucko-1 exploration well site
Vessel grounding	Damage to subsea habitat	• Supply vessels to transit along pre-planned routes between the Vucko-1 exploration well site and port where possible to avoid navigation hazards • Vessels will use approved navigation systems and depth sounders • Adherence to standard maritime safety/navigation procedures

Vessel/rig lighting	Alteration of marine fauna behaviour	• Light management will be consistent with that required to provide a safe working environment for the crew
Transport/introduction of invasive marine species in rig/vessel ballast water	Introduction and establishment of invasive marine species and displacement of native marine species	• Adherence to the Australian Quarantine Inspection Service Australian Ballast Water Management Requirements • An Invasive Marine Species (IMS) risk assessment will be undertaken for all vessels, rigs 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) • 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 establishing
Transport/introduction of invasive marine species on hull, internal niches and in-water equipment	Introduction and establishment of invasive marine species and displacement of native marine species	• An IMS risk assessment will be undertaken for all vessels, rigs 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)) • 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 establishing. • The Ocean America will not enter nearshore waters (i.e. <12 nm from land and <50 m water depth)
Use of vessel and machinery engines	Reduced localised air quality from atmospheric emissions	• Compliance with MARPOL 73/78 Annex VI (as implemented in Commonwealth waters by the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983)
Routine discharge of sewage, putrescible wastes and bilge water to marine environment	Toxic effect on 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; and Marine Orders - Part 96: Marine Pollution Prevention - Sewage)
Accidental discharge of solid, liquid and hazardous wastes to	Toxic effect on 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

the marine environment		IV (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983; and Marine Orders – Part 91: Marine Pollution Prevention – Oil; Part 94: Marine Pollution Prevention – Packaged Harmful Substances and Part 95: Marine Pollution Prevention – Garbage) • Woodside will have a plan in place for management of wastes
Non-compliant operational discharges to marine environment	Toxic effect on marine biota Localised burial and smothering of benthic habitats from cuttings pile 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 • Water based mud will be used while drilling the Vucko-1 exploration well • All hazardous substances (as defined in NOHSC:1008 (2004) – Approved Criteria for Classifying Hazardous Substances) will have a Material Safety Data Sheet available on board • All potentially hazardous materials and chemicals will be reviewed and approved through relevant Woodside procedures • Check for marine mammals within the vicinity of the rig undertaken before bulk discharge of water based mud or cement • Operational discharges are managed under the rig and vessel/s permit to work system
Non-compliant discharges from deck drainage to marine environment	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*) • Management of deck drainage will be consistent with applicable Woodside engineering standards
Loss of hydrocarbons/chemicals to marine environment – Deck spill	Toxic effect on marine biota	• All hazardous substances (as defined in NOHSC:1008 (2004) – Approved Criteria for Classifying Hazardous Substances) will have a Material Safety Data Sheet available on board • All potentially hazardous materials and chemicals will be reviewed and approved through relevant Woodside procedures • Fuels, oils and chemicals will be stored with secondary containment • Spill response bins/kits will be well stocked, readily available and personnel

		trained in their use
Loss of hydrocarbons/chemicals to marine environment – Refuelling	Toxic effect on marine biota Oiling of marine mammals, reptiles and seabirds	• Bulk transfers will commence during daylight hours and when sea conditions are appropriate as determined by the master of the supply vessel • Bulk transfer hoses for diesel will have adequate floatation and dry-break couplings • 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 rig and support vessel • Internal transfers of diesel will be undertaken in accordance with procedures, which include constant visual monitoring of gauges, hoses and fittings • Preventative maintenance system is in place and effective to ensure the integrity of hoses, dry break couplings and other equipment used for fluid transfers In the event of a loss of containment: • The rig and vessels will have a Shipboard Oil Pollution Emergency Plan (as per MARPOL 73/78 Annex 1) for managing spills aboard • Spill kits will be well stocked and readily available with personnel trained in their use • Spills to sea will be managed as per Woodside's Corporate Oil Spill Response Plan and the Vucko-1 Exploration Well Oil Spill Action Plan • Maintain a 500 m radius petroleum safety zone around the drill rig as required under the OPGGSA • Supply vessels to transit along pre-planned routes between the Vucko-1 exploration well site and port where possible to avoid navigation hazards • Vessels will use approved navigations systems and depth sounders • Adherence to standard maritime safety/navigation procedures
Loss of hydrocarbons/chemicals to marine environment – breach of vessel tanks (vessel collision/grounding)	Toxic effect on marine biota Oiling of marine mammals, reptiles and seabirds	
Loss of hydrocarbon during drilling of top-hole section	Toxic effect on the marine environment from any release of hydrocarbons due to shallow hazards	• A standard shallow geological hazard assessment to be completed for the Vucko-1 exploration well will be undertaken in the preparation of the drilling program