

Echo Yodel Well Suspension Environment Plan Summary

Subsea and Pipelines

Date: May 2012

Status: Final

1. INTRODUCTION

Woodside Energy Ltd (Woodside) will undertake a well suspension program via light well intervention (vessel-based) to suspend the Yodel 3 and Yodel 4 production wells in May and June 2012. The wells are located in the Echo Yodel field in the Dampier Sub-Basin in Commonwealth waters in permit WA-23-L.

The Echo Yodel Well Suspension Environment Plan (EP) has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Environment Regulations). The EP was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on 4 May 2012.

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

2. LOCATION OF THE ACTIVITY

The Yodel wells are located within the Production Licence Area WA-23-L in 140 m water depth approximately 23 km west south west of the Goodwyn A (GWA) platform and 135 km north west of Karratha (Figure 2-1). Table 2-1 summarises the details of the location including surface coordinates and permit area for the proposed activities.

GWA is an integrated drilling, production (gas and condensate), utilities and accommodation platform located on the North West Shelf (NWS) of Western Australia in production license WA-5-L. The facility currently processes gas and condensate from 16 of the 19 platform-based wells, intermittently from one of the two subsea wells from the Echo Yodel field, and four subsea wells from the Perseus over Goodwyn field.

The Yodel Lower E reservoir was developed in 2001 by two horizontal producers, Yodel-3 and Yodel-4, tied back via the Echo Yodel pipeline to the GWA Platform. The Yodel-3 and Yodel-4 subsea wellheads are connected via short 10 inch spools (pipes) to the 23km long Echo Yodel subsea pipeline, which is connected to GWA. The subsea wells are controlled from the GWA platform through a 23 km electro-hydraulic umbilical which is connected to the wells by short jumper flowlines. The two production wells are approximately 2 km apart.

Table 2-1: Yodel-3 and Yodel-4 Well Locations and Permit Area

Structure	Water Depth (m LAT)	Latitude	Longitude	Title
Yodel-3	140	19° 44' 21.841" S	115° 44' 49.064" E	WA-23-L
Yodel-4	140	19° 44' 48.040" S	115° 44' 06.603" E	WA-23-L

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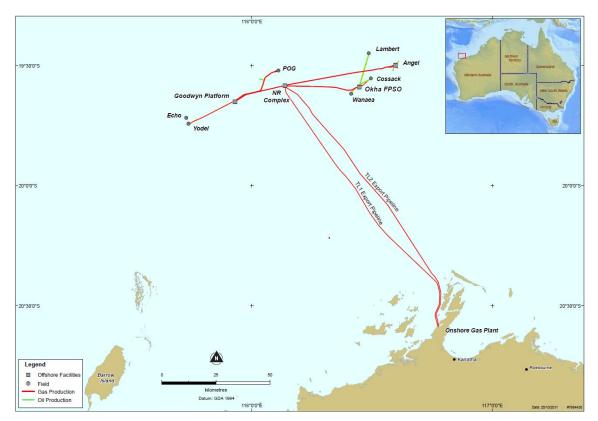


Figure 2-1: Location Map

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The climate of the NWS region shows two distinct seasons, a dry winter from April to August and a summer from October to March (when most rainfall occurs). The transition period (April and September) is a time during which summer or winter regime may predominate, or the conditions vary between these two. The mean daily air temperatures experienced offshore are about 24°C in winter and 27°C in summer. Rainfall is commonly associated with cyclones (November to April); however winter rain may also be experienced. Tropical cyclones are most frequent in the area for the months of January-March, with an annual average of ~1 storm per each of these months, passing within ~800 km of the area.

The persistent regional drift current (from near-surface to 10 to 30 m above sea bed) is primarily towards the SW-W (roughly along the regional bathymetry), probably due to the early beginnings of the Leeuwin Current and the Indonesian Throughflow from the Timor Sea. This W-WSW drift current is most apparent in the winter months, but also very visible in the summer months. Tides of the region are semi-diurnal (two highs and two lows per day) with a diurnal inequality (difference in heights of successive highs and successive lows). The tide range is of the order of 2.8 to 3.3 m at springs.

The NWS typically has gentle slopes (< 0.1°) while the outer shelf has steep slopes (5°). The deep water (>1,500 m) slopes gradually at 0.1°. Two significant banks are present on the gently inclined shelf, the Rankin Banks and Glomar Shoal. Rankin Banks is located some 37 km southwest of GWA and 12 km southwest of the Echo Yodel field. Glomar Shoals is located some 85 km east of GWA. These features rise to within 20 - 25 m from the sea surface. The seabed in the vicinity of the wells is typical of deeper offshore areas (>150 m water depth) on the NWS, being characterised by deep (>5 m) soft, silty sediments derived primarily from calcium carbonate, which become deeper, softer and finer with increasing depth.

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3.2 Biological Environment

Sampling of the benthos has consistently shown that the soft sediments of the NWS support a low abundance, high diversity invertebrate fauna population. Seafloor communities in deeper waters are relatively unproductive, and even with clear open ocean conditions, light penetration to the seabed is generally insufficient to sustain seagrasses, macroalgae and reef-building corals.

The NWS supports a diverse assemblage of fish, particularly in the shallow water environments around the oceanic island groups and the mainland coastline. Field sampling indicates up to 13 species of large fish are present around offshore NWS oil and gas facilities. Migratory marine species that may occur within the area include longfin mako, shortfin mako and whale sharks. A further 27 fish that are listed marine species under the *Environmental Protection and Biodiversity Conservation Act 1999* may occur in the GWA area.

Five species of marine turtles nest on onshore sites within the Pilbara region, and may occur within the Echo Yodel area; the flatback turtle, the green turtle and hawksbill turtle (all listed as 'vulnerable'); leatherback turtle and loggerhead turtle (both listed as 'endangered'). Hawksbill, flatback, green and loggerhead turtles may pass through the permit area on their way to and from nesting beaches on the mainland and adjacent islands. At sea, the concentration of these animals is low. Loggerhead and leatherback turtles may occur in the vicinity of the Yodel wells.

A range of whale and dolphin (cetacean) species traverse the waters in the Echo Yodel area, some being seasonal visitors while others occur at low densities all year round. The most common cetacean species that may occur in the area include the humpback whale, bottlenose dolphin, Indo-pacific humpbacked dolphin and Risso's dolphin. The peak northward migration of humpback whales occurs in July whilst the southern migration peak is late August / early September. The peak southward migration of cow/calf pairs is during October, and tends to occur in shallower waters, inshore from the Echo Yodel location.

The nearest sensitive marine environments to the Yodel wells are the shallow areas and shoreline surrounding Barrow Island (114 km SW), the Montebello and Lowendal Island groups (75 km SW), the inshore habitats and shoreline of the Dampier Archipelago (125 km SE) and the mainland (150 km SE). The topographical complexity and shallow waters of these near-shore waters afford a higher diversity of habitats and primary productivity than in the open waters of the shelf. There are no reef structures or landfalls typically associated with high marine productivity, bird or turtle nesting sites or other known areas of biological significance in the vicinity of the Yodel wells.

3.3 Socioeconomic Environment

The Yodel wells are located approximately 150 km offshore from the Port of Dampier. Smaller coastal fishing and tourism settlements occur at Onslow over 250 km to the SW, and Point Samson 170 km to the SSE. Dampier and Karratha are the main service centres for the region, and have approximate populations of 1,500 and 19,000 respectively. Although developed initially for the iron ore industry, these towns have expanded to service the oil and gas industry located on the NWS.

The Yodel wells lie within Zone 1 of Pilbara Trap Managed Fishery and adjacent to Zone 2 of the Pilbara Trawl Fishery. Established fishing operations are located at Onslow, Dampier, Point Samson and Port Hedland, and pearl oyster diving is conducted from Dampier. The major types of fish stock in the Pilbara include fin fish (snapper, red emperor, mackerel, job fish and shark), prawns, and molluscs. Commonwealth managed fisheries occur beyond the 200 m depth contour and therefore in deeper waters than the Yodel location. The Yodel location is beyond the range of nearshore fisheries (e.g. prawn fisheries) that operate between the North West Cape and Port Hedland.

The NWS supports the Open West Coast Fishery, the Pilbara Trawl Fishery, the Pilbara Trap Fishery and the North Coast Shark Fishery. Of these four fisheries, only the trawl fishery has any significant catch beyond the 50 m isobath. In general, due to a relatively featureless seabed, areas beyond the 100 m isobath are not very productive for fish. The Nickol Bay Prawn Fishery also operates out to the 200 m depth state limits, although there is little, if any, activity beyond the 30 m isobath. The Open West Coast Fishery is a low intensity fishery with 36 licensed boats throughout WA.

Recreational fishers rarely visit the Echo Yodel area as most recreational fishing is undertaken within the inshore coastal waters. There are no known sites of Indigenous or European cultural or heritage significance

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within the GWA area. There are no shipwrecks or heritage sites in the vicinity of the Yodel wells. The nearest declared wreck site is at Tryal Rocks, just north of the Montebello Islands.

4. DESCRIPTION OF THE ACTION

The Echo Yodel well suspension program will suspend the Yodel-3 and Yodel-4 production wells using rigless technology (termed Light Well Intervention (LWI)) supported by a dynamically positioned (DP) specialist intervention vessel and Remotely Operated Underwater Vehicles (ROV). The LWI system enables safe entry to the well bore without having direct connection to the well. This method has been successfully used by Woodside in the past two years and has been used extensively for the last twenty years in the United Kingdom and Norway.

Both wells will be suspended by the installation of two wireline plugs; one deep-set below the production packer and the other shallow-set in the tubing retrievable safety valve nipple, or one within the tubing directly below the tubing hanger and the other shallow-set in the tubing retrievable safety valve nipple. The suspension involves the deployment of an intervention device onto the Christmas tree of the well which enables safe entry into the well to set the plugs.

The repair is scheduled to commence in May 2012 and will be undertaken over a period of approximately 19 days. The activity will be carried out as a 24 hour a day operation onboard the *Skandi Hercules* intervention vessel mobilised from Dampier. This schedule is subject to change due to operational requirements, vessel availability and external influences such as unfavourable weather.

5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Echo Yodel well suspension (routine and non-routine) to ensure they are reduced to as low as reasonably practicable 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 Echo Yodel well suspension are summarised 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 ensure environmental risks are reduced to as low as reasonably practicable and will be of an acceptable level.

6. MANAGEMENT APPROACH

The Echo Yodel well suspension will be managed in compliance with the *Echo Yodel Well Suspension Environment Plan* (accepted by NOPSEMA under the Environment Regulations), other relevant environment 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 Echo Yodel well suspension, during both routine and no-routine operations, are identified, will be reduced to as low as reasonably practicable and will be of an acceptable level.

The EP details for each environmental aspect (identified and assessed in the environmental risk assessment) 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 and 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 (e.g. report submitted to NOPSEMA within three months of the completion of the activity).

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7. CONSULTATION

In support of this activity, Woodside undertook an assessment of proposed activities (scope, location, timing and duration) and potential environmental, social and economic impacts. Potential impacts considered to be of most relevance to stakeholders were hydrocarbon spills, marine traffic, fisheries and compliance with government legislation.

Stakeholders relevant to these potential impacts were identified on the basis that they undertook normal business activities in the vicinity of the proposed activity and therefore may be affected by the proposed activities, had a regulatory or emergency management role, or had a publicly demonstrated interest in the proposed activities or potential environmental, social and economic impacts arising from the proposed activity.

Commensurate with Woodside's stakeholder assessment for this activity Woodside prepared and issued to its key stakeholders via email, a fact sheet outlining the proposed activity. The fact sheet included a location map, a summary of the activity scope and approximate duration, the vessel involved and contact details.

Table 7-1 outlines key stakeholders identified by Woodside and the consultation method in relation to the proposed activity, the timing of the consultation and the potential impacts and areas of stakeholder interest.

Table 7-1: Key Stakeholders - Echo Yodel Well Suspension

Potential Impacts	Organisation	Stakeholder Category	Stakeholder Relevance	Consultation Method	Date
Hydrocarbon spills	Australian Maritime Safety Authority	Regulator	Interested party	Email and fact sheet	19 April 2012
	Australian Marine Oil Spill Centre	Industry association	Interested party	Email and fact sheet	19 April 2012
Marine traffic	Dampier Port Authority	Regulator	Interested party	Email and fact sheet	19 April 2012
	Australian Hydrographic Office (Department of Defence)	Statutory authority	Interested party	Email and fact sheet	19 April 2012
Commercial and recreational fishing	Department of Fisheries (Perth)	Regulator	Interested party	Email and fact sheet	19 April 2012

Table 7-2 outlines stakeholder feedback, Woodside's proposed response and timing for any actions / commitments made by the proponent in relation to this activity.

Table 7-2: Key Stakeholders Feedback Summary

Stakeholder	Issue	Woodside Response	Action/timing
Australian Maritime Safety Authority	Requested Woodside provide AMSA an update once the work has commenced and at completion	AMSA will be notified at the commencement and completion of the activity	At the commencement and completion of the activity
Australian Hydrographic Office (Department of Defence)	Requested confirmation of the work dates to advise mariners	Reconfirmed start dates to the Australian Hydrographic Office	11 May 2012

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8. CONTACT DETAILS

Further information about the Echo Yodel well suspension activity can be obtained from:

Andrew Decet Corporate Affairs Adviser North West Shelf Project Woodside Energy Ltd Woodside Plaza, 240 St Georges Terrace, Perth WA 6000

T: 1800 661 233

E: andrew.decet@woodside.com.au

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APPENDIX A: Summary of Key Environmental Hazards and Control Measaures to be Applied to the Echo Yodel Well Suspension

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Disturbance to marine habitats from equipment placement	Localised physical damage to seabed habitats	 Vessel position tracking data and anchor logs show no anchoring during normal operations The vessel will remain on location using dynamic positioning and will not use anchors (except if required in emergency) Equipment deployed to planned positions on seabed
Disturbance to marine fauna from vessel presence, lighting and noise	Behavioural and physiological effects on marine fauna	 Vessel speed will not be greater than 6 knots within 300 m of a whale (caution zone) and will not knowingly approach closer than 100 m of a whale Helicopters shall not operate lower than 1650 ft or within the horizontal radius of 500 m of a cetacean known to be present in the area Sightings of marine mammals and whale sharks will be recorded and reported at 6 monthly intervals to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities at cet.sightings@environment.gov.au
Atmospheric emissions from internal combustion engines	 Reduced localised air quality from atmospheric emissions. Greenhouse gas emissions resulting in global warming 	 Use of low sulphur fuel when it is available to minimise emissions from combustible sources Emissions managed by the implementation of a preventative maintenance system to ensure all diesel powered equipment is operating efficiently A valid IAPP (International Atmospheric Pollution Prevention) certificate shall be held by vessels of 400GT or more
Atmospheric emissions from venting hydrocarbons	 Reduced localised air quality from atmospheric emissions. Greenhouse gas emissions resulting in global warming 	 Venting equipment maintained as per equipment maintenance schedule Venting equipment tested prior to use Venting during wind conditions conductive to rapid dilution into the atmosphere Gas vented at a minimum rate possible within operational constraints to allow rapid dilution
Introduction of invasive marine species via	Introduction and establishment of invasive marine species and	 Adherence to the AQIS Australian Ballast Water Management Requirements. Woodside's invasive marine species risk assessment undertaken for all vessels and

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Potential Environmental Impact	Control/Mitigation Measures
displacement of native marine species	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)
	Based on the outcomes of each invasive marine species risk assessment, management measures commensurate with the risk implemented to minimise the likelihood of IMS being introduced and establishing in Australian waters
Localised reduction in water quality	Sulphamic acid is diluted with water to a maximum concentration of 20%
	Woodside will only utilise control fluids that have a Gold or Silver CHARM rating, a Group 'D' or 'E' OCNS rating, or are classified as a PLONOR (Poses Little Or No Risk to the environment) chemical
	Control umbilicals for intervention equipment tested prior to use
Localised reduction in water quality	Onboard sewage treatment system is certified by the International Maritime Organisation
	Moderate rate of sewage discharge while proceeding at >4kn >4nm from land (comminuted and disinfected) or >12nm from land (not comminuted and disinfected) with no visible floating solids or discolouration of the surrounding water
	Discharge of treated bilge water (<15 ppm oil) only at a distance of more than 12 nm from land
	No discharge of putrescible wastes unless ground or comminuted to particles <25mm
 Localised reduction in water quality 	All solid, liquid and hazardous wastes (other than sewage, grey water and putrescible wastes) will be incinerated (in a certified incinerator) or compacted (if possible) and stored in appropriate containers in designated areas and sent ashore for recycling, disposal or treatment by a licensed and approved waste management contractor
	Disposal of any oil sludges/slops in port must be recorded in the vessel oil record book
	Management of wastes as detailed in Woodside's Waste Management Plan
	Appropriate spill clean-up equipment (e.g. absorbent mats) will be located within or near storage areas where there is the potential for spillage
	Localised reduction in water quality Localised reduction in water quality Localised reduction in water

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Unplanned discharges of hydrocarbons	 Toxic effects on marine fauna and flora Reduction in water quality 	 Transfer hoses and valves certified for integrity prior to use Intervention system to Christmas tree interface connections pressure tested prior to use Barriers within the intervention system tested prior to use Proven well, intervention device and pipeline isolations in place throughout activity All rigging and lifting appliances certified and third party validated prior to sail-away Crane and equipment certified and preventative maintenance undertaken Activity specific job hazard analysis (JHA) conducted and permit to work (PTW) obtained for sea fastening and overside lifts. Vessel off location to designated safe area during deployment/recovery operations The vessel will return to port for refuelling. There will be no refuelling of the vessel on site under normal operations A vessel bulk transfer procedure will be in place for unforeseen diesel transfers (refuelling) that includes specific control and mitigation measures Detailed pre-job checklist to confirm correct valve line-up, quality of equipment and communication arrangements Use of dry break couplings and drip trays Continuous visual monitoring of hoses and couplings during refuelling or transfer Spill kits on board will be well stocked and readily available with personnel trained in their use The vessel will have a Shipboard Oil Pollution Emergency Plan and a valid IOPP (International Oil Pollution Prevention) certificate for managing spills onboard
Unplanned discharges of chemicals	Toxic effects on marine fauna and flora Reduction in water quality	 Woodside will only utilise chemicals that have a Gold or Silver CHARM rating, a Group 'D' or 'E' OCNS rating, or are classified as a PLONOR (Poses Little Or No Risk to the environment) chemical MEG supplied to the intervention device from and returned to the vessel via a closed system Hoses pressure tested to 34.5 MPa (5000 psi) before being used

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		 Well shut in during flushing limiting volume returned Chemical containers will be self-bunded or located in a bunded area on the deck of the vessel A plan to manage vessel waste will be in place detailing wastes generated and disposal requirements All chemical and hazardous wastes will be segregated into clearly marked containers prior to onshore disposal All storage facilities and handling equipment will be in good working order and designed in such a way as to prevent and contain any spillage as far as practicable Spill response bins/kits will be well stocked, readily available and personnel trained in their use All hazardous substances (as defined in NOHSC: 1008 (2004) – Approved Criteria for Classifying Hazardous Substances) will have a Material Safety Data Sheet (MSDS) readily available on board
Vessel collision	 Toxic effects on marine fauna and flora Reduction in water quality 	 The vessel has valid dynamic positioning certification Maintain a 500 m safety exclusion zone around the vessel Commercial shipping and other vessels will be advised of the position of the vessel and any exclusion zones around the vessel The vessel is equipped with navigation aids, radar, vessel GPS tracking and management systems (VMS), depth sounders and competent crew maintaining 24 hour visual, radio and radar watch for other vessels
Disturbance to social and community values from interaction with fisheries and shipping	 Disruption to commercial and recreational fishing vessels Disruption to shipping activities 	 Maintain a 500 m safety exclusion zone around the vessel Marine notices distributed to relevant parties Pre-activity notification/consultation with external stakeholders, as required

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