

# PLUTO LNG PROJECT

## Offshore Environment Plan Summary

This summary of the Pluto LNG Project – Offshore Environment Plan has been prepared and submitted to comply with Regulation 11(7) and (8) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*. It may not be used for any other purpose without prior approval from Woodside.

### 1. DESCRIPTION OF THE ACTIVITY

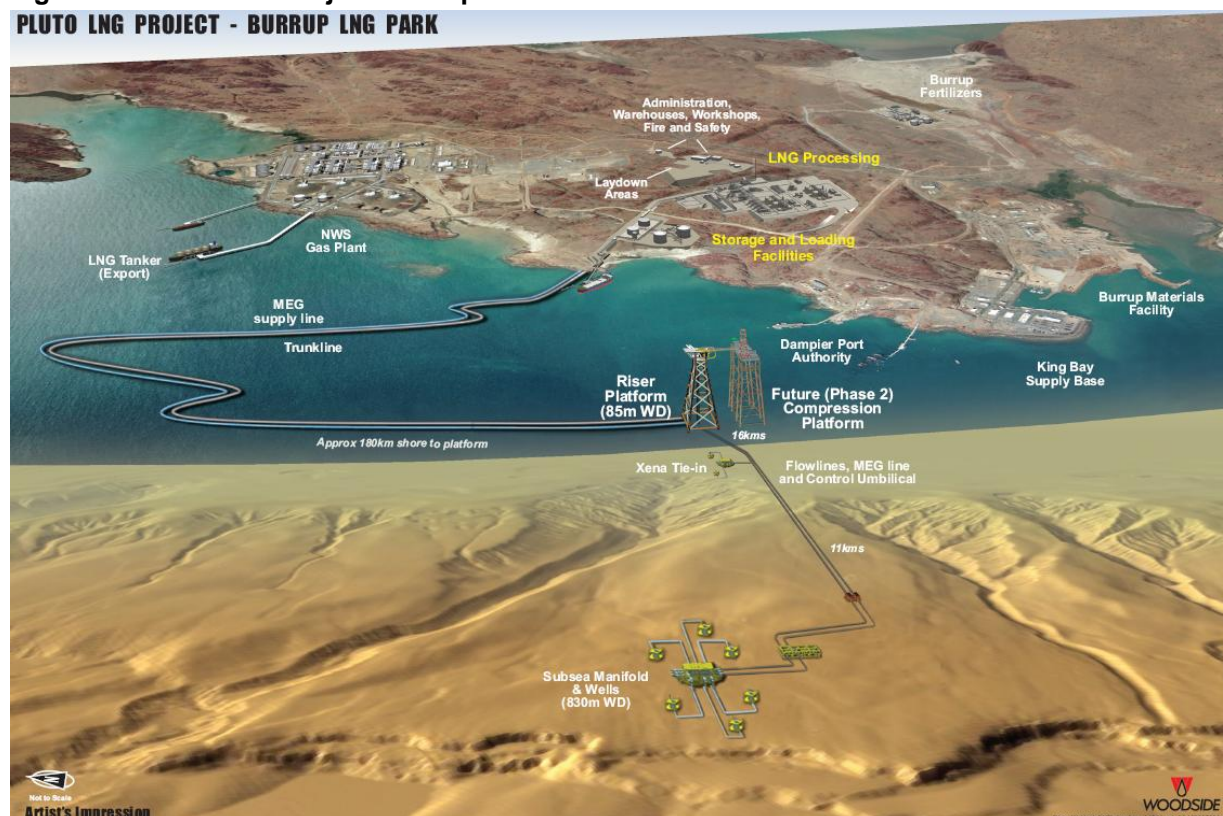
Woodside Burrup Pty Ltd (Woodside) is in the process of constructing the Pluto LNG Project in the north west of Western Australia. The offshore element of this project will extract gas and condensate from the Pluto gas field on the North West Shelf and deliver these hydrocarbons to an onshore liquefied natural gas (LNG) plant on the Burrup Peninsula.

**Table 1-1 Approx Coordinates of Key Infrastructure (GDA94)**

Infrastructure	Easting	Northing
Pluto Gas Field (Production Manifold)	304 466	7 796 990
Pluto Riser Platform	329 285	7 788 101
Trunkline Shore Crossing (Holden Point)	474 774	7 721 556

The design of the offshore infrastructure allows for the introduction of other fields into the production system. The development concept is shown in Figure 1.1.

**Figure 1.1 Pluto LNG Project Concept Overview**



The component of the development covered by this Offshore Environment Plan includes installation of the following offshore infrastructure:

- A subsea gathering system including manifolds and well tie-ins;
- Twin 20 inch gas flowlines, and an associated 4 inch MEG line and umbilical running from the gathering system to the offshore riser platform;
- A not-normally manned offshore riser platform;
- A 36 inch gas trunkline and associated 6 inch MEG line running from the riser platform to the LNG plant; and
- Stabilisation of the 36 inch gas trunkline and associated MEG line with quarried rock and sand.

The Offshore Environment Plan is being prepared in stages, such that as installation methodologies for specific scopes become firm, bridging environment plans are prepared that complement the overarching document and address in more detail any issues related only to that scope of work. As these bridging documents are approved, a revised Summary will be lodged with the Designated Authority for public disclosure. The approved Environment Plan currently includes the following scopes:

- Pipelay, including flooding, gauging and hydrotesting activities (Doc XB0700AH2000);
- Platform transport and installation activities (Doc XB7800AH5002);
- Platform hook-up and pre-commissioning activities (Doc XB7800AH7001);
- Trunkline rock dumping/stabilisation activities (Doc XB6530EH1003);
- Subsea tie-in and pre-commissioning activities (Doc XB0010AF2003);
- Trunkline sand backfill construction activities (Doc XB6530EH6002); and
- Pipeline pre-commissioning activities (Doc XB0700AH9000).

Aspects of the Pluto LNG Project outside the scope of this Environment Plan include construction of the onshore LNG and load-out facilities, drilling of the Pluto production wells, pipeline route preparatory works and commissioning / operation of the full facility.

## **2. GEOGRAPHIC LOCATION**

The Pluto gas field was discovered in April 2005 on the North West Shelf, approximately 190 km west-north-west of Dampier, Western Australia. The onshore LNG processing facilities are sited on Industrial Lot A and B, on the Burrup Peninsula, adjacent to the North West Shelf Karratha Gas Plant.

## **3. DESCRIPTION OF THE RECEIVING ENVIRONMENT**

An extensive research programme has been conducted on biological and physical aspects of the deep water and nearshore marine environments as part of Woodside's environmental review of the proposed project area. The following summarises the key environment and social values of the project area.

### **3.1. Physical Marine Environment**

The bathymetry of the offshore development area is characterised by three distinct features: the continental shelf, continental slope and the abyssal plain. The continental shelf extends approximately 150km offshore, where the continental slope drops sharply away to depths of 4000 – 5000 m on the abyssal plain.

The Pluto gas field is located on the continental slope in water depths ranging from 150 – 1000 m. The seafloor in this area is characterised by a series of submarine canyons and fine silty sediments. The riser platform will be located on the continental shelf in approximately 85 m water depth, in an area that is relatively flat and featureless with fine sandy sediments. The gas trunkline will traverse the continental shelf in gradually decreasing water depth from the riser platform to the receiving facility at Holden Point, on the Burrup Peninsula.

### **3.2. Ecological Marine Environment**

The area around the nearshore approaches of the trunkline route to Holden Point represents the only sensitive marine habitat in the vicinity of this project, although the offshore marine environment does represent a transit path for larger marine mammals (discussed further below). Several areas in this vicinity are formally protected under legislation and include marine parks and conservation areas.

Offshore benthic primary productivity is low and is a function of water depth, associated light attenuation, low nutrient availability and the absence of hard substrates. Seafloor communities in deeper waters are relatively unproductive, as light penetration at these depths is generally insufficient for the development of benthic primary producers (i.e. seagrass, algae and scleractinian corals). One area of deep water coral pinnacles was identified during geotechnical investigations of the gas field.

Phytoplankton in the waters of the North West Shelf is not particularly abundant, and concentrations vary little throughout the year. Benthic sampling offshore of the Pluto field found that the seabed comprises uncontaminated soft sediments supporting a sparse but diverse community of deep-water invertebrates, typical of the North West Shelf.

Seabirds may use the project area for foraging, populations generally concentrating around roosting or breeding areas along the coastline and adjacent to islands.

The offshore waters of the North West Shelf support a diverse assemblage of fish species. Whale Sharks congregate at Ningaloo Reef, approximately 100 km south-west of the project area from March to July each year. Sea turtles and sea snakes both occur in the development area, though the populations are spread sparsely due to the mobility of individuals.

There are 27 marine mammal species known to be present or to pass through the offshore project area which are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). One, the Blue whale (*Balaenoptera musculus*) is listed under the EPBC Act as endangered. Humpback whales (*Megaptera novaeangliae*), known to migrate through the project area, are listed as vulnerable. The other whale, dolphin and dugong species found within the project area are listed migratory and/or marine species and hence are protected under the EPBC Act. A full list of species covered by the EPBC Act that could occur in the project area can be found in Appendices B - E of Woodside's *Pluto LNG Development Draft Public Environment Report / Public Environmental Review* (December 2006).

### **3.3. Social and Economic Environment**

The principal fisheries in the Pilbara region target tropical finfish, tuna and other large pelagic species, as well as crustaceans and molluscs (e.g. prawn and pearl oyster). The management of commercial fisheries with the project area is undertaken by the Commonwealth Australian Fisheries Management Authority (AFMA) and the Department of Fisheries (Government of) Western Australia (DFWA)

AFMA manages four fisheries beyond the three nautical mile (Nm) offshore extent of the Australian Fishing Zone, which overlap parts of the offshore project area. Similarly, DFWA manages six fisheries on the North West Shelf which overlap or are in close proximity to the offshore project area.

A relatively low number of vessels are observed within a shipping route heading north-east in the vicinity of the Pluto gas field. Few recreational fishing boats are expected in the offshore development area, and along much of the trunkline length due to the distance from shore and the depth of water. Within the limits of the Dampier Port, Dampier Port Authority is responsible for the management of marine traffic.

Tourism and recreational activities such as fishing, swimming, diving and boating generally occur within two Nm of the shoreline. The majority of the offshore project area is located outside this nearshore region and therefore will have little interaction with such activities.

The Pluto gas field also falls within the Western Australian Exercises Area (WAXA). The area of the WAXA within which the Pluto gas field falls is used as a military flying area as detailed in Woodside's *Pluto LNG Development Draft Public Environment Report / Public Environmental Review* (December 2006)

## **4. MAJOR ENVIRONMENTAL HAZARDS**

Offshore installation activities have been subject to a comprehensive impact and risk assessment process which allows certain impacts and potential risks to be systematically identified and addressed.

The main environmental aspects of the offshore construction activities for the Pluto LNG Project and the main impacts and potential risks these activities pose to the environment or the socio-economic values of the project area are listed in Table 4-1.

**Table 4-1 Summary of Key Hazards Identified**

Hazard	Activity/ Source of Risk	Description & Potential Effects / Impacts
Seabed and Shoreline Disturbance	<ul style="list-style-type: none"> <li>• Direct disturbance to seabed from installation of Subsea wells, manifolds, flowlines, platform, moorings and gas trunkline.</li> </ul>	<ul style="list-style-type: none"> <li>• Localised offshore seabed disturbance including mortality / disturbance of benthos.</li> </ul>
	<ul style="list-style-type: none"> <li>• Pipeline stabilisation / rock dumping within Dampier Archipelago.</li> <li>• Coastal clearance at the shore crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts on non-sensitive areas of Dampier Archipelago Seabed.</li> <li>• Mechanical disturbance to corals from anchoring</li> <li>• Disturbance to marine fauna, particularly sea turtles</li> </ul>
Disturbance to marine fauna	<ul style="list-style-type: none"> <li>• Routine construction activities and movement of vessels</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance to marine fauna or impact with cetaceans or sea turtles as a result of vessel movements</li> </ul>
Sewage and Putrescible Waste	<ul style="list-style-type: none"> <li>• Routine discharges from vessels</li> </ul>	<ul style="list-style-type: none"> <li>• Sewage may temporarily increase nutrient content of water increasing populations of some organisms.</li> <li>• Localised decrease in water quality</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• Domestic or Hazardous waste discharged or lost overboard</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially toxic to marine organisms and environment.</li> </ul>
Atmospheric Emissions	<ul style="list-style-type: none"> <li>• Emissions resulting from combustion of fuel used in offshore construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Localised impact on air quality.</li> </ul>
Hydrocarbons and other hazardous materials	<ul style="list-style-type: none"> <li>• Accidental hazardous material release during routine vessel operations</li> </ul>	<ul style="list-style-type: none"> <li>• Negative effects on water / sediment quality and marine life.</li> </ul>
	<ul style="list-style-type: none"> <li>• Accidental hydrocarbon release during routine vessel operations</li> </ul>	<ul style="list-style-type: none"> <li>• Negative effects on water / sediment quality and marine life.</li> </ul>
	<ul style="list-style-type: none"> <li>• Accidental release during bunkering</li> </ul>	<ul style="list-style-type: none"> <li>• Negative effects on water / sediment quality and marine life.</li> </ul>
	<ul style="list-style-type: none"> <li>• Discharge of chemically treated hydrotest water</li> </ul>	<ul style="list-style-type: none"> <li>• Planned discharge of hydrotest water to sea and effects on water quality and marine life during pre-commissioning</li> </ul>
Introduction of Invasive Marine Pest Species	<ul style="list-style-type: none"> <li>• Construction and support vessels involved in all aspects of the offshore construction scope, including ballast water and other vectors.</li> </ul>	<ul style="list-style-type: none"> <li>• Introduction of invasive marine pest species, possibly resulting in competition for food, predation of native species, or hybridisation between native and introduced species.</li> </ul>
Increased turbidity and sedimentation.	<ul style="list-style-type: none"> <li>• Dredging and backfill of sand for trunkline stabilisation.</li> </ul>	<ul style="list-style-type: none"> <li>• Negative effects on coral health and/or coral mortality.</li> </ul>
Physical Presence	<ul style="list-style-type: none"> <li>• Infrastructure to be installed as part of the offshore scope</li> <li>• Construction and support vessel movement, including through shipping lanes, fishing areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance to shipping and fishing operators</li> <li>• Risk of collision with passing vessels</li> </ul>

To ensure that activities that present the key impacts/risks identified in Table 4-1 are managed to reduce the impact/risk to as low as reasonably practicable (ALARP), Woodside has identified key objectives, standards and criteria on which compliance can be assessed. These are listed in Table 4-2.

**Table 4-2 Performance Objectives, Standards and Criteria**

Objectives	Standards	Criteria
Ensure seabed and shoreline disturbance is as described in the EP	<ul style="list-style-type: none"> <li>• Pipeline Alignment Drawings</li> </ul>	<ul style="list-style-type: none"> <li>• Flowlines, gas export line and other subsea infrastructure (e.g. manifolds) sited as per design alignment, confirmed by as-built survey.</li> </ul>

Objectives	Standards	Criteria
Minimise disturbance to marine mammals and/or turtles	<ul style="list-style-type: none"> <li>• Woodside Environment Policy</li> <li>• Woodside Environmental Standards</li> <li>• Part 8 of the EPBC Regs</li> <li>• Pluto LNG Project Sea Turtle Management Plan</li> <li>• EA Cetacean Interaction Guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Adherence to cetacean interaction guidelines and buffer distances for vessels and helicopters</li> <li>• No collision with sea turtles or marine mammals (evidenced through incident reports)</li> <li>• Sightings of marine mammals and sea turtles recorded and records forwarded to DEWHA</li> <li>• Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the relevant Environment Plans. Attendance records kept.</li> </ul>
No significant impact from sewage and putrescible waste discharge.	<ul style="list-style-type: none"> <li>• MARPOL 73/78 Annex IV</li> <li>• DPA Marine Notice 002/2005</li> </ul>	<ul style="list-style-type: none"> <li>• MARPOL Annex IV requirements followed and records kept</li> <li>• Records show the sewage system is routinely serviced</li> <li>• Discharge of treated sewage in Port waters will only occur through treatment plants with IMO certification. Records of any compliance test results taken will be maintained.</li> </ul>
No significant impact on the environment from general and hazardous waste	<ul style="list-style-type: none"> <li>• Woodside Environment Policy</li> <li>• Woodside Environmental Standards</li> <li>• MARPOL 73/78 Annex V</li> <li>• Protection of the Sea (Prevention of Pollution from Ships) Act 1983</li> <li>• Relevant Contractor Waste Management Plans</li> </ul>	<ul style="list-style-type: none"> <li>• MARPOL annex V requirements followed and records kept</li> <li>• Briefing of all personnel on environmental sensitivities, management procedures and commitments detailed in the EP. Attendance records kept</li> <li>• Signed off Waste Management Plan in place for key contractors</li> <li>• Volumes of waste generated recorded and disposal path tracked</li> </ul>
Air emissions meet regulatory requirements	<ul style="list-style-type: none"> <li>• Australian Standards for Marine Diesel</li> </ul>	<ul style="list-style-type: none"> <li>• Diesel bunkered in Australia will conform to Australian Standards</li> </ul>
No significant (>80L) hydrocarbon or chemical spills to the marine environment from any source/activity	<ul style="list-style-type: none"> <li>• Woodside Environment Policy</li> <li>• Woodside Environmental Standards</li> <li>• MARPOL 73/78 Annex I</li> <li>• Western Australia and Dampier Sub-basin Oil Spill Contingency Plan (ERP-3210)</li> <li>• Vessel SOPEP</li> <li>• Fuel Transfer Procedures</li> <li>• EPBC Condition 4</li> </ul>	<ul style="list-style-type: none"> <li>• OSCP 3210 approvals in place from DMP (under PSIA) and DEWHA (under EPBC Condition 4) prior to works commencing</li> <li>• Environmental induction to include spill response procedures</li> <li>• Records kept of inspections and preventative maintenance</li> <li>• Refuelling procedures and fuel spill contingency procedures to be followed</li> <li>• No refuelling at night unless essential, approval given by Woodside Rep</li> <li>• Spill kits available and maintained</li> <li>• Oil spill drills carried out on a regular basis and records of attendance and outcomes kept</li> <li>• Vessel maintains current SOPEP</li> <li>• MARPOL Oil Book up to date</li> <li>• Spills &gt; 80L reported to DA (recommended best practice by DMP) within 2 hrs</li> <li>• Internal incident reports completed for all spills &gt;1L (contained and uncontained)</li> </ul>
No significant impacts from chemical discharges to sea.	<ul style="list-style-type: none"> <li>• Woodside Environment Policy</li> <li>• Woodside Environmental Standards</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance with procedures for use of flooding, hydrotesting and pre-commissioning chemicals documented in Bridging Environment Plans</li> <li>• Woodside and Contractor procedures followed for handling all chemicals</li> <li>• Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the relevant Environment Plans. Attendance records kept</li> <li>• Measure and record chemicals used in pipeline flooding activities</li> </ul>

Objectives	Standards	Criteria
No introduction of invasive marine species.	<ul style="list-style-type: none"> <li>Woodside Environment Policy</li> <li>Woodside Environmental Standards</li> <li>Australian Quarantine Regulations 2000</li> <li>Australian Ballast Water Management Requirements</li> <li>Pluto Marine Quarantine Procedure</li> </ul>	<ul style="list-style-type: none"> <li>AQIS clearance documentation obtained and kept, including: <ul style="list-style-type: none"> <li>sanitation certificate (where required)</li> <li>Ballast water information</li> </ul> </li> <li>Qualitative invasive marine pest risk assessment completed for all vessels mobilising from an overseas port of origin. Assessment records kept</li> </ul>
No coral health impact outside approved limits from dredging induced turbidity and sedimentation.	<ul style="list-style-type: none"> <li>Implementation of Best Environmental Practice (BEP) dredging techniques (where applicable) from the Woodside Dredging and Spoil Disposal Management Plan (DSDMP)</li> </ul>	<ul style="list-style-type: none"> <li>Placement of material by reverse pumping to near bottom through the dredge drag head;</li> <li>Water quality and coral health monitoring and reactive management measures such as reduction in overflow and relocation of the dredge (refer to Woodside DSDMP).</li> </ul>
No significant impact on recreational vessels, commercial fishing and shipping.	<ul style="list-style-type: none"> <li>Woodside Environment Policy</li> <li>Woodside Environmental Standards</li> <li>P(SL)A 1967, S119, S124A</li> <li>Emergency Response Plan/Procedure Australian Marine Safety Authority (AMSA) requirements</li> </ul>	<ul style="list-style-type: none"> <li>No collisions or near-hit incidents</li> <li>Adherence to standard maritime safety procedures including radio contact, radar monitoring, displays of appropriate beacons and communications</li> <li>Functional navigational lighting in place and in use</li> <li>Marine notices broadcast according to DPA processes</li> <li>Notification of Dampier Port Authority according to DPA requirements</li> <li>Rescue Co-ordination Centre (RCC) routinely notified of major offshore vessel locations</li> <li>2.5Nm precautionary zone requested around key installation vessels and shipping communities advised via marine notices</li> <li>AHO and the Designated Authority will be advised in writing of the location of fixed infrastructure to facilitate the update of nautical charts</li> </ul>

## 5. MANAGEMENT APPROACH

The Woodside Management System and Standards will be implemented for the offshore construction activities for the Pluto LNG Project by both Woodside and the installation contractors. The system is aligned to ISO14000. Key components of the management system that will be implemented include:

**Planning and Risk Identification:** Throughout all stages of the project, from design to implementation and eventual operation, the Project implements a thorough process of hazard identification and mitigation (e.g. hazard identification workshops, job safety analyses)

**Roles and Responsibilities:** accountabilities and responsibilities are defined for personnel involved in both the field and in office roles

**Training, Awareness and Competency:** personnel are provided tailored inductions covering environmental values of the project area and control measures the project is implementing to manage these. Drills are run regularly to test competency in emergency response processes.

**Documentation and Change Management:** a robust document control and change management process is in place to manage the flow of information and seamlessly implement necessary change

**Emergency Response Preparedness:** where credible risk of a significant incident exists, emergency response plans are prepared. This includes the preparation, implementation and testing of vessel-based and regional oil spill response plans.

**Performance Monitoring:** the Project tracks and monitors key performance indicators against agreed targets, which are reviewed by senior management.

**Review, Reporting and Corrective Action:** the Project maintains a robust assurance process that includes formal (i.e. audit, incident analysis) and informal review processes, backed up with formal action tracking and close-out processes. Certain incidents or near-incident events also trigger reporting obligations to Government.

## **6. CONSULTATION**

From early project planning and impact assessment phases, Woodside has actively and openly consulted with interested community, government and non-government organisations to ensure key risks were identified and views heard.

External stakeholder engagement during the construction phase will be primarily coordinated by members of the Pluto Government and Community Relations functional group and focus on petroleum title holders through which Woodside will be operating and third parties with an interest in the project (e.g. commercial vessel operators and recreational Port users).

## **7. CONTACT DETAILS**

For further information about the project or this Environment Plan, please contact the Pluto Government and Community Relations team toll-free on 1800 634 988 or visit our website at:

<http://www.woodside.com.au/Our+Business/Pluto/>