

ANGEL PROJECT - CONSTRUCTION AND INSTALLATION SUMMARY

GENERAL

The Angel Reservoir is a gas-condensate field located on the North West Shelf (NWS) approximately 50km east of the North Rankin Alpha (NRA) platform within the production license WA-3-L permit. The license is operated by Woodside Energy Ltd (WEL) on behalf of the six equal Joint Venture partners - Woodside, BP Developments Australia Pty Ltd, Japan Australia LNG (MIMI) Pty Ltd, BHP Billiton Petroleum (NWS) Pty Ltd, Chevron Texaco Australia Pty Ltd and Shell Development (Australia) Pty Ltd.

WEL is proposing to construct and install a jacket, topsides, export pipeline, three flowlines, power and communications cable, umbilicals and various subsea tie ins for the Angel Gas Field Development Project over a period of approximately 8 months on site (Sept 07 - April 08). This Environment Plan covers these installation and construction activities.

Angel will be developed via 3 subsea satellite wells, each tied back separately via 14" corrosion resistant alloy lined flowlines to a standalone processing platform. The platform is a 4-leg steel jacket configured to allow transverse floatover installation of an integrated topsides deck. The foundations consist of 8 drilled and grouted piles.

The platform will be capable of processing 800 MMscf/d of gas. The processed gas will be exported via a 49km, 30" carbon steel pipeline tied into the NWS first trunkline and commingled with production from the NRA facility for onshore processing. The export pipeline will tie into the existing 1TL via a pre-installed 30" Tee and Future Tap assembly in the vicinity of NRA. Remote operation and power is supplied from NRA and the target ready for start up date set for Q4 2008.

CO-ORDINATES OF THE ACTIVITIES

Table 1: Angel Wells, Platform and Pipeline Locations

Well/Platform/Pipeline	GDA 1994 MGA Zone 50		Nearest Coast - Dampier Archipelago – Legendre Island km
	Northing N	Easting E	
AP2	459 113.3E	7 845 652.9N	99
AP3	458 571.2E	7 842 615.7N	96
AP4	456 675.6E	7 841 394.1N	95
Centre of Angel platform	457 825.0E	7 843 948.0N	98
End of export pipeline	409 804.2E	7 834 057.5N	~120

DESCRIPTION OF THE ACTION

Table 2: Contractors, Scope of Works and Approximate Schedules

Scope of Work	Contractor	Main Vessels and Approx Schedule
Transportation from China & installation of jacket & piles	McDermott Industries (Australia) Pty Ltd	Derrick construction Vessel, supply/support vessels Sept 07 (tow), Sept-Nov 07 (installation)
Topsides transportation from Malaysia and floatover installation	Clough Aker Joint Venture (CAJV)	Deck transportation vessel, command & support vessels Feb 08 (tow) - Mar 08 (installation)
Transportation from Indonesia and installation of 30" export pipeline & 3 x 14" flowlines Subsea tie-in installations & crossings	McDermott Industries (Australia) Pty Ltd	Derrick lay barge or DP work boat, various barges & supply/support vessels Nov 07 (tow), Dec 07 - Feb 08 (lay), Mar 08 (tie ins)
Power cable installation between Angel & NRA and umbilicals	CTC Marine Projects	Construction and cable lay vessel Feb 08 - April 08
Pipeline & Flowlines Conditioning	BJ Services	Work vessel Feb 08 – April 08

DESCRIPTION OF RECEIVING ENVIRONMENT

The Angel Gas Field is located in a subtropical offshore region with average summer temperatures of ~28°C and winter temperatures of ~23°C. The average annual rainfall is ~315mm and generally falls during the summer months. Prevailing winds are predominantly WSW (April-Oct) changing to ESE (May-Sep). On average, 3-4 cyclones are experienced on the NWS (usually Nov-Apr). The major drift current in the North West Shelf (NWS) region is the Leeuwin Current. The Angel seabed water temperature is around 23°C while surface temperatures may vary from 19-31°C.

Most of the seabed in the Angel area is flat, featureless and consists of fine to medium silts and sands of varying depths in part overlying a limestone pavement with occasional calcarenite sub/outcrops typical of the NWS. Sampling along the pipeline route shows a dominance of finer particles in the size fraction of

<250µm, generally low in metal, Total Petroleum Hydrocarbons and organic carbon content, thus typical of its offshore non-depositional location.

Baseline surveys (2002, 2006) of the platform site and export pipeline route respectively concluded the biota and sediments were typical of the NWS, well represented regionally and comprise largely polychaete worms and crustaceans. None of the benthic assemblages observed were of regional conservation significance.

Coral reef systems can be found around the Montebello Islands (~140 km SW of the Angel area, Dampier Archipelago (~95km south west) and the Ningaloo Reef (~400 km south south west).

A variety of endangered and/or vulnerable whales and turtles may travel through the project area during the installation period such as Humpback whales during northbound migrations (Jul-Aug) and southbound to the summer feeding grounds (Aug-Sept). South bound cow/calf pairs can be as late as early October, but tend to be closer to shallower water. The Angel area is not a known cetacean aggregation, feeding or resting area nor is it close to one. 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.

The Angel area lies within Zone 2 of the Pilbara Trawl Fishery and Zone 1 of Pilbara Trap Managed Fishery where the fishing intensity is low. There are no sites of historical or cultural significance, known tourist activity or recreational fishing in the immediate vicinity of the Angel project. The platform site is close to the shipping lane for vessels en route to the Lombok Straits.

DESCRIPTION OF ENVIRONMENTAL HAZARDS

Environmental risks associated with the Angel construction and installation activities result mainly from the vessel operations and the installation and testing of subsea piping/equipment.

The potential environmental effects from these activities include:

- Physical disturbance of the seabed and water column;
- Installation discharges to the sea (hydrotest/pre-commissioning chemicals, etc);
- Emissions to the atmosphere from operating equipment and vessels;
- Waste disposal including deckwash, sewage, domestic, installation waste etc;
- Accidental fuels or chemical spills during routine activities and vessel re-fuelling;
- Disturbance to marine flora and fauna including whales;
- Introduction of exotic species via ballast water and/or vessel hulls; and
- Disturbance to socio-economic values (fishermen and commercial shipping).

The main impacts resulting from Installation activities with potential to result in medium/moderate or above environmental risks (before mitigation) are summarised in Table 3. The full list of hazards and their management is provided within the Environment Plan.

SUMMARY OF MANAGEMENT APPROACH

This Environment plan is aligned with the WEL and individual Contractors' Health, Safety and Environment Management Systems and policies. It has the support of the four main contractors' Environment Plans. In addition, Woodside employs a structured approach to the management of environmental issues via a formal and documented Environmental Management Sub Process System (EMS) which is part of the Woodside Management System and is based on the elements of the ISO 14001: 2004 standard.

CONSULTATION

WEL referred the Angel project to the Department of Environment and Water Resources in Sept 04 (EPBC 2004,1805) under the *Environment Protection and Biodiversity Conservation Act 1999*. The Minister determined the project as a whole to be a 'controlled action' and to be assessed at the level of 'Preliminary Documentation'. During this process, public consultation was sought and subsequently the Karratha community has also been updated through the Karratha Liaison Group.

Representatives from DEWR, DoIR and AMSA have been consulted during the approvals process and the WA Fishing Industry Council is updated of activities in the area.

CONTACT

Further information can be provided by contacting Roger Martin (Corporate Communications) at Woodside Energy Ltd (ph (08) 9348 4591 or email Roger.Martin@woodside.com.au).

Table 3: Main Environmental Risks and Mitigation

Hazard	Risk	Potential Impacts	Risk Rank ¹	Mitigating Factors and Controls
Seabed disturbance	Installation of equipment on the seabed (eg. flowlines, manifolds, etc)	Localised damage to seafloor habitats	Med	<ul style="list-style-type: none"> Flowlines/ pipeline/ umbilicals/ power cable lain on seabed without rock dumping or trenching Expected to partially self bury Local habitats are well represented regionally. Rapid recovery expected Surveys did not reveal endangered species. Adherence to installation procedures to minimise footprint on seabed Adherence to anchoring procedures and plan minimises anchor/chain drag impacts
Discharge of chemically treated water	Hydrotest chemicals discharged	Contamination of the water column, potential impacts on marine life	Med	<ul style="list-style-type: none"> Site in deep water, >90 km to nearest sensitive environments Hydrotest chemicals rated silver & above, 'D' & above (OCHNS/CHARM ranking) or on 'poses little or no risk' list (PLONOR, ie benign in proposed concentrations) Adherence to Project flooding, hydrotest & dewatering procedures. Once off discharges, plumes quickly diluted
Discharge of Ballast Water	Introduction of exotic marine organisms to local environment	Potential to cause imbalance in ecosystem	Med	<ul style="list-style-type: none"> Angel location in 70-130m water depth, >90km from sensitive coastal or shallow water environments International vessels <12nm offshore to comply with AQIS Ballast Water Management Requirements.
Hydrocarbons and Chemical Spills	Accidental loss of diesel, chemicals or oil due to leaks/ dropped loads/ equipment failures etc	Significant release of h/c chemicals, potential impacts on marine life	Med	<ul style="list-style-type: none"> >90 km to shoreline and sensitive environments, deep water site Approved oil spill contingency plan with appropriate response and recovery equipment on vessels and shore base Adherence to the Contractors' Installation Procedures and the Vessel's Management System incl. maintenance and housekeeping Chemical and bulk material storage, handling and disposal procedures within Vessel Management Systems
	Accidental release of diesel during bunkering	Significant release of diesel with contamination of water column & potential impacts on marine life	Med	<ul style="list-style-type: none"> >90 km to shoreline, deep water location Sea and weather state to be deemed acceptable by both vessel masters Dry break couplings for all at sea hydrocarbon transfers. Routine maintenance and inspection of hoses and couplings Detailed vessel refuelling procedures in Vessel Management Systems. Approved OSCP (ERP 3210) with response & recovery equipment on vessels and shore base. Vessels have current SOPEPs.
	Damage to existing pipelines due to dropped load or anchor drag	Major release of h/c, potential effects on marine life. If existing pipeline is damaged, blowdown will release greenhouse gases	Severe to High depending if leak or failure	<ul style="list-style-type: none"> Lifting procedures & approved Lifting Plans for lifts over existing assets. Engineered pipeline crossovers with mattresses and separation. Exclusions zones eg Suspend lifting from supply barge during pipeline crossing Approved OSCP (ERP 3210) with appropriate response and recovery equipment on vessels and shore base Contractors' safety cases and Contractor and WEL emergency response plans Anchor plans and procedures. Dynamic Positioning vessels will not anchor. Subsurface positioning systems ROV inspection during and following specific installations Shutdown systems for existing pipelines. Wellheads isolated below seabed
Physical presence	Risk of collision of passing vessels with installation vessels or platform	Significant release of diesel/debris, contamination of water column, potential impacts on marine life	Med	<ul style="list-style-type: none"> Standard maritime safety procedures, navigation lights and communications functional. Exclusion zone maintained Rescue Coordination Centre (RCC, Canberra) notified of all vessels' movements Automatic Identification System (AIS), Radar Beacon (RACON) and navigation lights positioned on topsides during installation >90 km to shoreline & sensitive environments, deep water location Diesel most likely to evaporate and degrade considerably before potentially contacting any coastline AMSA advises recommended shipping route northwards to Lombok Straits is shown on new maps as relocated ~20km eastwards

Note 1: Risks are ranked **before** mitigation is considered.