



Exmouth and North West Shelf Geotechnical Survey Environment Plan

SUMMARY

GeoTechnical Operations

Date: 24 August 2012

THIS PAGE HAD BEEN INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

1.	INTRODUCTION	2
2.	LOCATION OF THE ACTIVITY.....	2
3.	DESCRIPTION OF THE ENVIRONMENT	6
3.1	Physical Environment.....	6
3.2	Biological Environment.....	6
3.3	Socio-Economic Environment.....	10
4.	DESCRIPTION OF ACTIVITY	11
4.1	Survey Vessel	12
5.	MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS.....	12
6.	MANAGEMENT APPROACH	12
7.	CONSULTATION	13
8.	CONTACT DETAILS	13
9.	REFERENCES	13
	APPENDIX A	15

1. INTRODUCTION

Woodside Energy Limited (Woodside) will undertake a geotechnical survey in Commonwealth waters offshore Exmouth and offshore Karratha, in the North West Shelf (NWS) region. **Section 2** of this document provides the coordinates and permit areas of the survey. Refer to **Figure 2.1** and **Figure 2.2** for survey operational area locations.

This document provides a summary of the Environment Plan (EP) that was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in accordance with Regulation 11(1) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and Amendment Regulations 2011* (Environment Regulations). This document has been prepared as per the requirements of Regulation 11 (7) and (8) of the Environment Regulations.

2. LOCATION OF THE ACTIVITY

In order to assist in the environmental impact assessment and the identification of specific and relevant management, preventative and mitigation measures, (as outlined in the accepted EP) the survey has been separated into two operational areas based on geographical position. However the activity, vessel and contractor will remain the same for both locations, so they have been considered as one activity within the EP. The operational areas are the *Exmouth Operational Area* and *North West Shelf Operational Area*.

The boundaries of the Exmouth and NWS survey operational areas are provided in **Figure 2.1** and **Figure 2.2**. Boundary coordinates are provided in **Table 2.2**.

The Exmouth and NWS geotechnical survey will be undertaken in Commonwealth waters ranging between 200-900m (Exmouth) and 100-200m (NWS). The petroleum licences/titles in which the survey will be undertaken are detailed in **Table 2.1**.

The Exmouth and NWS geotechnical survey is planned to commence around September to December 2012 depending on vessel availability. It is expected that the geotechnical survey will take approximately 35 days with approximately 25 days on location at the Exmouth operational area and 10 days on location at the NWS operational area.

Table 2.1 – Relevant Petroleum Instruments for Survey

Operational Area	Licences / Titles
Exmouth Operational Area	WA-28-L, WA-36-R.
NWS Operational Area	WA-1-L, WA-2-L, WA-28-P(1)R7, WA-10-R, WA-16-L, WA-9-L, WA-3-L WA-5-L, WA-6-L

Table 2.2 – Boundaries of the Exmouth and NWS Surveys (GCS GDA 1994)

Longitude	Latitude
Exmouth Operational Area	
113 47 39.300	-21 34 55.374
113 47 39.295	-21 29 56.165
113 51 07.551	-21 29 56.221
113 51 07.624	-21 28 00.510
113 55 08.280	-21 28 00.478
113 55 08.303	-21 24 58.558
114 04 59.611	-21 24 58.598
114 04 59.608	-21 32 17.211
113 57 29.922	-21 32 17.210
113 57 29.925	-21 34 55.371
NWS Operational Area - Eastern Flank Development	
116 06 49.065	-19 36 50.970
116 06 51.335	-19 29 55.247
116 15 38.934	-19 29 55.228

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

116 28 50.289	-19 25 05.888
116 29 41.488	-19 25 10.555
116 36 28.087	-19 29 45.776
116 36 02.944	-19 30 28.355
116 21 41.539	-19 31 52.251
116 20 52.527	-19 32 07.152
116 12 34.248	-19 34 00.657
116 10 04.737	-19 36 51.904
NWS Operational Area - Greater Western Flank (Phase 1) Development	
115 51 19.686	-19 42 26.423
115 55 21.232	-19 38 22.733
115 56 36.342	-19 39 29.511
115 52 34.796	-19 43 33.228

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

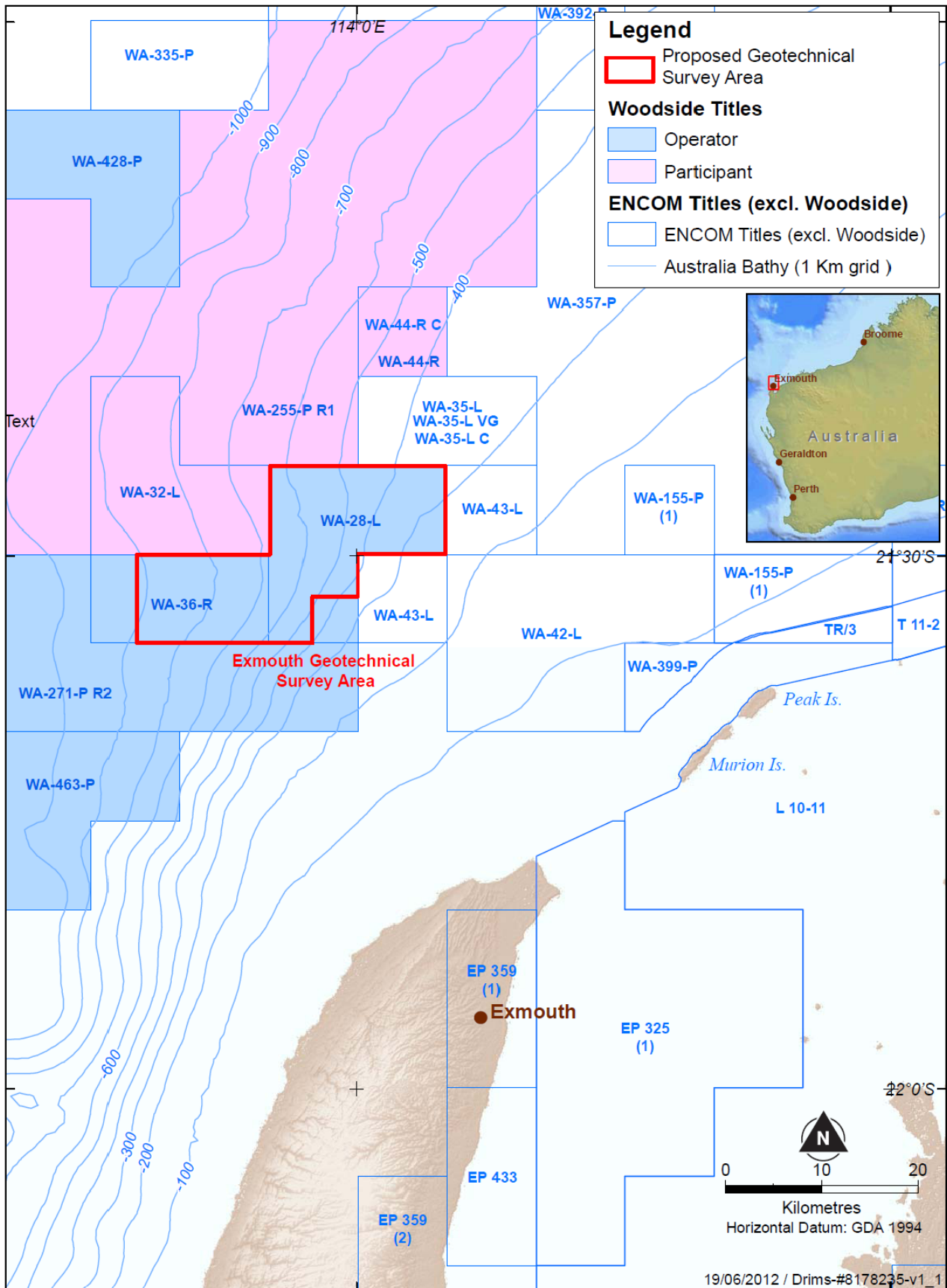


Figure 2.1 – Survey Boundary for the Exmouth Operational Area

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

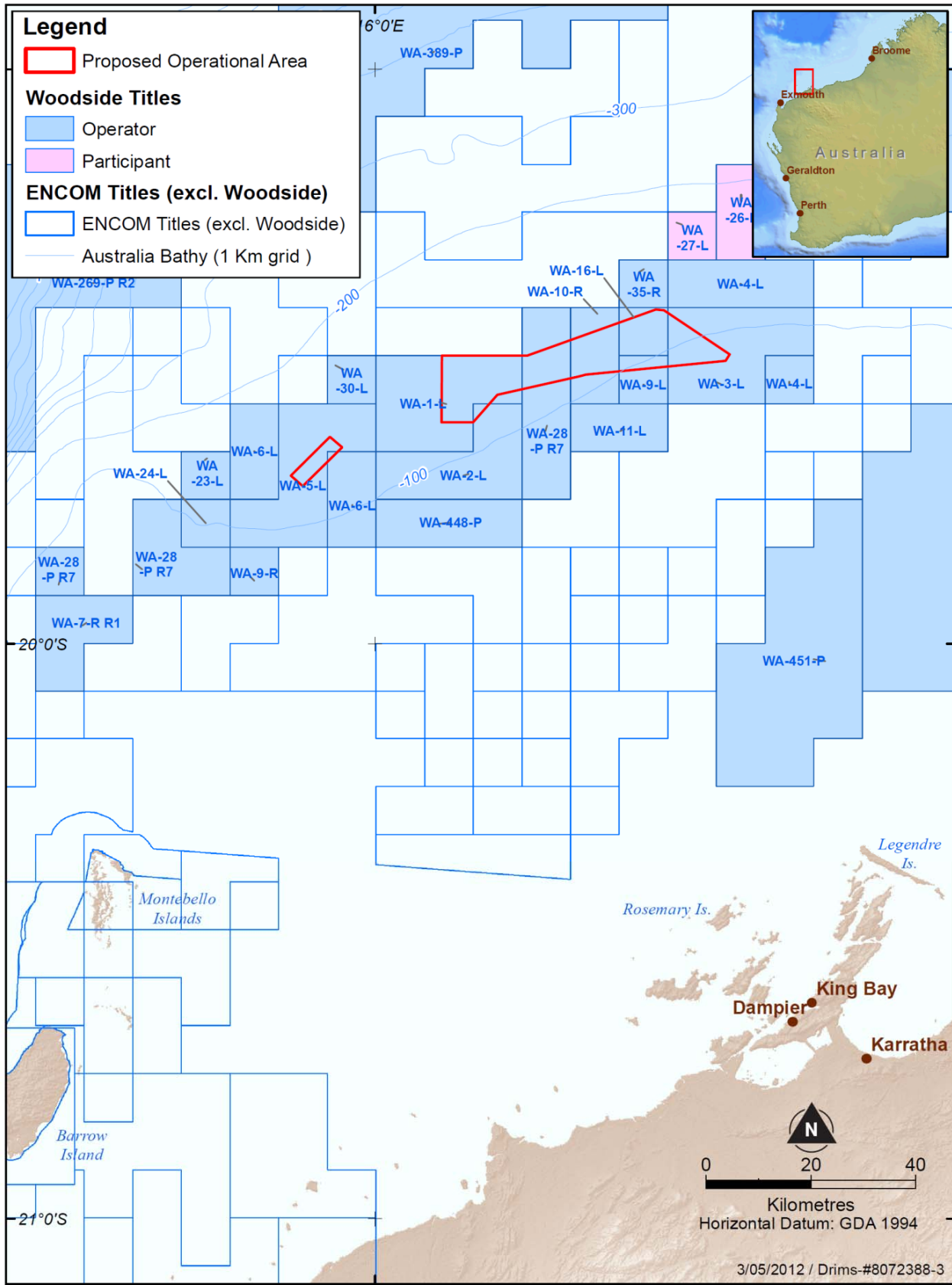


Figure 2.2 – Survey Boundaries for the NWS Operational Area

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

3. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Environment

The geotechnical survey will be undertaken in the North West Marine Region (NWMR) which encompasses Commonwealth waters from the Western Australian/Northern Territory border, south to Kalbarri, Western Australia. The NWMR is defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0). The IMCRA v4.0 is an ecosystem based classification of Australia's marine and coastal environments (DEWHA, 2008). The Exmouth operational area is located within the North West Province bioregion and the NWS operational area is located within the NWS Province.

The Exmouth operational area will be predominantly located on the continental slope in deep water, ranging from 200 to 900m. Soft sediment tends to dominate the area and is inhabited by a sparse seabed community.

The NWS operational area is located on the continental shelf in water depths between 100-200m of water. Broad scale surveys confirm that the seabed is flat and relatively featureless and no areas of hard outcropping are known within the vicinity of these operational areas.

The Exmouth operational area is located 10km (closest point of the boundary) from the Ningaloo Marine Park (Commonwealth). The operational area for NWS is located 99km from the Montebello / Barrow Islands Marine Conservation Reserves.

3.2 Biological Environment

A review of the EPBC Act database (Protected Matters Search Tool) held by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) was undertaken for both survey operational areas. The database indicated the Exmouth operational area boundary has a total of 37 marine species reported under the EPBC Act that may occur within, or travel through, the area, 13 of which are threatened marine species and 17 migratory species reported (SEWPAC 2012). A review of the NWS operational area boundary identified a total of 39 marine species were reported under the EPBC Act that may occur within, or travel through, the area, eight of which are threatened marine species and 15 migratory species reported (SEWPAC 2012).

There are no EPBC Act-listed threatened ecological communities in the vicinity of the survey operational areas and the areas do not contain habitat that is critical to the survival of any listed species.

Seabirds

Two seabird species, the Southern Giant-Petrel (*Macronectes giganteus*) and the Soft-plumaged Petrel (*Pterodroma mollis*), are listed as 'Migratory' under the EPBC Act. According to LeProvost Dames and Moore (1998, 2000), both species of seabirds are not known to breed in the Exmouth operational area region.

There are no listed species recorded to occur within the NWS operational areas, however based on the results of two survey cruises and other unpublished records (Dunlop *et. al.* 1995), 16 species of seabirds over the NWS waters have been recorded. These included a number of species of petrel, shearwater, tropicbird, frigatebird, booby and tern, as well as the silver gull. Of these, eight species occur year round and the remaining species are seasonal visitors.

Turtles

For both operational areas, there are five marine turtle species which occur in the region; and are listed as 'Migratory' under the EPBC Act. These species include the Green turtle (*Chelonia mydas*), Loggerhead turtle (*Caretta caretta*), Leatherback turtle (*Dermochelys coriacea*), Hawksbill turtle (*Eretmochelys imbricata*) and the Flatback turtle (*Natator depressus*).

Marine turtles such as the green turtle, may pass through the survey operational areas, however the timing of the survey will be outside the turtle breeding season (October to April), nesting season (October to December) and hatchling emergence (December to April). Marine turtles may be present due to the proximity to shallower waters (<150m) but numbers are expected to be low due to the offshore distance of the survey operational areas and the distance from nesting beaches on the mainland and adjacent islands.

Sharks

Listed under the EPBC Act, there are five migratory shark species which may occur in the Exmouth operational area region and three species which may occur in the NWS operational area region. These

species include the grey nurse shark (*Carcharias taurus*), shortfin mako (*Isurus oxyrinchus*), longfin mako (*Isurus paucus*), great white shark (*Carcharodon carcharias*) and whale shark (*Rhincodon typus*).

Whale sharks occur annually in the waters around Ningaloo Reef, from March to June with the largest numbers being recorded around April (Woodside 2002), however, the season is variable with individual whale sharks being recorded in other times of the year. Timing of the whale sharks' migration coincides with the coral mass spawning period when there is an abundance of food (krill, planktonic larvae and schools of small fish) in the waters adjacent to Ningaloo Reef. At Ningaloo Reef, whale sharks stay within a few kilometres of the shore and in water less than 50m (Woodside 2002).

Whale sharks are listed as Migratory and Vulnerable species under the EPBC Act in Commonwealth waters. The Exmouth operational area overlaps two known short term tracks and two known long term tracks of whale sharks which have been tagged in the region (**Figure 3.1**) which indicates that whale sharks may pass through the operational area. The survey timing is outside the migration season and is not expected to disrupt whale shark movements.

Cetaceans

There are potentially 24 listed cetacean species, including three threatened and seven migratory species that are potentially present in the Exmouth operational area. These species include several large whales, notably humpback whale (*Megaptera novaeangliae*), blue whale (*Balaenoptera musculus*), sperm whale (*Physeter macrocephalus*), Antarctic minke whale (*Balaenoptera bonaerensis*) and southern right whale (*Eubalaena australis*).

There are 22 listed cetaceans potentially present in the NWS operational area including two threatened and six migratory species that may pass through the operational area. The most common species include the humpback whale, false killer whale (*Pseudorca crassidens*) and a variety of dolphin species. Individuals of these species may be encountered in the region during the survey, although they are not expected in significant numbers.

The humpback whale (*Megaptera novaeangliae*) is the most commonly sighted whale in north Western Australian waters. The species has been observed seasonally to complete their northern migration in the Camden Sound area of the west Kimberley (Jenner *et al.* 2001), after feeding in Antarctic waters during the summer months (Bannister and Hedley 2001). The proposed timing of the survey (September to December) overlaps the southern migration period for humpback whales in the region, however the Exmouth and North West Shelf operational areas are located outside the known migratory pathways (**Figure 3.2**) which are landward of these operational areas. The likelihood of encountering whales is further decreased due to the survey operational areas being in offshore, deep waters therefore it is unlikely that many humpback whales will be encountered during the survey.

There are no known breeding, calving or feeding grounds for any listed threatened or migratory cetacean species within, or in the immediate vicinity of the Exmouth and NWS operational areas.

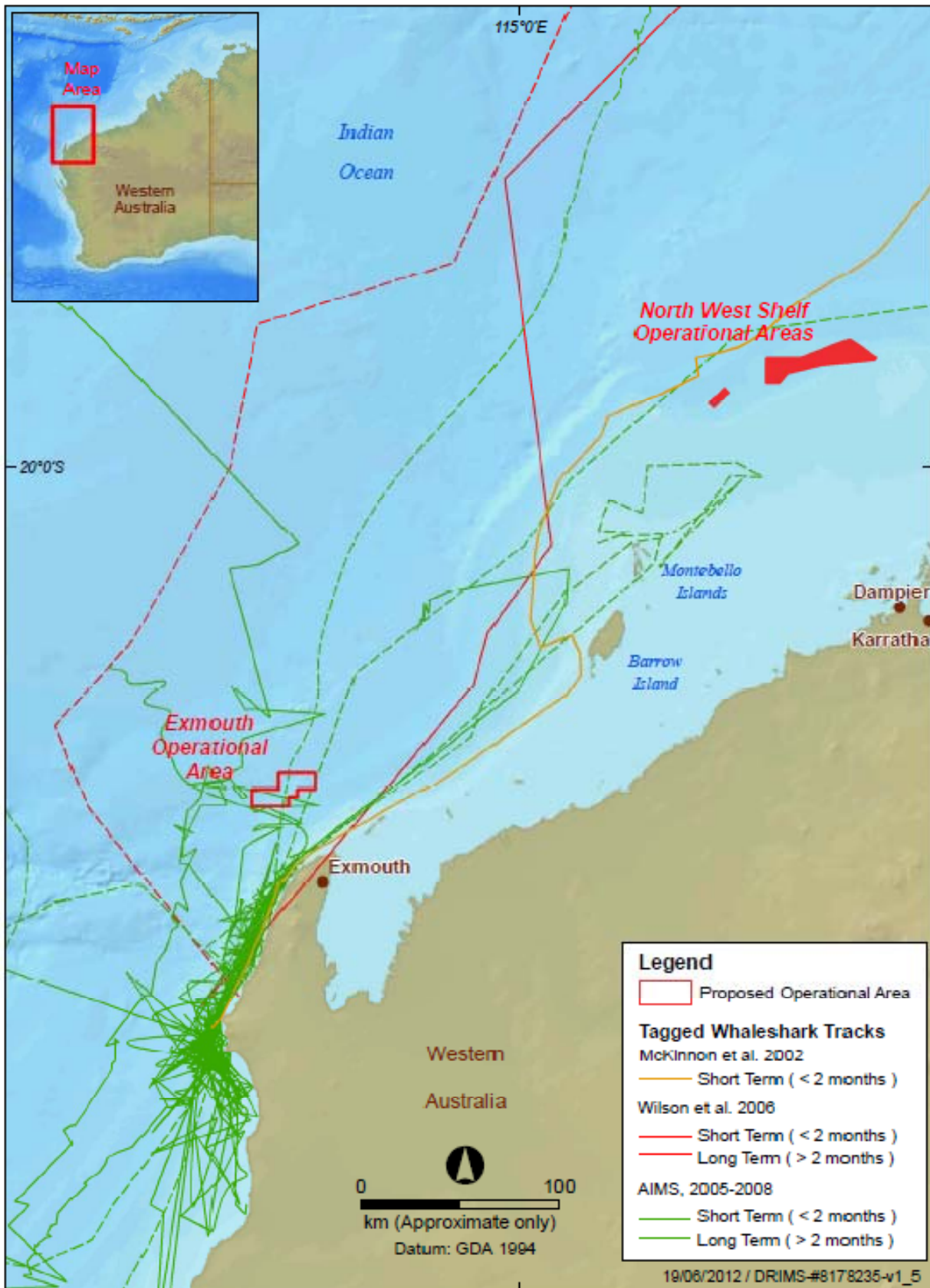


Figure 3.1 – Short and Long Term Satellite Tracking of 18 Whale Shark tagged between 2005 and 2008 (adapted from Meekan & Radford, 2010)

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

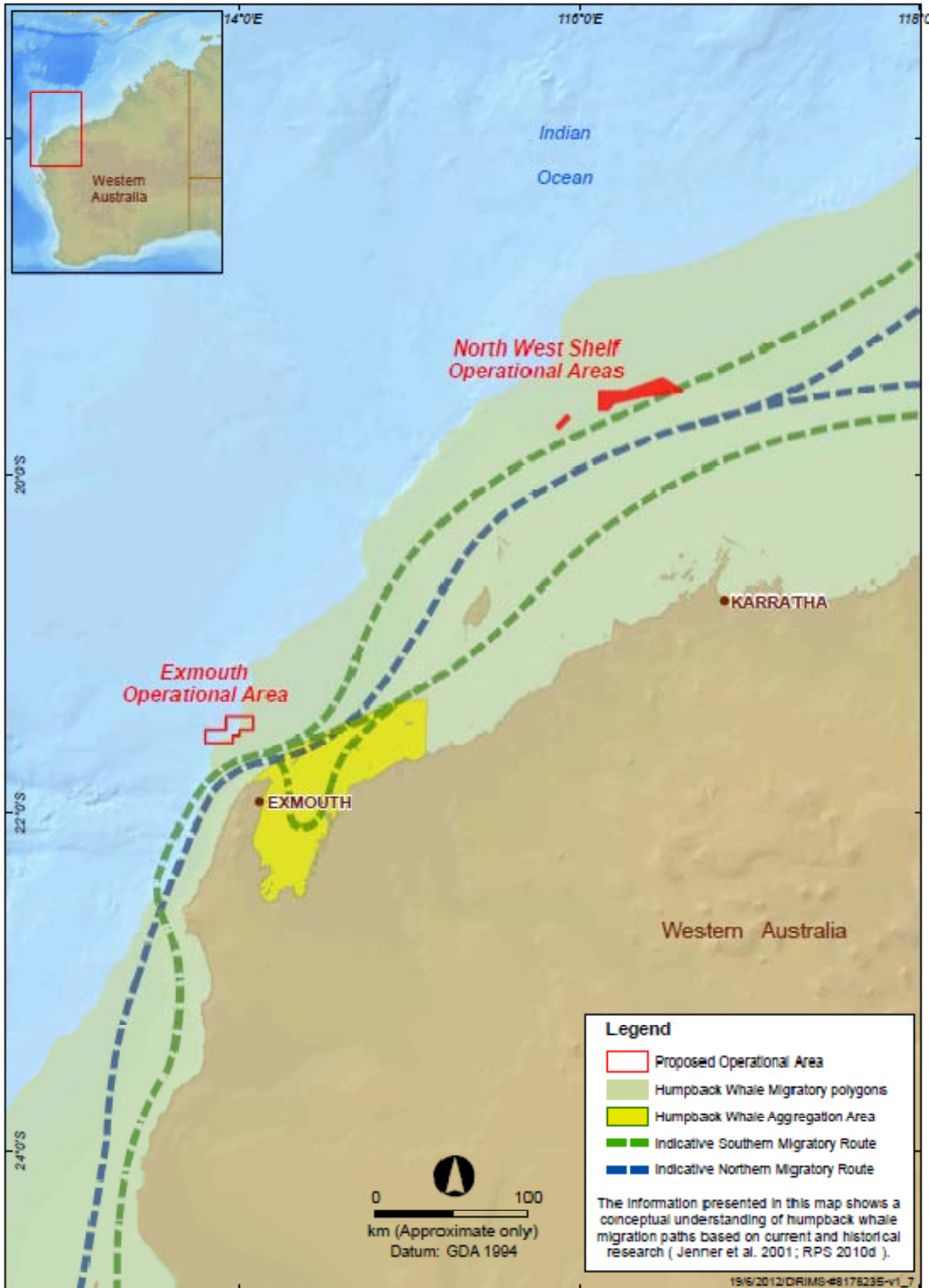


Figure 3.2 –Humpback Whale Migration Aggregation and Paths (Source: modified from Jenner et al (2001) and RPS (2010d))

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

3.3 Socio-Economic Environment

Fisheries

The Exmouth operational area overlaps the following fisheries:

- Western Tuna and Billfish Fishery.
- North West Slope Trawl Fishery.
- Southern Bluefin Tuna Fishery.
- Western Skipjack Fishery.
- Western Deepwater Trawl Fishery.

The timing and location of the survey in Exmouth may overlap with the Western Tuna and Billfish Fishery and Western Deepwater Trawl Fishery. Fishing intensity in the Western Tuna and Billfish Fishery is medium with less than five vessels operating in the fishery. Fishing intensity data indicates that the Exmouth operational area may be an active area for operator vessels. For the Western Deepwater Trawl Fishery, fishing intensity data indicates that while vessels may operate in the area, Exmouth operational area is not an intensively fished area. Stakeholder consultation undertaken by Woodside for the survey with the Western Australian Department of Fisheries, Western Australian Fishing Council, Australian Fisheries Management Authority and Commonwealth Fisheries indicated there were no issues or comments with the survey timing and/or location.

The NWS operational areas may overlap the following fisheries:

- Western Tuna and Billfish Fishery.
- Western Skipjack Fishery.
- Onslow Prawn Fishery.
- Western Australia North Coast Shark Fishery.
- Pilbara Fish Trawl.
- Abalone Fishery.
- Pearl Oyster Fishery.
- Southern Bluefin Tuna Fishery.
- Mackerel Fishery.

The NWS operational areas overlaps the Western Tuna and Billfish fishery and Area 3 of the Onslow Prawn Fishery and the survey vessel may be in this area during these seasons. Fishing for the Onslow Prawn Fishery is usually concentrated on the landward side of the 200m isobath which is shallower than the NWS operational area between 100-200m. Fishing intensity has decreased since 2010 with a single vessel fishing this region in 2010. The Western Tuna and Billfish fishery boundary may overlap with the NWS operating area but fishing intensity data indicates there is little known fishing intensity within this area.

Shipping

There are a number of floating production storage and offloading (FPSO) facilities located in close proximity to the Exmouth operational area such as the Nganhurra FPSO, Ngujima-Yin FPSO and Stybarrow Venture FPSO.

The NWS operational area is also within close proximity the Goodwyn A, North Rankin Complex and Angel Platforms.

While there are no defined shipping lanes in the Exmouth operational area 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 Exmouth, with approximately 550 ships passing through Woodside's area of activities each year (Woodside 2002).

Tourism

Tourism is one of the major industries of the Exmouth operational area region and contributes significantly to the local economy in terms of both income and employment. The main marine nature-based tourist activities are snorkelling and scuba diving, whale shark encounters and whale watching. Most diving takes place relatively close to shore, e.g. Ningaloo Reef, and around the reefs fringing the offshore islands, e.g. Muiron and Serrurier Island. There is no recreational diving in the deep waters off the Exmouth operational area. Whale watching and whale shark encounters take place during the seasonal migration of the humpback whale and whale shark aggregation periods, respectively. These activities generally occur within the Ningaloo Marine Park, approximately 10km from the survey boundary of the Exmouth operational area.

Learmonth Airport is the major airport in the region, servicing both civilian and defence force aircraft. There are also small airstrips in Exmouth and Coral Bay, as well as private airstrips on most pastoral stations in the region.

There is no known tourist activity in the immediate vicinity of the NWS operational areas.

Marine Parks and Reserves

The Exmouth operational area does not impinge on any existing marine parks or nature reserve, however it is located 10km at the closest point to the Ningaloo Coast World Heritage Area and Ningaloo Marine Park (Commonwealth) boundary. Approximate distances of marine parks and reserves are identified **Table 3.1**.

Table 3.1 – Approximate Distances of the Operational Area Boundary to Marine Parks and Reserves

Marine Park / Reserve	Jurisdiction	Distance from Exmouth Operational Area
Ningaloo Coast World Heritage Area	Commonwealth	10km
Ningaloo Marine Park	Commonwealth	10km
Muiron Islands Marine Management Area	State	31.5km
Jurabi Coastal Park	State / Shire	32km
Bundegi Coastal Park	State / Shire	36km
Cape Range National Park	State	40km

There are no identified marine conservation reserves immediately adjacent to the NWS operational area. The closest marine conservation reserves are the Montebello / Barrow Islands Marine Conservation Reserves which are located 99km (at the closest point) from the survey operational area. The inshore habitats and shoreline of the Dampier Archipelago is located 125km south east of the survey operational area with the mainland approximately 135km south east.

4. DESCRIPTION OF ACTIVITY

Woodside will conduct a geotechnical survey for a number of development areas offshore Karratha and Exmouth. The objective of the survey is to collect sea floor and sub-sea floor material and to conduct in-situ testing of soils in real-time using the following techniques (with associated preparation and calibration):

- Gravity Piston Corer - coring is a technique used to bring sediments up from the seafloor in a relatively undisturbed manner. The process utilises a tube which penetrates the ground (2-8 metres) and pulls a core of sediment to the surface. The core has a diameter up to 106 mm. This core is used to study the physical structure, history and nature of the sediments. Coring will be undertaken along the proposed pipeline route and at other locations in order to assist with soil analysis and geophysical interpretation.
- Piezocone Penetration Testing (PCPT) - Seabed penetrometer tests are performed by pushing an instrumented probe, mounted on an 'A' frame, into the soil. Penetrometer tests are used to accurately profile the thickness and type of surface soil layers, for shallow pipeline route investigations and investigations for shallow foundations. The strength and density of these soils assist when determining the suitability of the seabed for pipeline design, installation and for structure foundation concepts. Soil disturbance with these seabed penetrometer tests is limited to the penetration of the probe and the placement of the 'A' frame on the seafloor.
- Environmental Sampling (box coring, water/sediment sampling) - sediment and water sampling may be undertaken using a box corer, water profiler and Niskin bottle at selected locations. Sediment samples utilising a box corer will be taken along proposed pipeline routes and at structure locations. Water

sampling, utilising a Niskin Bottle and water profiler, will be taken at depth, with samples taken from near surface, mid water and near seabed

A survey vessel will be used to deploy the geotechnical equipment at the proposed pipeline routes and structure locations and at locations where geophysical data validation is required.

4.1 Survey Vessel

The geotechnical survey will be undertaken using a single general purpose survey vessel, around 30 – 60m in length. No support vessels are involved in this operation. The vessel will be mobilised from, and operate out of, Dampier. The vessel will have an endurance greater than the length of the planned survey, therefore at sea refuelling is neither necessary nor planned. Crew changes are not planned but if required the vessel will return to Dampier.

The Exmouth and NWS geotechnical survey 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, geotechnical equipment handling, maintenance, and vessel movements.

5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

The environmental risks and potential environmental impacts of the Exmouth and NWS geotechnical survey have been determined on the basis of the outcomes of an environmental risk assessment.

This environmental risk assessment has been undertaken by Woodside to understand and manage the environmental risks associated with the Exmouth and NWS geotechnical survey to ensure that the impacts and risks of the activity are reduced to an acceptable level and are in-line with the ALARP principle (As Low As Reasonably Practicable). ALARP refers to a level of risk that cannot be reduced further without sacrifices that are grossly disproportionate in relation to the benefit gained. This method is consistent with the *AS/ISO 31000-2009 Risk Management Principles and Guidance*.

Woodside's process evaluates and demonstrates two key areas, the acceptability of impacts and risks which meets the requirements of Regulation 11(1)(c) of the Environment Regulations, and the demonstration that the impacts and risks are reduced to ALARP levels which meets the requirements of Regulation 11(1)(b) of the Environment Regulations.

Environmental risk assessment workshops (i.e. ENVIDs) are undertaken to support the environment plan and are attended by personnel with sufficient breadth of knowledge, training and experience to identify and evaluate the impacts and risks associated with the activity.

The key environmental risks for the environmental aspects of the survey and details of control/mitigation measures to be applied to the Exmouth and NWS geotechnical survey are shown in **Appendix A**. These are consistent with Woodside corporate and project-specific objectives, standards and criteria. A summary of these key sources of environmental risks include:

- Use of geotechnical sampling equipment.
- Loss of geotechnical equipment during the survey.
- Light and noise generation from the survey vessel.
- Emissions to atmosphere from the survey vessel and equipment.
- Discharge of ballast water and vessel biological fouling.
- Planned discharge of wastewater and waste to ocean from the survey vessel.
- Unplanned discharge of solid waste, hydrocarbons and chemicals to ocean from the vessel and equipment.
- Interactions with other marine users and commercial fishing activities.

6. MANAGEMENT APPROACH

The Exmouth and NWS geotechnical survey will be managed in compliance with the *Exmouth and North West Shelf Geotechnical Survey Environment Plan* accepted by NOPSEMA under the Environment Regulations,

other relevant environmental 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 survey, during both routine and non-routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

The accepted EP details, for each environmental aspect (identified and assessed during the Environmental Risk Assessment), specific performance objectives and standards, and identifies the range of controls (controls available in **Appendix A** of this Summary) 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 accepted EP identifies the fit for purpose systems, practices and procedures which are in place to direct, review and manage the survey activities so that any environmental risks and impacts are continually being reduced to ALARP and performance objectives and standards are achieved. The accepted EP identifies roles/responsibilities and training/competency requirements for all personnel (Woodside and its contractors) in relation to implementing controls, managing non-compliance, emergency response and meeting monitoring, auditing, and reporting requirements during the activity. The accepted EP further details the types of monitoring and auditing that will be undertaken, the reporting requirements for environmental incidents and reporting on overall compliance of the survey with the EP.

7. CONSULTATION

Consultation and stakeholder engagement activities conducted for the Exmouth and NWS geotechnical survey builds upon the extensive and ongoing engagement with stakeholders undertaken throughout Woodside's long history of working offshore Exmouth and Karratha. Prior to submitting the Exmouth and NWS Geotechnical Survey Environment Plan to NOPSEMA for assessment and acceptance, a number of stakeholders were consulted for this survey based on the potential for impact or their high level of interest in the survey activity.

Consultation did not identify any material issues that would impact the completion of the survey.

Woodside will continue to accept material feedback from stakeholders and will continue to advise potentially affected stakeholders in the event of any material changes to the survey activity.

A copy of the consultation fact sheet is available at <http://www.woodside.com.au/Our-Approach/Pages/Consultation-Activities.aspx>.

8. CONTACT DETAILS

For further information about this survey, please contact the following personnel:

North West Shelf Operational Area

Andrew Decet

Corporate Affairs Adviser

North West Shelf Project

Email: andrew.decet@woodside.com.au

Toll free: 1800 661 233

Exmouth Operational Area

Kirsten Stoney

Corporate Affairs Manager

Australia Oil

Email: kirsten.stoney@woodside.com.au

Toll free: 1800 661 233

9. REFERENCES

Bannister, J.L. (1979-2005). Annual Reports on aerial surveys of Southern Right Whales on the southern Australian coastline. Western Australian Museum, Perth.

Department of Environment, Water, Heritage and the Arts (DEWHA), 2008, Marine Bioregional Planning in the North-west, Available at: <http://www.environment.gov.au/coasts/mbp/north-west/index.html>

Department of Sustainability, Environment, Water, Populations and Communities (SEWPAC), 2012, Protected Matters Search Tool. Available at: <http://www.environment.gov.au/erin/ert/epbc/index.html>

Double MC, Gales N, Jenner KCS and Jenner MN 2010. Satellite tracking of south-bound female humpback whales in the Kimberley region of Western Australia – Final Report. Report produced for Woodside Energy Limited. 30 pp.

Dunlop NJ, Surman, CA and Wooller RD, 1995, Distribution and abundance of Seabirds in the Eastern Indian Ocean: An analysis of Potential Interactions with the offshore Petroleum Industry. Report to APPEA, April 1995, Canberra.

Jenner KCS, Jenner M-NM and McCabe KA, 2001, Geographical and Temporal Movements of Humpback Whales in Western Australian Waters. APPEA Journal 41 (2001): 749-765.

Meekan MG and Radford B 2010. Migration patterns of Whale Sharks: A summary of 15 satellite tag tracks from 2005 to 2008. Report produced for Woodside Energy Ltd. Australian Institute of Marine Science, Perth. 21 pp.

Woodside Energy Limited (Woodside), 2002, WA-271-P Draft Environmental Impact Statement – EPBC Referral 2001/257.

APPENDIX A

SUMMARY OF MAJOR ENVIRONMENTAL HAZARDS AND MEASURES IMPLEMENTED TO CONTROL IMPACTS

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

Controlled Ref No: DRIMS # 8314055

Revision: 0

Native file DRIMS No: 8312043

Page 15 of 22

Uncontrolled when printed. Refer to electronic version for most up to date information.

Environmental Aspect	Source of risk (hazards)	Potential Environmental Impacts	Measures Implemented to Control Impacts
Disturbance to Marine Habitat	Location of survey activities	Impacts to Marine Conservation Reserves	<ul style="list-style-type: none"> - Vessel position tracking data confirm the buffer between the survey areas and the Ningaloo Marine Park (Commonwealth) are maintained. - Minimum 10km distance to sensitive areas maintained during routine operations.
	Unplanned Release of Hydraulic Fluid	Toxic effects to marine biota	<ul style="list-style-type: none"> - Pre-deployment checks of CPT Unit to be undertaken prior to use.
	Geotechnical Sampling (box coring, gravity piston coring)	Physical damage to benthic habitats	<ul style="list-style-type: none"> - There are no identified applicable environmental performance standards in regards to the geotechnical sampling.
	Equipment loss to seabed	Physical damage to benthic habitats	<ul style="list-style-type: none"> - In the event that lost geotechnical equipment is unable to be retrieved during the survey; AMSA/AHO/potentially affected stakeholders will notified in the event lost equipment is unable to be recovered. - Records of equipment lost overboard will be maintained.
Disturbance to Marine Fauna	Vessel Lighting	Alteration to marine fauna behaviour	There are no identified applicable environmental performance standards in regards to the survey vessel lighting for offshore waters. All vessel lighting will be maintained as required to for vessel navigation, vessel safety and safety of deck operations.
	Vessel Noise	Alteration to marine fauna behaviour	Compliance with the National Standards for Vessels (Tier 1) as specified in the Australian National Guidelines for Whale and Dolphin Watching (DEWHA 2005); <ul style="list-style-type: none"> - The survey vessel will not travel within 300m either side of a whale (caution zone) and should operate at no wake speeds within this zone; - The survey vessel is not allowed to approach closer than 100m of a whale (no approach zone). Vessels shall not enter the no approach zone and should not wait in front of the direction of travel of an animal or pod of animals.
			Interaction between the vessel and cetaceans (whales and dolphins) will be consistent with the EPBC Regulations 2000 – Part 8 Division 8.1, Regulation 8.05 Interacting with cetaceans; <ul style="list-style-type: none"> - The survey vessel will not travel greater than 6 knots within 300m of a whale (caution zone) and minimise noise; - The survey vessel shall not approach closer to the cetacean than 50m for a dolphin and/or 100

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

			<p>metres for a whale (with the exception of bow riding);</p> <ul style="list-style-type: none"> - If the cetacean shows signs of being disturbed, immediately withdraw the vessel from the caution zone at a constant speed of less than 6 knots.
			<p>Interactions between the vessel and whale sharks will be consistent with the Whale Shark Code of Conduct (DEC 2012);</p> <ul style="list-style-type: none"> - The survey vessel will not travel greater than 8 knots within 250 m of a whale shark (exclusive contact zone) and the vessel will not approach closer than 30 m of a whale shark.
	Timing of the survey/presence of the survey vessel	Disturbance to listed migratory marine fauna Injury / morality to listed migratory marine fauna	<p>Compliance with the National Standards for Vessels (Tier 1) as specified in the Australian National Guidelines for Whale and Dolphin Watching (DEWHA 2005);</p> <ul style="list-style-type: none"> - The survey vessel will not travel within 300m either side of a whale (caution zone) and should operate at no wake speeds within this zone; - The survey vessel is not allowed to approach closer than 100m of a whale (no approach zone). Vessels shall not enter the no approach zone and should not wait in front of the direction of travel of an animal or pod of animals.
			<p>Interaction between the vessel and cetaceans (whales and dolphins) will be consistent with the EPBC Regulations 2000 – Part 8 Division 8.1, Regulation 8.05 Interacting with cetaceans;</p> <ul style="list-style-type: none"> - The survey vessel will not travel greater than 6 knots within 300m of a whale (caution zone) and minimise noise; - The survey vessel shall not approach closer to the cetacean than 50m for a dolphin and/or 100 metres for a whale (with the exception of bow riding); - If the cetacean shows signs of being disturbed, immediately withdraw the vessel from the caution zone at a constant speed of less than 6 knots.
			<p>Interactions between the vessel and whale sharks will be consistent with the Whale shark Code of Conduct (DEC 2012);</p> <ul style="list-style-type: none"> - The survey vessel will not travel greater than 8 knots within 250 m of a whale shark (exclusive contact zone) and the vessel will not approach closer than 30 m of a whale shark.
			<p>All members of crew will be briefed on environmental requirements and particularly crew responsible for vessel operation and navigation will be aware of marine fauna interaction regulations / guidelines</p>

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

Atmospheric Emissions	Use of vessel and machinery	Reduced localised air quality from atmospheric emissions (BTEX, NO _x , SO _x).	<p>Compliance with Protection of the Sea (Prevention of Pollution from Ships) Act 1983, MARPOL 73/78 Annex VI (Regulations for. the Prevention of Air Pollution from Ships) and Marine Orders – Part 97 (Marine Pollution Prevention – Air Pollution);</p> <ul style="list-style-type: none"> - A valid International Atmospheric Pollution Prevention (IAPP) certificate. - Implementation of a preventative maintenance system to confirm diesel powered equipment is maintained for efficient operation. - Use of low sulphur fuel when it is available.
Invasive Marine Species	Transport/introduction of invasive marine species in vessel ballast water	Introduction and establishment of invasive marine species	<p>AQIS Australian Ballast Water Management Requirements (as defined under the Quarantine Act (1908) Regulation B-4 Ballast Water Exchange (aligned with the International Convention for the Control and Management of Ships' Ballast Water and Sediments);</p> <ul style="list-style-type: none"> - As a minimum, all vessels mobilised from outside of Australia must undertake ballast water exchange > 50 nautical miles(nm) from land and >200m water depth.
	Transport/introduction of invasive marine species on hull, internal niches and in-water equipment	Introduction and establishment of invasive marine species	<p>National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia 2009). Woodside Energy Limited Invasive Marine Species Management Plan (A3000AH4345570);</p> <ul style="list-style-type: none"> - Risk assessment undertaken on the vessel used during this survey, as it plans 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 50m deep at LAT
Solid and Liquid Waste Management	Planned Discharge of bilge water, sewage, putrescible wastes	Reduction in water quality due to nutrient enrichment.	<p>Compliance with MARPOL 73/78 Annex IV: Sewage (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983); Marine Orders - Part 96: Marine Pollution Prevention – Sewage;</p> <ul style="list-style-type: none"> - Vessel to hold current International Sewage Pollution Prevention (ISPP) Certificate; - Sewage treatment system certified under MARPOL MEPC.2 (IV) or MEPC.159 (55); - Discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land; - Discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than 3 nm from the nearest land; - Discharge of sewage will occur at a moderate rate while vessel is proceeding (>4 knots), with no visible floating solids or discolouration of the surrounding water. <p>Compliance with MARPOL 73/78 Annex I: Oil (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983); Marine Orders - Part 91:</p>

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

			<p>Marine Pollution Prevention – Oil, including:</p> <ul style="list-style-type: none"> - Valid International Oil Pollution Prevention (IOPP) certificate; - Bilge water contaminated with hydrocarbons must be contained and disposed of onshore, except if the oil content of the effluent without dilution does not exceed 15 ppm or an IMO approved oil/water separator is used to treat the bilge water; - Bilge water contaminated with chemicals must be contained and disposed of onshore, except if the chemical is demonstrated to have a low toxicity (as determined by the relevant Material Safety Data Sheet (MSDS) and the Woodside Environmental Adviser); - Discharge of treated bilge water (<15 ppm oil) only at a distance of more than 12 nm from land. <p>Compliance with MARPOL 73/78 Annex V: Garbage (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983), Marine Orders - Part 95: Marine Pollution Prevention – Garbage;</p> <ul style="list-style-type: none"> - Current Garbage Management Plan.
	Unplanned loss of waste to marine environment	Toxic effects on marine fauna. / Reduction in water quality./ Physical impacts on marine fauna i.e. from plastics	<p>Compliance with:</p> <ul style="list-style-type: none"> - MARPOL 73/78 Annex III: Packaged Harmful Substances (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983), Marine Orders - Part 94: Marine Pollution Prevention – Packaged Harmful Substances; <ul style="list-style-type: none"> - All solid, liquid and hazardous wastes (other than sewage, grey water and putrescible wastes) will be compacted (if possible) and stored in designated areas and sent ashore for recycling, disposal or treatment; - MARPOL 73/78 Annex V: Garbage (as implemented in Commonwealth waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983), Marine Orders - Part 95: Marine Pollution Prevention – Garbage; <ul style="list-style-type: none"> - No discharge of domestic wastes (i.e. cans, glass, paper or other wastes from living areas) and no maintenance wastes (i.e. paint sweepings, rags, deck sweepings, oil soaks, machinery deposits, will be disposed of overboard) from vessels; - All wastes (other than sewage, bilge water and putrescible waste) will be segregated and stored in appropriate containers in designated areas and sent ashore for recycling, disposal or treatment.
Use of fuel and hazardous	Unplanned loss of hydrocarbons/chemicals to marine	Toxic effects to marine biota	Compliance with MARPOL 73/78 Annex I, III and V (prevention of pollution by oil, harmful substances and garbage);

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

chemicals	environment – Small localised spill (chemicals, hydraulic fluids, deck spill)		<p>Woodside’s Management of Hazardous Substances Procedure (WM1040PF5925420)</p> <ul style="list-style-type: none"> All chemical and hazardous wastes will be appropriately segregated into clearly marked containers prior to onshore disposal, and managed in accordance with the requirement of the material safety data sheet. <p>Shipboard Oil Pollution Emergency Plan.</p>
	Unplanned loss of hydrocarbons to marine environment – breach of vessel tanks (vessel collision)	Toxic effects to sensitive marine areas and marine biota.	<p>Compliance with Section 4.7 Marine Vessel Assurance of the Woodside Marine Operations Operating Standard (WM6070SV7193964);</p> <ul style="list-style-type: none"> All vessels engaged by Woodside are subject to Marine Vessel Assurance requirements to confirm the vessel is equipped with standard maritime safety procedures (radio contact, display of navigational beacons and lights) to meet the mandatory requirements for class. <p>Protection of the Sea (Prevention of Pollution from Ships) Act 1983, Australian Maritime Safety Authority, Marine Orders Part 30: Prevention of collisions, (Issue 8);</p> <ul style="list-style-type: none"> Survey vessels are equipped with navigation aids, radar, vessel GPS tracking and vessel management systems, depth sounders and competent crew maintaining 24 hour radio and radar watch for other vessels; Survey vessel applies standard maritime safety procedures (radio contact, display of navigational beacons and lights). <p>Vessel position tracking data confirm the buffer between the survey areas and the Ningaloo Marine Park (Commonwealth) are maintained;</p> <ul style="list-style-type: none"> Minimum 10km distance to sensitive areas maintained during routine operations. <p>Shipboard Oil Pollution Emergency Plan and the Woodside’s Corporate Oil Spill Response Plan (W0000AV0003.0001);</p> <ul style="list-style-type: none"> Current Shipboard Oil Pollution Emergency Plan and Woodside’s Corporate Oil Spill Response Plan (W0000AV0003.0001) on board vessel. <p>Consultation Factsheet sent to relevant stakeholders (eg AMSA and Australian Hydrographic Office) prior to mobilisation;</p> <ul style="list-style-type: none"> Survey fact sheet distributed to relevant stakeholders prior to the survey.
Physical Presence	Physical presence of survey vessel	Interference with and displacement of	<p>Consultation Factsheet sent to relevant stakeholders prior to mobilisation;</p> <ul style="list-style-type: none"> Survey fact sheet distributed to relevant stakeholders prior to the survey.

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

	(fishing)	commercial fishing operations.	<p>Australian Maritime Safety Authority, Marine Orders Part 30: (Prevention of collisions, Issue 8) Marine Orders - Part 21: Safety of navigation and emergency procedures, Issue 7;</p> <ul style="list-style-type: none"> - Activities reported to AMSA and Australian Hydrographic Office within 2 weeks of mobilisation. <p>Protection of the Sea (Prevention of Pollution from Ships) Act 1983, Australian Maritime Safety Authority, Marine Orders Part 30: Prevention of collisions, (Issue 8);</p> <ul style="list-style-type: none"> - Survey vessels are equipped with navigation aids, radar, vessel GPS tracking and vessel management systems, depth sounders and competent crew maintaining 24 hour radio and radar watch for other vessels; - Survey vessel applies standard maritime safety procedures (radio contact, display of navigational beacons and lights). <p>Compliance with Section 4.7 Marine Vessel Assurance of the Woodside Marine Operations Operating Standard (WM6070SV7193964);</p> <ul style="list-style-type: none"> - All vessels engaged by Woodside are subject to Marine Vessel Assurance requirements to confirm the vessel is equipped with standard maritime safety procedures (radio contact, display of navigational beacons and lights) to meet the mandatory requirements for class.
	Physical presence of survey vessel (shipping)	Interference with other marine users (i.e. shipping) (excluding vessel collision).	<p>If entry to an exclusion zone around offshore facility is required, authorisation obtained under Section 12 of the Woodside Marine Operating Procedure MSP 0072;</p> <ul style="list-style-type: none"> - Operations Impact Notification (OIN) will be required to operate within a facility 500m exclusion zone. The OIN process involves raising a Woodside work permit (iSSOW) which inturn will require advanced notice and SIMOPS planning. <p>Consultation Factsheet sent to relevant stakeholders prior to mobilisation;</p> <ul style="list-style-type: none"> - Survey fact sheet distributed to relevant stakeholders prior to the survey. <p>Australian Maritime Safety Authority, Marine Orders Part 30: (Prevention of collisions, Issue 8). Marine Orders - Part 21: Safety of navigation and emergency procedures, Issue 7 Protection of the Sea (Prevention of Pollution from Ships) Act 1983 MARPOL 73/78 Annex I: Oil</p> <ul style="list-style-type: none"> - Activities reported to AMSA and Australian Hydrographic Office who will issue maritime safety information notifications, warnings, and if required, a notice to mariners. <p>Compliance with Section 4.7 Marine Vessel Assurance of the Woodside Marine Operations</p>

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.

			<p>Operating Standard (WM6070SV7193964);</p> <ul style="list-style-type: none">- All vessels engaged by Woodside are subject to Marine Vessel Assurance requirements to confirm the vessel is equipped with standard maritime safety procedures (radio contact, display of navigational beacons and lights) to meet the mandatory requirements for class.
--	--	--	---

This document is protected by copyright. No part of this document may be reproduced, adapted, transmitted, or stored in any form by any process (electronic or otherwise) without the specific written consent of Woodside. All rights are reserved.