

Enfield M1 4D Marine Seismic Survey 2007 Environmental Plan Summary

This summary of the Enfield M1 4D Marine Seismic Survey 2007 Environment Plan has been submitted to comply with Regulation 11(7)(8) of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999* (As Amended). It may not be used for any other purpose without Woodside's prior approval.

1. Project Description

Woodside Energy Ltd (Woodside) propose to undertake a 3 dimensional (3D) marine seismic survey (known as the Enfield M1 4D MSS 2007) over an area of approximately 65 km² in Commonwealth waters offshore from North West Cape, Western Australia. A further 27 km² adjacent and to the north east covering parts of the Vincent field may also be conducted contingent on further investigations. The survey is centred on the Enfield oilfield, located approximately 36 km to the north-west of North West Cape, and approximately 50 km north-west of Exmouth. At its closest point, the survey area is about 15 km from the boundary of the Ningaloo Marine Park (Commonwealth Waters) and about 36 km from the nearest coastline. The water depth across the survey area ranges from about 300–700 m.

To maximise control of the location of the seismic equipment the Enfield M1 4D MSS 2007 will be acquired using two specialised vessels. One vessel, the *Veritas Voyager* (designated as the "streamer" vessel), will tow 4 hydrophone cables, each with a maximum length of 3 km, at a depth of approximately 7 m beneath the sea surface. A tail buoy, that acts to identify the end point of the cable, will be towed behind each hydrophone cable. The marine sound energy sources will be towed behind a second survey vessel, the *Pacific Sword* (designated as the "source" vessel), at a depth of approximately 5 m beneath the sea surface.

The survey will be undertaken over a period of approximately 10 days, between mid January and late February 2007.

2. Coordinates of Activity

Easting (m)	Northing (m)	Latitude	Longitude
Enfield M1 4D MSS			
185570	7626204	21° 26' 20.96"S	113° 57' 59.93"E
189154	7626267	21° 26' 21.17"S	114° 00' 04.30"E
192177	7624944	21° 27' 06.02"S	114° 01' 48.33"E
190237	7620141	21° 29' 40.82"S	114° 00' 37.81"E
184667	7615171	21° 32' 18.75"S	113° 57' 21.13"E
181607	7616409	21° 31' 36.60"S	113° 55' 35.75"E
Contingent Vincent Survey Area			
188007	7626247	21° 26' 21.11"S	113° 59' 24.51"E
190662	7628938	21° 24' 55.34"S	114° 00' 58.40"E
196172	7629042	21° 24' 55.34"S	114° 04' 09.61"E
193712	7622856	21° 28' 14.78"S	114° 02' 40.20"E
191315	7622811	21° 28' 14.78"S	114° 01' 17.01"E
192177	7624944	21° 27' 06.02"S	114° 01' 48.33"E
189154	7626267	21° 26' 21.17"S	114° 00' 04.30"E

3. Description of the Receiving Environment

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 decrease with depth, with temperatures near the seabed in the proposed survey area (300 – 700 m water depth) ranging seasonally from 8 – 10°C.

Biological Environment

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.

The seabed in the vicinity of the proposed survey area is dominated by soft sediments inhabited by a sparse seabed community, including larger species living on the seabed (mainly urchins, sea-stars and crustaceans) and smaller burrowing invertebrate species living within the seabed sediments.

Limited patches of outcropping rock can be found at a range of depths, although these occur mainly along scarp and canyon features to the south-west, and outside of the proposed survey area, in water depths greater than 500 m. These hard rocky surfaces support a locally diverse accumulation of species.

While some unusual species were recorded during sampling of the deeper water environments conducted as part of investigations, the same collection of species that typically inhabits the seafloor and burrows in seafloor sediments is generally found to be widespread and well represented along the continental shelf and upper slopes in this region.

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 of the Enfield Development and of the proposed Vincent Development, an extensive programme of investigation and studies has been conducted on deepwater marine environments. This has included:

- Seabed habitat surveys: a series of vessel and drilling rig-based video surveys and fauna sampling surveys of the seabed in water depths up to 900 m;
- Physical and biological oceanographic surveys: vessel-based recording of a range of physical parameters and zooplankton abundance and distribution in inshore and offshore areas;
- Aerial surveys of larger marine animals: a two-year programme of regular flights over the region to record the presence of large marine fauna including whales, dolphins, whale sharks, manta rays and turtles;
- Vessel surveys of larger marine animals: a two year programme of vessel surveys funded by both Woodside and BHP Billiton, to record the presence of large marine fauna, focussing on Humpback whales; and

- Whale shark studies: satellite and acoustic tagging to determine short and long-term movements and inshore feeding behaviour.

A variety of cetaceans (whale and dolphin species) have been recorded during surveys of offshore waters in the vicinity of the proposed survey area, including several large whales, notably Humpback, Blue, Sperm, Minke, Pilot and False Killer 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 with a peak in average numbers recorded during the year over a three-week transition period, commencing in late August, when the northern and southern migrations overlap.

Overall, the highest concentrations of pods were observed in water depths of around 200 m during the northern migration, 200–300 m during the transition period and in waters shallower than 200 m during the southern migration.

Whale sharks are found to aggregate off Ningaloo Reef, generally between April and June each year. Encounters mainly take place within a few kilometres of the reef. A relatively small number of whale sharks (21 individuals) were recorded during two years of aerial surveys (2000/2001) with none being seen in the vicinity of the proposed survey area. Recent whale shark tagging and tracking studies have provided more information on whale shark movements in waters beyond the vicinity of the reef. While further information is required to achieve comprehensive understanding of seasonal whale shark movements, evidence indicates that some whale sharks could pass near or through the proposed survey area when making their approach or departure from the reef.

Socio-Economic Environment

The nearest town to the proposed survey area is Exmouth. Despite the relatively small population and isolation of the Exmouth area, a range of special events and recreational activities are held in the area throughout the year, including fishing competitions and the Whale Shark Festival.

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, based 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.

The main commercial activities associated with Exmouth include prawn fisheries, tourism and defence-related activities. Limited commercial fishing takes place in deepwater offshore regions, the most notable being a developing long-line fishery.

The region is very prospective for oil and gas, with two oil and gas production facilities already located in the region. The nearest is the Woodside-operated *Nganhurra* FPSO, which is producing from the Enfield oilfield and is located within the proposed survey area. The BHP Billiton Petroleum-operated Griffin oil and gas project, which is an FPSO development, is located approximately 70 km north-east of Exmouth.

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 or adjacent to the proposed survey area each year.

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. Major Environmental Hazards

An environmental risk assessment has identified environmental risks and potential environmental effects associated with the operation of the survey and standby vessels during the proposed Enfield M1 4D MSS 2007. The principal environmental risks have been determined to be associated with noise generated by the seismic source arrays. Other environmental aspects of seismic activities include:

- operation of the vessels and towing of the airgun and streamer array through the survey area;
- routine waste discharges from the survey and standby vessels;
- accidental fuel and oil spills from the survey and standby vessels;
- accidental loss of streamers, streamer fluid and associated equipment; and
- introduction of marine pests to the marine environment from ballast water or hull fouling.

Potential environmental effects associated with the above environmental aspects are:

- disturbance to marine fauna and habitats;
- fuel and oil spills;
- waste disposal;
- interference with commercial fishing; and
- interference with shipping.

5. Summary of Management Approach

The following table identifies the key management objectives, and standards and criteria to achieve these objectives, for environmental risks identified in the risk assessment process as in the “High” or “Medium” category.

Objectives	Standards	Criteria
Minimise disruption to cetaceans and other protected species (noise risk)	<ul style="list-style-type: none"> • Woodside Environment Policy • Department of Environment and Heritage <i>Guidelines on the Application of the Environment Protection and Biodiversity Conservation Act to Interactions Between Offshore Seismic Operations and Larger Cetaceans</i> • DEH <i>Whale and Dolphin Sighting Report</i> • Survey Vessels Environmental Management Procedures • DEH ‘manner prescribed’ conditions 	<ul style="list-style-type: none"> • Temporal avoidance of whale migrations by timing of survey to occur between December and February. • Survey is to be conducted according to whale interaction procedures to minimise the potential impacts from the survey. These procedures will be in accordance with the <i>Guidelines on the Application of the Environment Protection and Biodiversity Conservation Act to Interactions Between Offshore Seismic Operations and Larger Cetaceans</i>

Objectives	Standards	Criteria
Minimise disruption to cetaceans (collision risk)	<ul style="list-style-type: none"> • Woodside Environment Policy • EPBC Act Regulations 2000 (Part 8) • DEH <i>Whale and Dolphin Sighting Report</i> • DEH 'manner prescribed' conditions • Survey Vessels Contracting Company Environmental Management Procedures 	<ul style="list-style-type: none"> • Temporal avoidance of whale migrations by timing of survey to occur outside of main migratory period • Vessel-whale interaction procedures made known to vessel crews and implemented • Sighting reports completed and returned to Woodside and DEH
Avoid introduction of marine pest species	<ul style="list-style-type: none"> • Woodside Environment Policy • AQIS Ballast Water Management Requirements 	<ul style="list-style-type: none"> • Ensure vessels complies with, and records compliance with, AQIS Ballast Water Management Requirements • Vessels are to submit a Quarantine Pre-Arrival Report (QPAR) to AQIS. The QPAR requires details about the vessels including reporting recent visits by the vessels to places where organisms of concern to Quarantine are known to exist.
Minimise occurrence of fuel and oil spills	<ul style="list-style-type: none"> • Woodside Environment Policy • MARPOL 73/78 Annex I • AMSA <i>Marine Notice 36/2002</i> • P(SL)A Schedule 1995, Clause 220 • P(SL)A Schedule 1995, Clause 285 • Survey Vessels SOPEP (<i>Shipboard Oil Pollution Emergency Plan</i>) 	<ul style="list-style-type: none"> • Procedures comply with MARPOL 73/78 requirements • MARPOL <i>Oil Record Book</i> kept up to date • Fuel spill contingency procedures are in place and operational • Designated containment areas onboard the vessels for storage of oils, greases and streamer fluid • Sufficient spill response equipment on board to respond to foreseeable spill events • No refuelling at sea (except in emergency as determined by the vessel masters) • Appropriate actions are taken to minimise pollution • Any spills are to be reported as described in Section 6.5.2 of the Environment Plan • Personnel responsibilities are clearly identified

6. Consultation

Woodside is committed to ensuring stakeholders are consulted on activities associated with its proposed exploration, development and operational activities off North West Cape.

A community consultation programme has been in place since 1997 and formalised in 2001, with the establishment by Woodside of community reference groups in Perth and Exmouth to support the development of the then Vincent-Enfield joint development.

Woodside decided in 2004 to pursue a stand-alone Enfield development and has since used the reference groups, supported by one-to-one briefings and associated communication activities, to embrace development of Vincent and other activities. The consultation programme will be used to inform stakeholders on the proposed Enfield M1 4D MSS 2007.

Specific consultation activities planned for the Enfield M1 4D MSS 2007 includes:

- Provision of programme information to key stakeholders, including environmental non-government organisation representatives in Exmouth and Perth; Exmouth Shire representatives and peak industry groups; regional indigenous groups; and Perth and Exmouth community reference group members.
- Advice to the wider Exmouth community by way of advertising in local media, newsletters and briefings.
- Provision of a toll free telephone number to ensure stakeholders have an opportunity to voice their interest on proposed activities and potential impacts.

- Making the Enfield M1 4D MSS 2007 Environment Plan available to those stakeholders who request a copy.

7. Contact Details

For further information about Woodside's exploration, development or operational activities off North West Cape please contact:

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