PYRENEES 4D
MARINE SEISMIC MONITOR SURVEY
HCA12A
ENVIRONMENT PLAN SUMMARY

Document No: APU-000280

Contents

1 INTRODUCTION

The Pyrenees Operational Area has been active since early 2009 and includes production permits WA-12-R and WA-155-P. An offshore Floating Production, Storage and Offloading (FPSO) facility is located within the operational area and produces from ten well centres with a total of 18 wells, including 14 production wells, one gas injector and three water injectors.

BHP Billiton Petroleum (BHPBP) plans to undertake a four dimensional (4D) marine seismic monitor survey (MSMS), in and around the Pyrenees Operational Area in order to detect changes in seismic characteristics of the reservoir. The survey area is located within Production Permits WA-42-L, WA-43-L and WA-28-L. The project specific Environment Plan (EP) has been accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) and ensures that all operations are planned and conducted in line with BHPBP's environmental standards and comply with statutory requirements.

The EP will serve as a practicable environmental management tool to be used throughout the survey by operators to implement targeted environmental control measures.

This summary EP contains the findings and conclusions of the environmental impact assessment undertaken for the proposed seismic survey. This process ensures any potential environmental impacts associated with the activity, during both routine and non-routine (abnormal) operations, have been identified and appropriately assessed. Relevant preventative and mitigation measures have been developed and implemented to ensure any adverse impacts are eliminated where possible or managed to be as low as reasonably possible.

2 LOCATION OF THE ACTIVITY

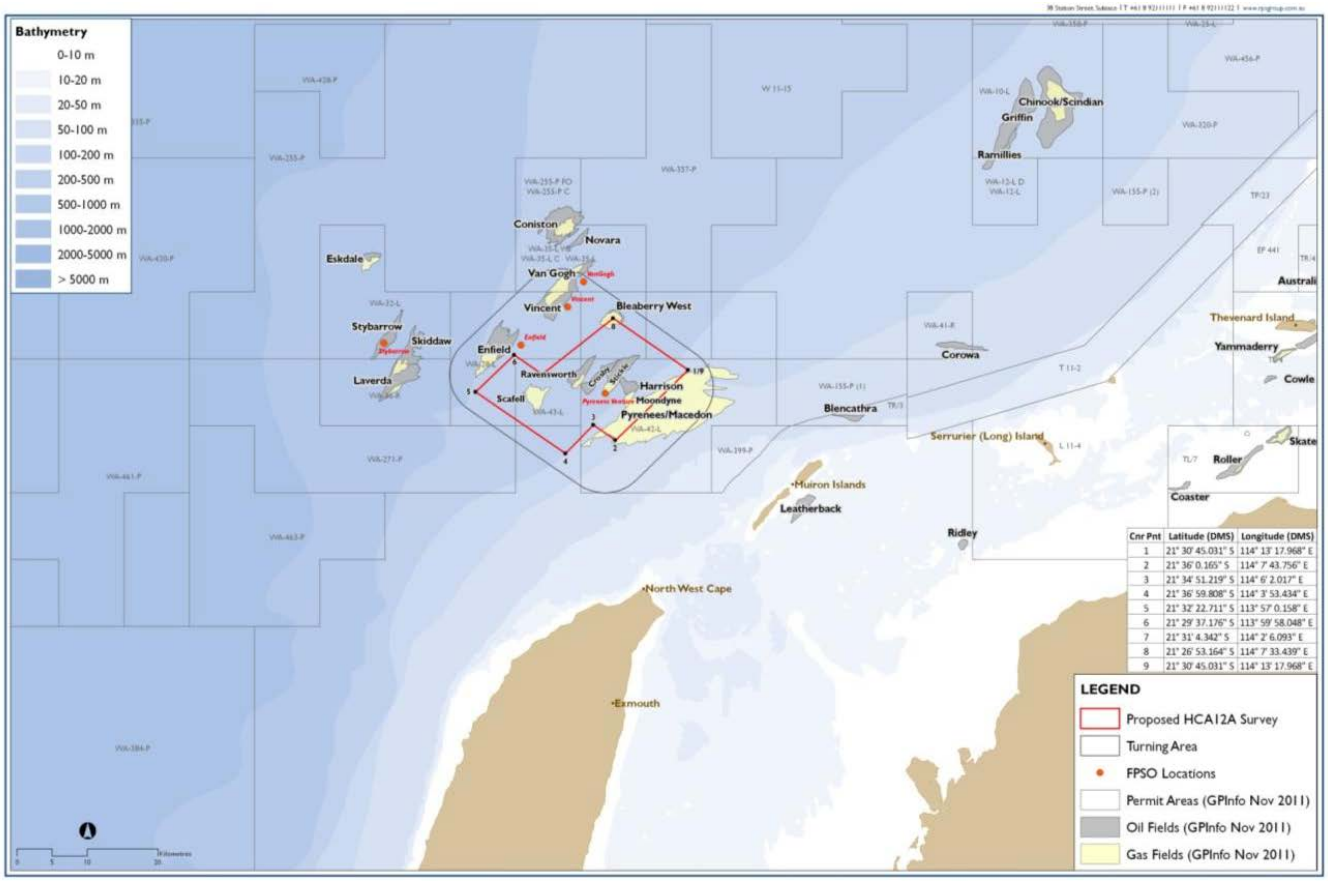
2.1 Project Location

The survey will be conducted entirely in Commonwealth waters. The coordinates of the survey area are provided in the table below. The survey area (including the 5km vessel line turns) is located 21km northwest of North West Cape and at least five km from the boundary of the Ningaloo Coast World Heritage Area at its closest point. The water depths in the survey area, including vessel turning corridors, range from >50–500m.

Vessels participating in the Pyrenees 4D MSMS survey are prohibited from entering the Ningaloo Coast World Heritage Area (Commonwealth Waters) and the Muiron Islands Marine Management Area.

Coordinates of the survey area (excluding turning corridor)

Label	Latitude (DMS)	Longitude (DMS)
1	21° 30' 45.031" S	114° 13' 17.968" E
2	21° 36' 0.165" S	114° 7' 43.756" E
3	21° 34' 51.219" S	114° 6' 2.017" E
4	21° 36' 59.808" S	114° 3' 53.434" E
5	21° 32' 22.711" S	113° 57' 0.158" E
6	21° 29' 37.176" S	113° 59' 58.048" E
7	21° 31' 4.342" S	114° 2' 6.093" E
8	21° 26' 53.164" S	114° 7' 33.439" E



3 DESCRIPTION OF THE ACTION

BHPBP proposes to conduct a 4D Marine Seismic Monitor Survey (MSMS), HCA12A, off North West Cape in Western Australia. The seismic data acquired will cover an area of approximately 250 km^2 within Production Permits WA-42-L, WA-43-L and WA-28-L. The survey involves the acquisition of 119 km^2 of data as an extension to the 4D baseline survey that was undertaken in January and February 2006. Approximately 131 km^2 of additional data will be acquired for exploration purposes.

A 4D MSMS involves repeating the same three-dimensional (3D) marine seismic survey over time and analysing the differences between successive surveys in order to detect changes in seismic characteristics of the reservoir. The 4D component of the survey will be conducted as an extension to the baseline acquisition of seismic data to obtain seismic characteristics of the oil/gas reservoir during early production (field start-up was in November 2007).

The survey will be conducted in accordance with BHPBP's operating requirements, including the Health Safety, Environment and Community (HSEC) Management System Framework.

The geophysical contractor will acquire seismic data by traversing the survey area in a series of pre-determined lines. Two seismic vessels will be utilized during the survey. The primary seismic vessel will tow a dual seismic array, with an operating pressure of approximately 2,000 psi and a volume of approximately 3,090 cubic inches. The source will produce sound pulses within a few metres of the source in the order of 210 dB re 1µPa-m at frequencies up to approximately 240 Hz. The array will be towed behind the survey vessel at a depth of 5 m. A second vessel, towing dual sources with similar characteristics, will be utilized for a period of the survey to acquire data in close proximity to the Pyrenees Venture FPSO. A single noise source will be generated from one of the two vessels at any one time.

The primary survey vessel will also tow 12 seismic (solid) streamers, each with a maximum length of 3,000m and spaced approximately 50m apart. Streamers will be towed behind the survey vessel at a depth of 15m. The seismic streamers are fitted with pressure-activated, self-inflating buoys designed to bring the equipment to the surface if accidentally lost during the survey.

One support vessel will accompany the seismic vessel(s) throughout the duration of the project. The support vessel will provide logistical, safety and gear management support to the survey vessels along with the ability to provide emergency assistance such as emergency towing. All vessels will operate out of the Port of Dampier during the acquisition phase of the survey.

3.1 Timeframe

The survey is scheduled to commence in February 2013, pending vessel availability with an approximate duration of 30 – 40 days and be completed no later than May 2013.

Survey Parameters – Primary Survey Vessel

Parameter	Survey
Survey area	250 km^2 total
Port	Dampier
Number of streamers	12
Streamer length	3,000 m
Streamer separation	50 m
Compressed Air Source - total volume	Dual source - 50,636 cm^3 (3,090 cubic inches)
Operating pressure	2,000 psi
Streamer depth	15 m
Compressed Air Source depth	5 m
Shot point interval	25 m
Peak source sound pulse	210 dB re 1 µPa-m
Frequency range	10-240 Hz

Survey Parameters – Secondary Source Vessel

Parameter	Survey
Compressed Air Source - total volume	Dual source (approximately 50,636 cm^3 (3,090 cubic inches))
Operating pressure	2,000 psi
Compressed Air Source depth	5 m
Shot point interval	25 m
Peak source sound pulse	Approximately 210 dB re 1 µPa-m
Frequency range	10-240 Hz

4 DESCRIPTION OF RECEIVING ENVIRONMENT

4.1 Natural Environment

The survey area is in the Central Western Shelf Transition Zone (DEWHA, 2008a), which is a zone of overlap between tropical and temperate regions, with transition between tropical and temperate marine species.

Located entirely on the continental shelf, this bioregion is in close proximity to the shelf break, but is narrow enough to allow connections with the deeper waters beyond the slope. The inshore currents as well as the seasonal Ningaloo Current (September to April) allow for enhanced biological activity.

The region's climate is characterised as arid and sub-tropical. Tropical cyclones occur in the region, mainly from January to March.

4.2 Biological Environment

A range of habitat types including extensive coral reefs, mangroves and sandy, muddy and rocky intertidal areas are associated with mainland and island coasts. Extending for approximately 260 km, the Ningaloo Reef is a prominent biological feature in this bioregion known for its high biodiversity, comprising numerous species of coral, fish, invertebrates, turtles, and large fauna such as dolphins, dugongs, sharks and sea snakes (DEWHA, 2008a). Exmouth Gulf (about 60 km from the survey area) supports extensive mangrove communities, particularly on its eastern shore.

The EPBC Act Protected Matters database indicates that 14 threatened species and 18 migratory species may occur within or travel through the survey area (see table below). There are no threatened ecological communities within or in close proximity to the survey area.

EPBC Act Listed Threatened and Migratory Fauna that May Occur in the Survey Areas

Fauna Group	Species	Connon Name	Commonwealth Status
Cetaceans	*Balaenoptera bonaerensis*	Antarctic minke whale	Migratory
	Balaenoptera edeni	Bryde's whale	Migratory
	Balaenoptera musculus	Blue whale	Endangered, Migratory
	Eubalaena australis	Southern right whale	Endangered, Migratory
	Megaptera novaeangliae	Humpback whale	Vulnerable, Migratory
	Orcinus orca	Killer whale	Migratory
	Physeter macrocephalus	Sperm whale	Migratory
	Tursiops aduncus	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	Migratory
Reptiles	*Caretta caretta*	Loggerhead turtle	Endangered, Migratory
	Chelonia mydas	Green turtle	Vulnerable, Migratory
	Eretmochelys imbricata	Hawksbill turtle	Vulnerable, Migratory
	Dermochelys coriacea	Leatherback turtle	Vulnerable, Migratory
	Natator depressus	Flatback turtle	Vulnerable, Migratory
	Aipysurus apraefrontalis	Short-nosed seasnake	Critically Endangered

Sharks	*Carcharodon carcharias*	Great white shark	Vulnerable, Migratory
	Rhincodon typus	Whale shark	Vulnerable, Migratory
	Carcharias taurus	Grey nurse shark	Vulnerable
	Isurus paucus	Longfin mako shark	Migratory
	Isurus oxyrinchus	Shortfin mako shark	Migratory
Birds	*Macronectes giganteus*	Southern giant-petrel	Endangered, Migratory
	Pterodroma mollis	Soft-plumaged petrel	Vulnerable

4.2.1 Biodiversity

The main centre of biodiversity in the region is the Ningaloo Reef, with an extremely diverse and abundant array of marine habitats and communities. One of the underlying factors behind its high biodiversity is the overlap of tropical and temperate biogeographical zones.

4.2.2 Cetaceans

Cetaceans (whales and dolphins) are commonly observed in the region, especially in Exmouth Gulf. Humpback whales (*Megaptera novaeangliae*), pygmy blue whales (*Balaenoptera musculus brevicauda*), southern right whales (*Eubalaena australis*) and Antarctic minke whales (*B. acutorostrata*) migrate seasonally through the region in low to high numbers. Other species, including Bryde's whales (*B. edeni*), killer whales (*Orcinus orca*), sperm whales (*Physeter macrocephalus*) and spotted bottlenose dolphins (*Tursiops aduncus*) are thought to be present throughout the year in low numbers or to transit occasionally through the region. Spotted bottlenose dolphins are relatively abundant throughout the year, with large pods (more than 20 individuals) sometimes observed. Other common cetacean species also likely to occur in the survey area are the bottlenose dolphin (*T. truncatus*), common dolphin (*Delphinus delphis*), long-snouted spinner dolphin (*Stenella longirostris*) and the Indo-Pacific humpbacked dolphin (*Sousa chinensis*) (LDM, 2000).

Balanoptera Musculus is the True Blue Whale and there are several sub species of blue whales including the pygmy blue whale (*Balaenoptera musculus brevicauda* and the Antarctic blue whale (*Balaenoptera musculus intermedia*). These whales are listed as a threatened species by the International Union for Conservation of Nature.

Of particular relevance to the WA coast is the Pygmy blue whale (*Balaenoptera musculus brevicauda*) which is known to reside in the Indian Ocean, Southern Ocean and eastern Pacific Ocean (Branch *et al*., 2007). Migratory patterns of these whales are reasonably understood with studies revealing Blue Whales passing Exmouth in the northern migration in April through to August and southern migration from October to late December (McCauley and Jenner 2010).

Humpback whales migrate seasonally from polar feeding grounds to tropical breeding/calving grounds in every ocean throughout the world (Jenner *et al*., 2001). In the region from North West Cape to Port Hedland, the first northbound humpback whales are often seen in late July each year, while the last of the northbound whales have been observed as late as August (Jenner *et al*., 2001). During the northern migration, the majority of pods are observed within water depths less than 500 m. The survey area is located in water depths of over 50 m to 500 m and will be completed before the northerly humpback whale migration reaches the Exmouth region.

4.2.3 Reptiles

There are five species of marine turtle known to occur in the region:

- flatback turtle (*Natator depressus*);
- green turtle (*Chelonia mydas*);
- hawksbill turtle (*Eretmochelys imbricata*);
- leatherback turtle (*Dermochelys coriacea*); and
- loggerhead turtle (*Caretta caretta*).

Green turtles are found in tropical and subtropical waters throughout the world and are the most abundant marine turtle species in northern Western Australian waters. They are known to nest in the Exmouth region between October and March, with peak nesting in December to January (EPA, 2010).

Leatherback turtles are found in tropical, subtropical and temperate waters throughout the world. Leatherback turtles feed in pelagic and coastal waters from tropical to temperate and boreal waters. They can be found throughout the water column, from the surface layer to depths of more than 200 m (DSEWPaC, 2011h).

Hawksbill turtles have a widespread distribution in tropical, subtropical and temperate waters. The species feed mainly on benthic habitats which include coral and rocky reefs. Hawksbill turtles nest from August to December in Western Australia, with a peak between October and November (EPA, 2010).

Flatback turtles are found in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya. All recorded nesting beaches are in Australia (Limpus et al., 1989). Regionally important rookeries are located at Cape Thouin (430 km away), the eastern beaches of Barrow Island (50 km away), Lacepede Islands (980 km away), Dampier Archipelago (270 km away), Port Headland (470 km away) and the Lowendal and Montebello Islands (approximately 170 and 180 km away, respectively) (DSEWPaC, 2011j). Flatback turtle nesting in Western Australia occurs from November to March, with a peak from December to January (EPA, 2010).

Loggerhead turtles have a more temperate distribution than green, hawksbill and flatback turtles and are found throughout tropical, subtropical and temperate waters, preferring waters of coral and rocky reefs, seagrass beds and muddy bays (DSEWPaC, 2011k). Nesting occurs from Shark Bay to North West Cape in Western Australia, with major rookeries at Dirk Hartog Island (approximately 470 km away), the Muiron Islands (approximately 20 km away) and the beaches of North West Cape (22 km away). Nesting occurs between November and March, with a peak from December to February (EPA, 2010).

The short-nosed sea snake is a critically endangered species that is endemic to Western Australia (DSEWPaC, 2011l). This species has been identified in Exmouth Gulf with the primary habitat for this species includes reef flats and shallow waters along the edges of reefs (about 10 m deep).

4.2.4 Fish

Approximately 1,400 species of finfish are known to occur in the region with the greater proportion occurring in shallow coastal waters. Reef fish (e.g. damselfish, parrotfish, wrasse and scorpion fish) are mainly associated with coral reefs, but also occur on broken ground around islands and offshore shoals. A number of reef fish species likely to be present in the survey area are targeted by commercial or recreational fisheries (e.g. bald-chin groper, North West snapper, red emperor, seabream, etc.). Pelagic fish also occur in the deeper offshore waters outside of the Ningaloo Reef.

Whale sharks (*Rhincodon typus*) are seasonally present at Ningaloo Reef and nearby waters, between March and July each year to feed. Data from tagged whale sharks suggests that they migrate north after leaving Ningaloo (Meekan *et al, 2006*). Long-term movement patterns of six tagged whale sharks documented, travelled northeast into the Indian Ocean after departing Ningaloo Reef. Further tagging of Whale sharks in 2006 and 2007 also demonstrated similar northerly movements after feeding. Existing available data, illustrates that Whale sharks are only present in the Ningaloo region from March to July and depart soon after.

The great white shark (*Carcharodon carcharias*) is widely distributed throughout temperate and sub-tropical regions throughout the southern hemispheres, extending from the southern coastline of Australia up to the North West Shelf (DSEWPaC, 2011m).

Grey nurse sharks (*Carcharias taurus*) have a broad inshore distribution, primarily in subtropical to cool temperate waters around the main continental landmasses. In Western Australia, grey nurse sharks have been regularly reported from the southern waters and up to Shark Bay.

The longfin mako shark (*Isurus paucus*) is a widely-distributed but rarely-encountered, oceanic tropical shark species. This species is found in Australian waters, north of Geraldton, Western Australia, around the northern coast of the continent and to at least Port Stephens, New South Wales (Last and Stephens, 2009).

The shortfin mako shark (*I. oxyrinchus*) is a pelagic species with a circumglobal, wide-ranging oceanic distribution in tropical and temperate seas (Mollet *et al*., 2000).

4.2.5 Birds

The southern giant-petrel (*Macronectes giganteus*) is the largest petrel species and documented to be seldom seen in Australia (Pizzey and Knight, 2010). It is listed as Endangered, Marine and Migratory under the EPBC Act, and is included in the listing of species under the Bonn Convention. In summer, it occurs predominantly in sub-Antarctic to Antarctic waters, dispersing in a circumpolar fashion during the cold winter months to extend north towards the Tropic of Capricorn, and sometimes beyond.

The soft-plumaged petrel (*Pterodroma mollis*) is a regularly common species to Western Australia, with known breeding areas off southern Tasmania, where sightings have been documented between September and April (DSEWPaC, 2011o).

A broad variety of seabirds known to occur in the region may also breed in the region. One of the most common species is the wedge-tailed shearwater, which breeds mainly on offshore islands (including the Muiron Islands and Serrurier Island) from October to May.

4.3 Socio-Economic Environment

There are several offshore petroleum developments (Enfield, Vincent, Van Gogh, Harrison and Pyrenees/Macedon) in and around the proposed activity. Other anthropogenic activities occurring in the area include commercial and recreational fishing and shipping activities.

The nearest town to the survey area is Exmouth. The Shire of Exmouth has a resident population of approximately 2,207 people (Census 2011), though there are large and short-term fluctuations in population due to the high number of seasonal tourists. The main employment is public administration and safety, accommodation and food services and construction (Census, 2011).

4.3.1 Parks and Reserves

The survey is within an area which is a minimum of 15 km northwest from the Muiron Islands Marine Management Area and minimum of five km from the northern boundary of the Ningaloo Coast World Heritage Area (Commonwealth Waters). The Ningaloo Marine Park was established in 1987 and stretches 300 km from the North West Cape to Red Bluff, and encompasses the state waters covering the Ningaloo Reef. The Ningaloo Marine Park is part of the Ningaloo Coast World Heritage Site.

The Muiron Islands Marine Management Area was established in 2004 and covers approximately 28,000 hectares. The area was designated to protect the waters surrounding South Muiron Island, North Muiron Island and Sunday Island.

4.3.2 Fisheries

Commercial Fisheries

State-managed fisheries do not overlap with the survey area (DoF, 2011). There are three Commonwealth commercial fisheries operating in the survey area, including:

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

Recreational Fisheries

Recreational fishing occurs year-round, with peak activity during the cooler winter months. Much of the activity is confined to coastal waters and the nearby islands. Offshore fishing targets pelagic species (such as mackerel, trevally and tuna) using trolling. Game fishing is also popular, with marlin, sailfish, Spanish mackerel trevally and tuna being the most popular targets.

4.3.3 Petroleum Industry Activities

Oil and gas production in the vicinity is in the main carried out in Commonwealth waters using FPSO vessels connected to subsea wells via flexible flow lines, and crude oil unloaded regularly by tankers. The seismic survey will be conducted primarily around the Pyrenees FPSO however the survey extent including the

turning area broaches other oil and gas operations including the Enfield, Vincent and Van Gogh developments.

4.3.4 Shipping

Approximately 1,200 ships pass through the region each year (Woodside, 2002; BHPBP, 2004), with most of the ships running north-south heading up and down the Western Australian coast (approximately 50–60 km offshore).

4.4 Cultural Environment

4.4.1 Shipwreck and Heritage Sites

The Western Australian Maritime Museum database identifies five shipwrecks in the general area off North West Cape. There are no historic shipwrecks (as per Historic Shipwreck Act 1976) recorded within the survey area. However, there is one significant shipwreck outside the north-east boundary of the survey area (Lady Ann, a drilling rig tender vessel), in addition to 26 shipwrecks recorded off Ningaloo Reef, 28 wrecks in Exmouth Gulf and eight off the coast near Onslow (Department of Maritime Archaeology, 2008).

The Department of Indigenous Affairs (DIA) Aboriginal Heritage Sites Inquiry System did not identify any registered aboriginal sites or heritage places within the survey area (DIA, 2011).

5 MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Risk analysis has been undertaken for all environmental aspects of the survey, consistent with the procedures outlined in the Australian and New Zealand Standards AS/NZS ISO 31000:2009 (Risk Management – Principles and Guidelines) and HB 203:2012 (Managing environment-related risk). These aspects, potential impacts and preventative and mitigative controls are indicated below.

RISK ID	RISK ISSUE	RISK EVENT	POTENTIAL IMPACTS	CONTROLS
1	Seismic acoustic source operations	Acoustic disturbance to marine life from seismic operations	Physiological damage to sensitive and listed threatened or migratory marine fauna from seismic pulses. Disruption to behaviour patterns of sensitive listed marine fauna.	• Survey will not be undertaken in peak whale abundance periods when whales are breeding calving or resting. • Two Marine Fauna Observers (MFOs) will be engaged and located on the primary survey source vessel to undertake Marine Fauna Observations • One Marine Fauna Observer (MFOs) will be engaged and located on the support vessel to undertake Marine Fauna Observations • During daylight hours, visual observations for the presence of whales will be undertaken by a suitably trained crew member for at least 30 minutes before the commencement of the Soft Start Procedure • Soft Start Procedures will be used each time the acoustic sources are initiated, gradually increasing power over a 30-minute period. • Visual observations by MFOs or trained crew will be maintained continuously during daylight hours during seismic acquisition • The acoustic source will be powered down to the lowest possible setting if a whale is sighted within or is about to enter the 2km low power zone of the air gun array and completely shut down if sighted or is about to enter the 500m shut-down zone. • Power down seismic source to lowest practicable settings on line turns
2	Physical Presence	• Vessel collision with marine fauna • Entanglement of marine fauna in streamer	Injury or death of an individual cetacean or turtle species.	• Seismic streamer tail buoys will be fitted with turtle deflecting devices. • No survey activity within the Ningaloo Coast World Heritage Area and Muiron Marine Management Area. Depth activated floatation devices will be located on seismic equipment to assist with emergency recovery.
		Anchoring	Damage to benthic primary producer habitat or habitats of conservation significance.	• No survey activity within the Ningaloo Coast World Heritage Area and Muiron Marine Management Area for the duration of the survey. • No anchoring will occur during survey unless required in an emergency. • Storm avoidance procedures will be developed and implemented to ensure that vessels depart survey area and transit to a safe anchorage or location. • Nautical/navigation charts will be available for reference prior to anchoring operations.
		Interactions with other users of the marine environment (disruption of commercial and recreational fishing, shipping, recreational vessels and oil and gas facilities).	• Reduced access to fishing grounds. • Displacement of targeted fish species away from fishing grounds. • Deviation from normal navigation	• Liaison with commercial and recreational fisheries in the area will be conducted prior to survey mobilisation. • A schedule of the survey operations and vessel location will be made available to relevant stakeholders when known. • Issue of Notice to Mariners with information regarding survey. • Development and implementation of a Simultaneous Operations (SIMOPs) Plan prior to survey mobilization.

		routes.	
	Vessel to Vessel Collision	Adverse effects on marine life due to reduction of water quality (e.g. oil or chemical loss) or debris resulting from collision.	• Liaison with relevant stakeholders (authorities, petroleum operators, commercial and recreational fisheries, etc) will be conducted prior to survey mobilisation. • A schedule of the survey operations and vessel location will be made available to all identified stakeholders through the distribution of an Environment Plan Fact Sheet prior to survey mobilisation. • A Simultaneous Operations (SIMOPs) Plan will be developed and distributed to appropriate operational stakeholders prior to the start of the survey. • Offshore Vessel Inspection Database (OVID) Inspection of marine and navigation systems - All vessels involved with the Pyrenees 4D Marine Seismic Monitor Survey are required to have a current OVID audits reports issued prior to survey mobilisation. - All vessel audit actions identified in the OVID will be entered into and maintained in the Pyrenees 4D Action Tracker Database. - All High Priority actions from OVID are closed prior to accepting the vessel for mobilization. • HSE Management System Audit will be completed for the seismic vessel contractor to assess level of compliance with their own Management System, the various BHPBP HSEC requirements and Geophysical Operations Management System. • Safety Critical Elements Audit will be completed for all survey vessels prior to mobilization and include checks on planned maintenance system as outlined in the Safety Critical Element Marine Audit Check Sheet • Marine Containment Audit (or equivalent) will be completed for all survey vessels prior to mobilization and includes the following checks: - SOPEP - Availability, reviews; - Transfer Operations - Protocols, checklists, procedures, breakaway fittings; - Training – Manuals, drills; - Equipment – Spill kits, spill containment; - Equipment (Transfer System Components) - Certificates, maintenance; and - Emergency Response/PPE – Procedures, Hazardous Material Register, MSDS, PPE. Emergency Response Audit will be completed for all survey vessels prior to mobilization and include completion of the Emergency Response Audit Check Sheet which ensures that vessel emergency response procedures, plans, training, drills and equipment meet the requirements of the Pyrenees 4D Emergency Response Plan. • Issue of Notice to Mariners with information regarding survey. • Functional navigational lighting in place for all vessels involved in the survey. • Radio communications and sophisticated navigation aids • Support vessel will be required to accompany the seismic vessels at all times during acquisition phase of the survey to communicate with and direct 3rd party vessels protection of

				the seismic vessels and towed equipment.
		Loss of streamer	Disruption to other users of the marine environment.	• Storm avoidance procedures will be developed and implemented to ensure that vessels depart survey area and transit to a safe anchorage or location. • Depth activated floatation devices will be located on seismic equipment to assist with recovery. • Tail buoys of streamer sections will be fitted with radar reflectors and navigation aids to assist in warning other vessels of their location and to assist in location and recovery.
3	Storage and transfer of hydrocarbons.	Accidental hydrocarbon (diesel/Isopar-M streamer fluid) leak or spill to the marine environment via fuel transfer, loss of containment (Refer to section 7).	• Acute/chronic toxic effect on marine organisms from hydrocarbon loss. • Incorrect disposal of used absorbent material leading to adverse effects on marine life due to reduction of water quality or entanglement / ingestion.	• OVID Inspection of marine and navigation systems - All vessels involved with the Pyrenees 4D Marine Seismic Monitor Survey without current OVID audits will be audited and audit reports issued prior to survey mobilisation. - All vessel audit actions identified in the OVID will be entered into and maintained in the Pyrenees 4D Action Tracker Database. - All High Priority actions from OVID are closed prior to accepting the vessel for mobilization. • HSE Management System Audit will be completed for the seismic vessel contractor to assess level of compliance with their own Management System, the various BHPBP HSEC requirements and Geophysical Operations Management System. • Safety Critical Elements Audit will be completed for all survey vessels prior to mobilization and include checks on planned maintenance system as outlined in the Safety Critical Element Marine Audit Check Sheet • Marine Containment Audit (or equivalent) will be completed for all survey vessels prior to mobilization and includes the following checks: - SOPEP - Availability, reviews; - Transfer Operations - Protocols, checklists, procedures, breakaway fittings; - Training – Manuals, drills; - Equipment – Spill kits, spill containment; - Equipment (Transfer System Components) - Certificates, maintenance; and - Emergency Response/PPE – Procedures, Hazardous Material Register, MSDS, PPE. Emergency Response Audit will be completed for all survey vessels prior to mobilization and include completion of the Emergency Response Audit Check Sheet which ensures that vessel emergency response procedures, plans, training, drills and equipment meet the requirements of the Pyrenees 4D Emergency Response Plan. • Vessels will refuel away from survey area and at a safe distance (Outside of facility safety zone) from existing oil & gas facilities. • No refueling within 12 nautical miles of the boundaries of the Ningaloo Coast World Heritage Area and Muiron Marine Management Area • Dry break couplings to be used for fuel transfers • All offshore fuel transfers will be conducted under a Permit to Work process • Hazard Identification workshop (HAZID) will be conducted before any at sea refueling with results entered into project risk

				register • All Vessels ≥400GT will maintain Shipboard Oil Pollution Plan (SOPEP) • Project specific Oil Spill Contingency Plan (OSCP) will be developed and implemented which identifies oil spill strategies, resources and contact information • A site based hazardous material register, which includes MSDS's will be located on board each vessel. • All hazardous materials (including hydrocarbons) will be kept in areas which can safely contain spills. • Solid or Gel filled streamers will be used for the survey
4	Storage and transfer of chemicals.	Accidental chemical leak or discharges to the marine environment: • Leaks from storage and equipment. • Transfer of chemicals between vessels (e.g. dropped loads). • Lifting of bulk containers with chemicals from support vessel to seismic vessel. • Incorrect disposal of chemicals.	Potential impact on water quality, affecting local marine fauna and flora.	• OVID Inspection of marine and navigation systems - All vessels involved with the Pyrenees 4D Marine Seismic Monitor Survey without current OVID audits will be audited and audit reports issued prior to survey mobilisation. - All vessel audit actions identified in the OVID will be entered into and maintained in the Pyrenees 4D Action Tracker Database. - All High Priority actions from OVID are closed prior to accepting the vessel for mobilization. • HSE Management System Audit will be completed for the seismic vessel contractor to assess level of compliance with their own Management System, the various BHPBPHSEC requirements and Geophysical Operations Management System. • Safety Critical Elements Audit will be completed for all survey vessels prior to mobilization and include checks on planned maintenance system as outlined in the Safety Critical Element Marine Audit Check Sheet • Marine Containment Audit (or equivalent) will be completed for all survey vessels prior to mobilization and includes the following checks: - SOPEP - Availability, reviews; - Transfer Operations - Protocols, checklists, procedures, breakaway fittings; - Training – Manuals, drills; - Equipment – Spill kits, spill containment; - Equipment (Transfer System Components) - Certificates, maintenance; and - Emergency Response/PPE – Procedures, Hazardous Material Register, MSDS, PPE. Emergency Response Audit will be completed for all survey vessels prior to mobilization and include completion of the Emergency Response Audit Check Sheet which ensures that vessel emergency response procedures, plans, training, drills and equipment meet the requirements of the Pyrenees 4D Emergency Response Plan. • All hazardous materials (including chemicals) will be kept in areas which can safely contain spills. • All Vessels ≥400GT will maintain a Shipboard Oil Pollution Plan (SOPEP) • PPE and absorbents will be located near the spill receiving points. • A site based hazardous material register, which includes

				MSDS's will be located on board each vessel. • No offshore transfer of hazardous chemicals. • Solid or Gel filled streamers will be used for the survey
5	Routine wastes	Discharge of putrescibles (food) wastes to the marine environment.	Adverse effects on marine life due to reduction of water quality (e.g. nutrient enrichment).	• Putrescible wastes are to be managed via the Vessel Waste Management Plan. • Putrescibles will be macerated to <25 mm and discharged >3 nautical miles from the nearest land. • Putrescibles not macerated are to be discharged >12 nautical miles from the nearest land. • Garbage record book to include ground food waste discharged overboard.
		Discharge of sewage and grey water to the marine environment.	Adverse effects on marine life due to reduction of water quality (e.g. nutrient enrichment).	• Vessel Waste Management Plans include disposal of sewage. • Commutated and disinfected sewage will be discharged >3 nautical miles from the nearest land. • Sewage stored in holding tanks not commutated will be discharged >12 nautical miles from the nearest land at a moderate rate with the vessel proceeding at a speed of at least 4 knots. • All vessels will use biodegradable detergents only.
		Deck drainage directly to the marine environment.	Adverse effects on marine life due to reduction of water quality	• All hazardous materials (including chemicals and hydrocarbons) will be kept in areas which can safely contain spills. • All Vessels ≥400GT will maintain a Shipboard Oil Pollution Plan (SOPEP) • All vessels will use biodegradable detergents only.
		Discharge of oily water to the marine environment.	Adverse effects on marine life due to reduction of water quality.	• Oil and oily mixtures are to be held on board for on shore disposal where possible or if required bilge water will be discharged overboard once the water has passed through an oil-water separator with hydrocarbon concentrations reduced to <15ppm prior to discharge. • Vessels must not be stationary while discharging
6	Generation of solid and hazardous wastes during the survey.	General and hazardous waste disposal: • Incorrect storage and disposal of general and hazardous waste • Loss over the side of vessel	Reduction in habitat/water quality if waste is lost overboard or disposed of inappropriately.	• A Waste Management Plan will be in place detailing wastes generated and disposal requirements. • Records and quantities of wastes transported ashore will be maintained
7	Vessel engines and power generator operations.	Atmospheric emissions	Reduction in air quality.	• All vessels involved with the survey will use Marine Gas Oil (MGO). Vessel maintenance complies with vessel management system.
8	Release and	Ballast water exchange, hull	Introduced exotic	• No exchange of ballast water <12 nautical miles from land.

settlement of NIMS in Australian waters.	and seismic equipment fouling.	species may establish and negatively affect native ecosystems and species.	• Vessels arriving in Australia from international waters will submit a QPAR to AQIS and complete the AQIS Ballast Water Log. • Primary survey vessel will be dry docked, cleaned and re-painted prior to entering Australian water with independent vessel inspection report for primary survey vessel biofouling treatment.

6 MANAGEMENT APPROACH

A Pyrenees 4D MSMS Environment Plan has been prepared in accordance with Commonwealth regulatory requirements, specifically the Offshore Petroleum Greenhouse Gas Storage (Environment) 2009 Regulations, as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

The Pyrenees 4D MSMS will be managed in compliance with the Pyrenees 4D MSMS Environment Plan BHPB and the company-wide Charter, HSEC Policy and HSEC Management System Framework and associated controls. These systems aim to maximise productivity by adopting sound technical standards and the principles of Zero Harm to people, the environment and the local communities.

During the survey an organisational structure linking BHPB and Vessel Contractor will be utilised to ensure the management system and associated controls identified in the EP are implemented and monitored with all reporting requirements undertaken as required. Each role within the organisational structure has allocated responsibility.

All vessel crew will have appropriate competencies and training as required under their conditions of employment as pertains to their role. All vessel crew involved in the survey will attend start-up meetings that will incorporate a project specific environmental induction that supports this EP.

The induction includes an Environmental Awareness section which includes details of the EP and presents topics on the following:

- Ecological, cultural and socioeconomic values
- Description of the Activity (location)
- Regulations relevant to the activity
- BHPB HSEC Management Standards
- Environment Plan importance, structure, implementation and personnel roles and responsibilities
- Adherence to standards and procedures, and the use of Job Safety Analysis and permit to work hazard identification and management process
- Main environmental aspects/hazards and potential environmental impacts.
- Introduced Marine Pests
- Waste management
- Refueling
- Chemical management requirements
- Spill Response
- Monitoring and reporting
- Incident Reporting

BHPB and vessel contractors will manage emergency response through a survey specific Emergency Response Plan and vessel contractor emergency plans. These plans will also be tested.

Monitoring, auditing and reporting will be undertaken pre, during and post survey in accordance with the Pyrenees 4D MSMS EP.

7 CONSULTATION

Under the Petroleum Health, Safety, Environment and Community Management System a Stakeholder Engagement Plan must be in place for all exploration, development and production activities.

An Exmouth Sub-basin Stakeholder Engagement Management Plan (SEMP) has been in place since the start-up of the Stybarrow FPSO in November 2010. The SEMP is reviewed annually.

In support of the Pyrenees 4D MSMS, BHP Billiton undertook an assessment of the proposed activities and potential environmental, social and economic impacts of the activity which identified the relevant stakeholders.

All relevant stakeholders were sent an Environment Plan Fact Sheet and consulted (phone calls, meetings and email exchanges). This included Exmouth community representatives, fishing industry associations, WA Department of Transport, Australian Maritime Safety Authority, Commonwealth Department of Sustainability, Environment, Population and Communities, , Shire of Exmouth, WA Department of Environment and Conservation and other regional oil and gas companies.

BHPBP met face-to-face with representatives from:

- Cape Conservation Group
- Exmouth Chamber of Commerce
- Shire of Exmouth
- North West Cape Exmouth Aboriginal Corporation
- WA Department of Transport
- WA Department of Environment and Conservation
- Department of Defence

Prior to mobilisation of the survey, BHPBP and the Contractor will issue a notice to mariners that provides the coordinates of the survey area and a brief summary of the vessels and towing configuration. BHPBP will also re-distribute a survey fact sheet to Exmouth and regional recreational and commercial marine users that will contain project and vessel specific information along with relevant contact details for field and office based support during and following the survey.

8 CONTACT DETAILS

For further information about this activity please contact BHPB Petroleum Government and External Affairs Team on 1800 110 258 or send an email to bhppetexternalaffairs@bhpbilliton.com.

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