



Armagnac 2D Marine Seismic Survey Environment Plan Summary

This summary of the *Armagnac 2D Marine Seismic Survey Environment Plan* has been submitted in accordance with Regulation 11(7)(8) of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999*. It may not be used for any other purpose without Woodside's prior approval.

1 Background

Woodside Energy Ltd (Woodside) proposes to undertake a two dimensional (2D) marine seismic survey (MSS) (known as the Armagnac 2D MSS) over an area of approximately 25,000 km² in Commonwealth waters offshore from Dampier, Western Australia. The survey will be undertaken using the *M/V Veritas Voyager*, over a period of approximately 74 days, between the beginning of June and early August 2008.

This Environment Plan (EP) has been prepared in accordance with Commonwealth regulatory requirements, guidelines for the preparation of an EP and with Woodside corporate environmental policies and the Health, Safety and Environment (HSE) Management System (HSE-MS).

The scope of the EP covers all operational activities relating to the Armagnac 2D MSS. The EP specifically describes:

- The activities of the marine seismic survey and the environment in the vicinity of the survey area;
- The potential environmental effects, risks and measures designed to minimise and/or mitigate actual and potential risks of the seismic surveys; and
- Management measures and strategies to be used in implementing the best practice requirements and commitments made in the *Armagnac 2D Marine Seismic Survey Environment Plan*.

2 Description of the Action

2.1 Location

The proposed Armagnac 2D MSS is entirely within Commonwealth waters on the North West Shelf offshore from Dampier, Western Australia. Total data acquisition will be approximately 6,300 line km full fold.

The Armagnac 2D MSS operational area is, at its closest point, approximately 157 km from the northern boundary of the Montebello/Barrow Islands Marine Conservation Reserve and approximately 280 km from the nearest mainland coast (i.e. Dampier). Water depth across the Armagnac 2D MSS area ranges from approximately 1,000 to 2,500m. **Figure 1** : shows the location of the proposed Armagnac 2D MSS with the coordinates of the Armagnac 2D MSS operational area provided in **Table 1** :

Table 1 : Armagnac 2D MSS Operational Area Coordinates (GDA94)

Latitude			Longitude		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
113°	07'	01.18"E,	17°	46'	55.95"S
113°	14'	32.46"E,	17°	49'	59.28"S
113°	21'	07.33"E,	17°	32'	21.60"S
113°	43'	41.16"E,	17°	38'	28.26"S
114°	01'	32.95"E,	17°	47'	24.15"S
113°	57'	33.20"E,	17°	59'	09.27"S
114°	16'	07.30"E,	18°	05'	58.24"S
114°	19'	10.63"E,	18°	16'	04.65"S
114°	15'	21.18"E,	18°	23'	59.97"S
114°	28'	48.83"E,	18°	23'	59.97"S
114°	56'	47.02"E,	18°	34'	24.64"S
114°	55'	22.40"E,	18°	43'	06.43"S
114°	38'	12.92"E,	19°	00'	30.01"S
114°	07'	11.40"E,	19°	03'	47.44"S
113°	51'	12.44"E,	19°	00'	30.01"S
113°	50'	30.13"E,	19°	15'	18.46"S
113°	43'	55.26"E,	19°	18'	21.79"S
113°	09'	36.31"E,	19°	17'	39.49"S
112°	53'	53.66"E,	19°	11'	02.55"S
112°	54'	37.60"E,	18°	49'	04.22"S
112°	58'	19.39"E,	18°	40'	31.30"S
113°	10'	18.62"E,	18°	09'	57.99"S
112°	59'	44.01"E,	18°	05'	01.83"S
113°	07'	01.18"E,	17°	46'	55.95"S

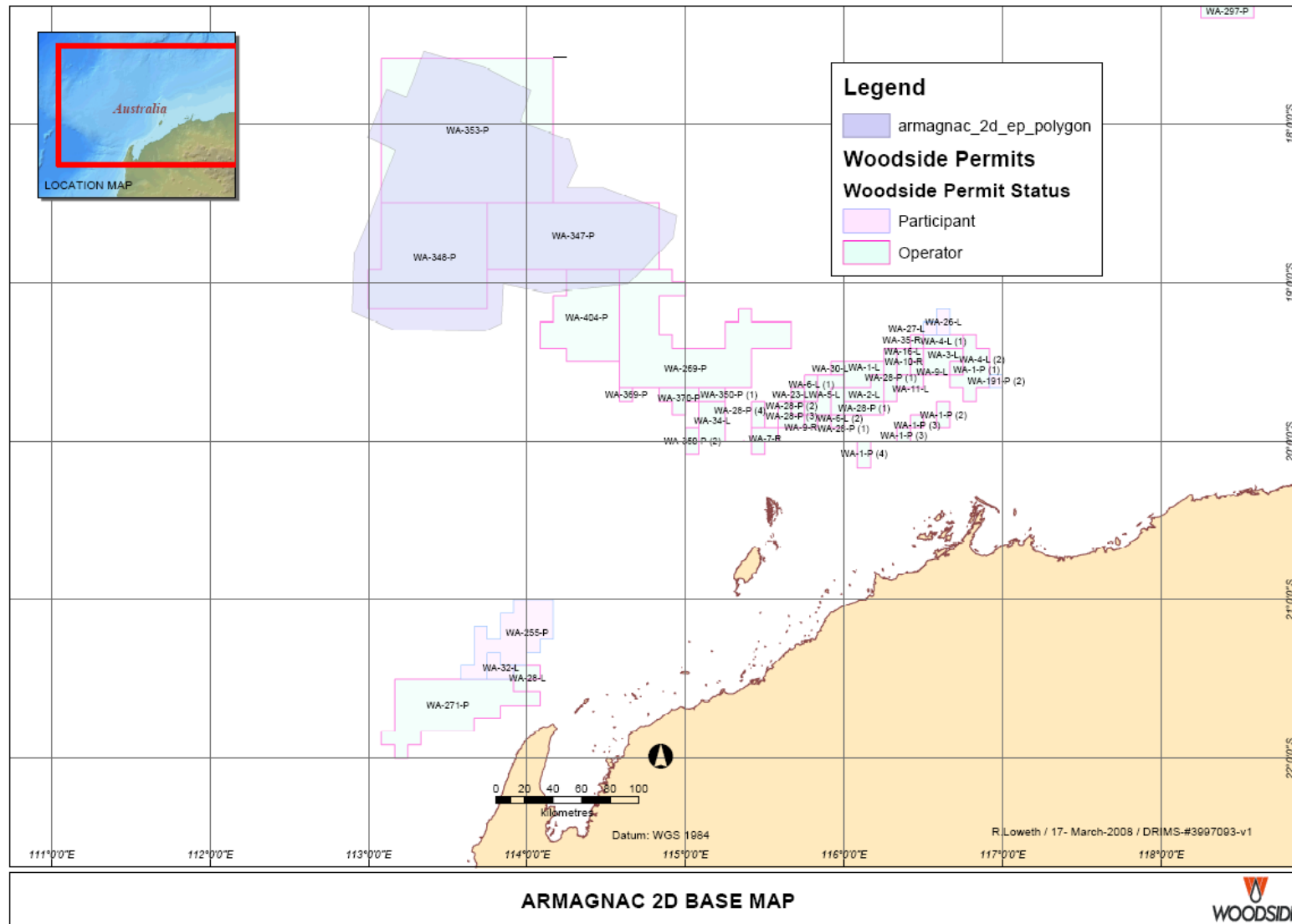


Figure 1 : Proposed Armagnac 2D MSS Operational

2.2 Proposed Operations

The survey will be conducted by a geophysical contractor, CGGVeritas Asia Pacific using the *M/V Veritas Voyager* to conduct the survey. This vessel is diesel powered, weighing 2,070 tonnes (gross registered tonnage) and measures 67.8 m overall (LOA) in length. The beam is 16 m with a draft of 4.85 m.

The *OMS Voyager* will aid the seismic operation, providing logistical, safety, and gear management support. The *OMS Voyager* is a twin screw offshore supply vessel weighing 478 tonnes (gross tonnage) and measures 54.6 m LOA, with a beam of 11.6 m and draft of 3.6 m to 4.2 m.

The proposed Armagnac 2D MSS will be used to map the subsurface geology of the survey area, enabling potential subsurface oil and gas reserves to be identified. The survey will involve a specialised survey vessel the *M/V Veritas Voyager* towing a marine acoustic source array (which produces acoustic pulses) astern, whilst moving along linear transects at speeds of up to 4.5 knots. The acoustic pulses are reflected from the boundaries of the geological layers in the sub-surface and the reflected signals are recorded by a series of hydrophones in multiple cables (streamers) towed behind the vessel.

The vessel will tow four solid hydrophone streamers of up to 4.5 kilometres in length, at a depth of approximately eight metres. The streamers will be set approximately 120 metres apart, with tail buoys to identify the trailing end of each. The vessel will sail along a series of pre-determined, parallel transects, however there may be deviations from the planned lines in order to achieve full data coverage of the subsurface within the defined survey area. Such deviations may be required as a result of ocean surface currents that may push the streamers off-line from the planned transects. The areal extent of the survey shown in Figure 1 includes the area required for the survey vessel to turn from transect to transect.

Survey operations will be conducted in accordance with all relevant Commonwealth Acts and regulations, with procedures in place to govern the survey activities that involve potential environmental impacts, including cetacean interaction, refuelling operations, streamer handling and maintenance, and vessel encounters. Specific procedures will be implemented to avoid interference with cetaceans and other marine species during the seismic survey and will include those required by the *EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales (May 2007)*.

3 Receiving Environment

3.1 Physical Environment

The Armagnac 2D MSS will be conducted on the North West Shelf (NWS) in offshore Commonwealth marine waters of the Indian Ocean, approximately 280 km northwest of Dampier, WA. Water depths in the survey area range from approximately 1,000 to 2,500 m. The area in which the survey is to take place is situated within the monsoon belt, experiencing north-westerly, rain-bearing winds from November to March followed by dry south-easterly trade winds from May to September. Tropical cyclones occur in the region typically three to four times per year, most commonly between December and March and are not expected to affect the proposed survey.

3.2 Ecological Environment

A search of the Australian Government's Department of Environment, Water, Heritage and the Arts (DEWHA) protected matters search tool identified five threatened/migratory species and four migratory species which may occur within the proposed survey areas.

3.2.1 Cetaceans

Blue whales (*Balenoptera bonaerensis*) have a wide distribution, with recordings throughout Australian Antarctic waters and off all states excluding the Northern Territory. Blue whales are known to feed in Antarctic waters with their diet having an almost exclusive dependence on euphausiids, particularly krill (*Euphausia superba*). Their migration paths are widespread and do not clearly follow coastlines or particular oceanographic features. It is believed that calving grounds are in tropical waters, occurring in winter and peaking in May to June; however the exact breeding grounds of this species are unknown (Bannister *et al.*, 1996).

The proposed survey area overlaps a portion of the uppermost northern extent of the deep-sea trench known as Kangaroo Trough. Kangaroo Trough is recognised as a feeding grounding for blue whales (Jenner pers. comm. 2005). It is however expected that the survey will not impact on this feeding ground due to the relatively sparse distribution of blue whales in the area, the extensive size of the trough, the survey area overlaps only a small portion of the trough, the probable occurrence of other feeding grounds in the region and the timing of the survey, prior to a peak in migration.

Humpback whales (*Megaptera novaeangliae*) have a wide distribution, with recordings throughout Australian Antarctic waters and off all states including the Northern Territory (Bannister *et al.*, 1996). The whales migrate north and south along the eastern and western coasts of Australia from calving grounds in the tropical north to feeding grounds in the Southern Ocean. Analysis of DEWHA whale distribution maps indicates that humpback whales migrate north through the Kimberley region during late July to early August, and south in late August to early September.

Humpback whales pass through the Northwest Shelf region during their annual migrations (June to November). The peak in the northward migration past the Montebello and Barrow Island occurs July/early August and the southward migration occur from mid-August to late October, peaking in mid-September. The peak movement (south) of the cow-calf pairs would generally occur two or three weeks later.

It is unlikely that humpback whales will be seen in the proposed survey area given that the southern peak migration paths occurs along the 50 to 300m depth contours and the survey area lies 100km west of the peak migratory pathways in water depths between 1,000 and 2,500m.

3.2.2 Turtles

A total of three threatened migratory turtle species are identified to potentially occur in the region of the survey areas including the green turtle (*Chelonia mydas*), flatback turtle (*Nator depressus*), and leatherback turtle (*Dermochelys coriacea*). The survey areas have not been identified as being suitable habitat (foraging) for these species based on water depth 1,000 to 2,500m. There is no possibility of impacts on nesting sites given the nearest nesting site over 130km away.

Flatback turtle are endemic to Australia and are distributed throughout the tropical waters of northern Australia. A major aggregation of nesting sites occurs along the North West Shelf. The Armagnac 2D MSS operational area is >130km from the nearest nesting site and is therefore unlikely to disturb turtles nesting at these sites. It is considered unlikely that the flatback turtle may pass through the proposed survey area.

The leatherback turtle (*Dermochelys coriacea*) is a pelagic feeder, found in tropical, subtropical and temperate waters throughout the world. Although identified as may be occurring within the survey areas, the leatherback turtle is considered unlikely to occur within the survey areas due to small population numbers and no confirmed breeding areas in WA (Limpus, 2004).

3.3 Socio-Economic Environment

The closest marine conservation areas to the survey area include the Montebello/Barrow Islands Marine Conservation Reserve (157km), proposed Dampier Archipelago – Cape Preston Marine Conservation Reserve (235km), Ningaloo Marine Park (275km) and Muiron Islands Marine Management Area (>275km). These areas will not be affected by the proposed Armagnac 2D MSS.

Commercial fisheries within the study area are managed by the Commonwealth Australian Fisheries Management Authority. A consultation process has been undertaken involving the fisheries known to operate in the survey areas including: North West Slope Trawl Fishery; Western Tuna and Billfish Fishery and Southern Bluefin Tuna Fishery. No issues or concerns were raised during the consultation process.

Recreational fishing does not occur in the survey areas due to the distance from the mainland (>200km) and the water depths that range from 1,000 to 2,500m.

The proposed marine seismic survey areas are located in a region regularly utilised by coastal and international shipping traffic. Given the level of existing petroleum activities already in the region the presence of the survey is not identified as a significant issue.

3.4 Cultural Environment

A search of the Australian Heritage Database did not reveal any sites listed as National Heritage Places, within the proposed seismic survey area (Australian Heritage Council, 2008).

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Sites Register did not identify any indigenous heritage values within the proposed seismic survey area.

4 Major Environmental Hazards

The principal environmental risks and potential environmental effects of the proposed marine seismic survey have been determined on the basis of Woodside's previous seismic experience in the region and the generic environmental risks outlined in Swan *et al.* (1994). The principal environmental risks have been determined to be associated with noise generated by the seismic source arrays. Other environmental aspects of the marine seismic survey include:

- Operation of the vessels and towing of the airgun and streamer arrays through the survey area;
- Routine waste discharges from the survey and support vessels;
- Accidental fuel and oil spills from the survey and support vessels;
- Accidental loss of streamers, streamer fluid and associated equipment;
- Ballast water discharge and hull bio-fouling;
- Interactions with usage groups (including commercial fisheries, shipping and oil/gas activities);

In summary, the potential environmental effects associated with the above environmental aspects are:

- Acoustic disturbance to marine fauna;
- Disturbance to marine habitats;
- Marine pollution;
- Introduction of non-indigenous species; and
- Disruption to usage groups (including commercial fisheries, shipping and oil/gas activities).

An environmental risk analysis was conducted using the Woodside Corporate Risk Matrix to rate the major environmental hazards. There were 16 key environmental risks identified, with all 16 listed with low risk ratings.

Woodside's environmental performance objectives, relevant standards and criteria to measure its performance are outlined in the *Armagnac 2D Marine Seismic Survey Environment Plan*.

5 Summary of Management Approach

Woodside's environmental management strategies and procedures to be used for the Armagnac 2D MSS include responsibilities, training, reporting frameworks, mitigation and response activities and monitoring and auditing procedures. Commitments associated with these (listed in Table 2), will be used to reduce environmental risk to As Low As Reasonably Practicable (ALARP).

A series of environmental management controls will be implemented by Woodside and its survey contractors to ensure that no significant environmental effects are realised from the survey. Table 2

6 Stakeholder Consultation

Consultation has been carried out throughout the course of the preparation of the Enfield M3 4D MSS, Vincent 4D MSS and HCA08X Trial Survey approvals. The following organisations, identified by Woodside as key stakeholders, have been contacted regarding the proposed seismic survey.

- Department of Environment, Water, Heritage and the Arts (DEWHA);
- Australian Fisheries Management Authority (AFMA);

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- Department of Industry and Tourism and Resources.
 - *Commonwealth Fisheries Association*;
 - Department of Industry and Resources (DoIR), (Petroleum Environment Branch and the Major Projects Division);
 - *Western Australia Fishing Industries Council (WAFIC)*;
 - *Western Australian Northern Trawl Owners Association*;
 - *Northern Fishing Companies Association*

No issues or concerns were raised during consultation. Key stakeholders (in italics) did not provide input.

A wider programme of engagement with stakeholders is in place to ensure adequate consultation. The following organisations have been identified by Woodside as key stakeholders who will be contacted prior to the commencement of the seismic surveys.

Government

- DEWHA;
- DoIR;
- AFMA;
- Australian Maritime Safety Authority;
- Australian Customs;
- Australian Department of Foreign Affairs and Trade;
- Australian Institute of Marine Science (AIMS); and
- International Maritime Organisation (IMO).

7 Contact Details

For further information about the Armagnac 2D MSS please contact:

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Table 2: Key Management Objectives and Commitments for Armagnac 2D MSS

No	Objective	Commitments/Criteria
1)	To ensure all contractor personnel are aware of and comply with Project EP and applicable Woodside Policies and standards	<ul style="list-style-type: none"> • All Crew will undertake Woodside HSE Inductions that will include environmental sensitivities, management procedures and commitments detailed in this EP.
2)	Minimise disruption to transient marine life (e.g. marine fauna).	<ul style="list-style-type: none"> • Adherence to the requirements of the <i>EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales (May 2002)</i> • Soft start procedure applied to all operations. • Whale, dolphin and porpoise sighting reports completed and returned to Woodside.
3)	Minimise disturbance to the seabed and benthic habitats.	<ul style="list-style-type: none"> • Anchoring of support vessels is minimised or avoided. • Recording and reporting of all items lost overboard. • Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the Environment Plan.
4)	Minimise occurrence and effects of hydrocarbon spills.	<ul style="list-style-type: none"> • No significant hydrocarbon spills. • All spills reported and cleaned up promptly and effectively. • Approved refuelling procedures are in place and followed for all vessels. • All valves and the flexible transfer hose checked for integrity prior to use. • At sea refuelling supervised by Vessel Master or nominated Officer. • Records kept of inspections and preventative maintenance. • Oil and fuel risks associated with the seismic survey will be assessed and managed in accordance with Woodside's <i>Western Australia and Dampier Sub-Basin Oil Spill Contingency Plan (ERP - 3210)</i> approved by the DoIR. • Response actions to spills comply with the OSCP. • Personnel responsibilities are clearly understood and followed. • Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the EP.
5)	Minimise impact of chemical discharges on marine environment.	<ul style="list-style-type: none"> • Approved, low toxicity chemicals are used. • Minimise discharged volumes in accordance with ALARP principles. • Woodside and Contractor procedures followed for handling all chemicals. • Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the EP. • Set targets for and measure total losses for chemical use and discharges. • Design and operate equipment to prevent loss of containment.

No	Objective	Commitments/Criteria
6)	Minimise impact of routine waste discharge on marine environment.	<ul style="list-style-type: none"> • Relevant waste discharge requirements are followed. • Procedures for management and disposal of sewage in place. • Waste log maintained for sewage/ground food waste discharged overboard. • Limited use of Sippican probes (one/week) spread over whole acquisition area and log maintained for all probes dropped in survey area. • Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the Environment Plan.
7)	Minimise potential for introducing non-indigenous marine species	<ul style="list-style-type: none"> • All vessels contractually obliged to comply with AQIS requirements
8)	Minimise interference with commercial and traditional fishing.	<ul style="list-style-type: none"> • Functional navigational lighting in place and in use for all vessels. • No negative feedback received regarding effects of installation and construction on commercial and traditional fishing. • Adequate and timely consultation with local fishermen, fishing industry groups and management agencies, where required and in advance of actions that potentially affect these users. • Operations carried out in a manner that does not interfere with fishing to a greater extent than is necessary. • Briefing of all project personnel on environmental sensitivities, management procedures and commitments detailed in the Environment Plan.
9)	Minimise disruption to commercial fishing, shipping and recreational vessels	<ul style="list-style-type: none"> • Functional navigational lighting in place and in use. • No negative feedback received from shipping representatives or vessel masters. • Radio warnings provided to shipping. • Operations carried out in a manner that does not interfere with navigation to a greater extent than is necessary. • Radar/radio monitoring undertaken. • No collisions or incidents.

8 References

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