



# Bath-1, Barberry-1 (permit area TL/2) and Laurel-1 (TP/7(4)) Exploration Wells Environment Plan: Public Summary

April 2010

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*This summary has been submitted to comply with Regulation 11(7)(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) (OPGGs(E)) Regulations 1999.*

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## Introduction

Apache proposes to drill three exploration wells in WA State waters (Bath-1, Barberry-1 in permit area TL/2 and Laurel-1 in TP/7(4)). Drilling is proposed to commence around mid to late May 2010 (weather conditions permitting) using the *Ocean Shield* jack-up drill rig. Airlie Island lies ~3.4 km from Bath-1, ~3.2 km from Barberry-1, and ~12.2 km from Laurel-1(P). Thevenard Island lies ~22 km SW of the Bath-1 well. The wells are located 34 km SE of the nearest mainland and 80 km east of the nearest Dampier Archipelago islands. Barrow Island lies ~45 km NE of the proposed wells (**Figure 1**). Drilling is scheduled to commence early May 2010 and takes approximately 55 days (17 days for Bath-1, 24 days for Laurel-1 and 14 days for Barberry-1).

Apache's generic Environment Plan (EP) for its 2007 -2011 drilling program on the North West Shelf (NWS) in State and Commonwealth waters will be used to manage the wells ([EA-00-RI-164](#)). A bridging document to this EP for Bath-1, Barberry-1 and Laurel-1 (R-100406), was approved by the DMP on 23 April 2010, in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) (OPGGs(E)) Regulations 1999*.

## Project Description

The proposed drill sites are located in a water depth of 16 - 22 m (**Table 1**). The wells will be drilled with water-based mud (WBM) and drill cuttings will be discharged to the seabed, through a shute which is extended to approximately 5 m below the sea surface to accelerate settlement and minimise vertical dispersion of drill cuttings.

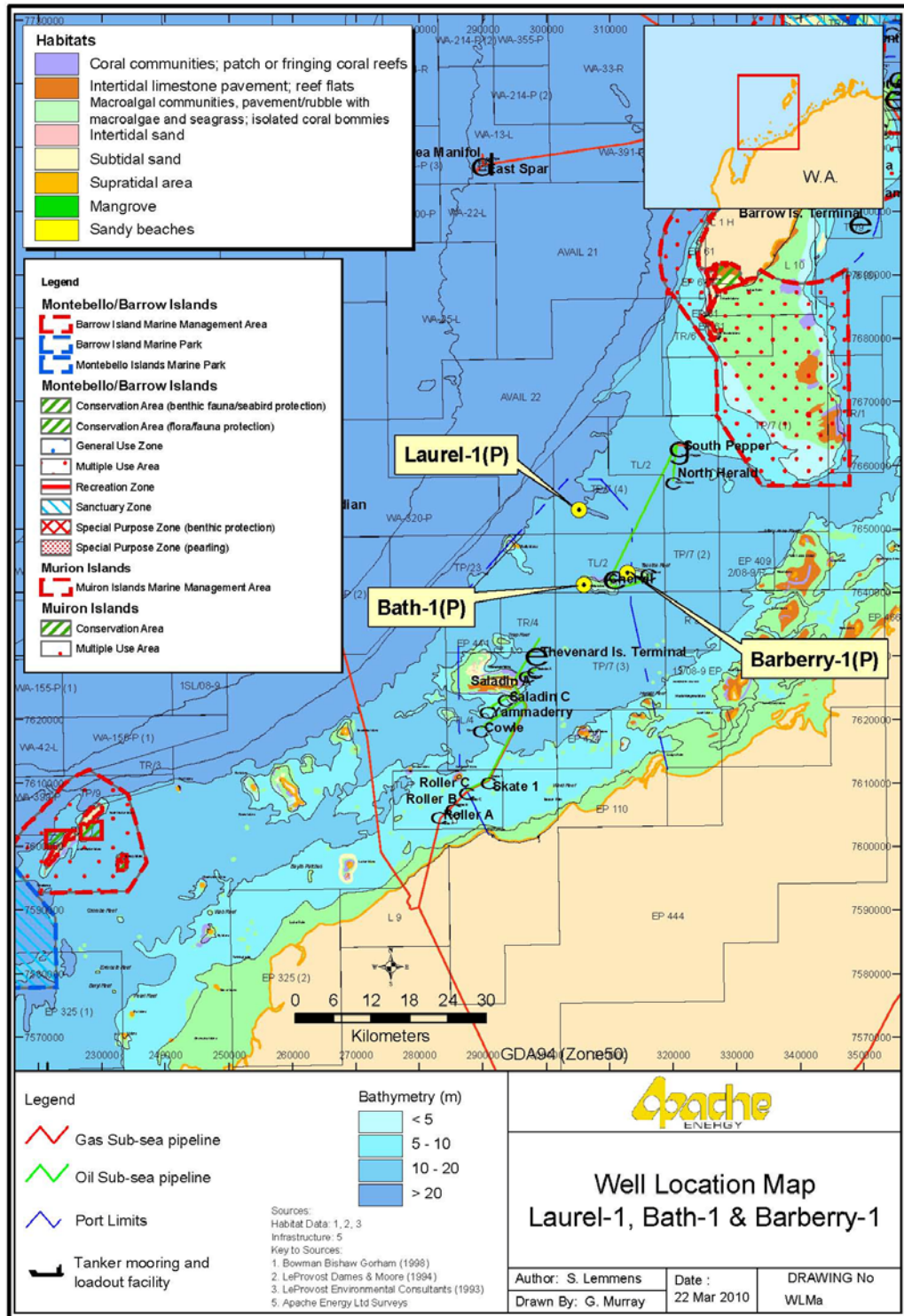
Drilling will be undertaken from the *Ocean Shield* jackup rig. The drilling procedure for the exploration wells is summarised in **Table 1**. Each well will have a Blow Out Preventer (BOP) and riser run, landed, latched and pressure tested before a full BOP test is performed. Once total depth (TD) is reached, and logging and evaluation is completed, the wells will be plugged and abandoned.

For Laurel-1, a 216 mm directional Bottom Hole Assembly (BHA) will be used to sidetrack the hole once TD has been reached and logging and evaluation is completed. The well will be plugged back for sidetracking. A 72 m core will be taken in the sidetrack hole before plugging and abandoning the well. Seismic profiling (VSP) may be performed for all three wells.

## Receiving Environment

### Seabed Surveys

Airlie, Barrow, Lowendal and the Montebello Islands are part of a shallow submarine ridge, which extends north from the mainland near Onslow. The ridge contains extensive areas of intertidal and shallow subtidal limestone pavement surrounding the numerous, mostly small islands which are found in the region.



**Figure 1** Location of the proposed Bath-1 and Barberrry-1 wells in permit area TL/2, and Laurel-1 in TP/7(4) wells.

**Note:** the modelled spill site is Taunton-2, which is located ~3 km to the west of Bath-1, ~10 km west of Barberrry-1 and ~12.5 km south of Laurel-1

**Table 1: Bath-1, Barberrry-1 (in permit area TL/2) and Laurel-1 (in TP/7(4)) well details**

Parameter	Bath-1 well	Barberrry-1 well	Laurel-1 well
Surface hole location (GDA 94, Zone 50)	Lat 21° 19' 15.58" S Long 115° 07' 45.96" E	Lat 21° 18' 14.30" S Long 115° 11' 42.85" E	Lat 21° 12' 49.86" S Long 115° 07' 21.95" E
Type of well	Exploration well	Exploration well	Exploration well
Approximate water depth (m)	17 m AHD	16 m AHD	22 m AHD
Approximate length of drilling period (days)	17.3 days	13.5 days	23.4 days
Proposed total depth of well (m)	2,686.5 m MDRT	2,345 m MRDT	3,230.5 m MDRT
Drilling rig	Ocean Shield Jackup Rig		
Drilling fluid	Seawater and pre-hydrated Gel (SW/PHG) & Water Based Mud (WBM)		
Volume of cuttings (estimate only, assumes hole is 25% overgauge)	171.9 m <sup>3</sup> SW/PHG 153 m <sup>3</sup> WBM	150 m <sup>3</sup> SW/PHG 132 m <sup>3</sup> WBM	201.9 m <sup>3</sup> SW/PHG 161.8 m <sup>3</sup> WBM
Cuttings management	WBM to be discharged to the seabed from a chute that is extended to 5m below the water surface, to accelerate settlement and minimise spill to nearby ecosystems.		
Site survey undertaken	Yes – preliminary survey around 10 m depth contour and approach routes. More detailed survey to follow prior to start of drilling. Sensitive shallow water ecosystems shall be avoided, with rig remaining in depths exceeding 10 m. Previous drilling has been undertaken nearby, in similar terrain (e.g. Taunton-4, Taunton-3, Chervil –A)		
Scheduled commencement date (weather permitting)	9 <sup>th</sup> May 2010 (Bath-1), 26 <sup>th</sup> May (Laurel-1), 19 <sup>th</sup> June (Barberrry-1)		
Nearest land or reef system (km)	Airlie Islands, ~3.4 km E	Airlie Islands, ~3.2 km SW Taunton reef, ~1.9 km E	Airlie Islands, ~12.2 km SSE
Oil Spill Modelling	Using Oil Spill modelling, undertaken in 2003 as part of the Taunton 3/3 L1 Exploration Drilling Program (see EA-65-RI-026). The modelled spill site is Taunton-2, which is located ~3 km to the west of Bath-1, ~10 km west of Barberrry-1 and ~12.5 km south of Laurel-1.		

The water depths in the region range from intertidal along island shorelines and in shoal areas to 50 m in the deeper waters offshore to the north, west and east of the region. The seafloor to the west of the Barrow Island and the Montebello complex drops away steeply in to deep water off the edge of the North West Shelf. Much of the water surrounding the Montebello Islands and extending south to Barrow Island and the Lowendal Islands is very shallow, ranging in depth from intertidal to approximately 5 m.

In 2008, Apache commissioned a coral survey, as part of its Annual Marine Monitoring. It included a site on the reef flat immediately to the south of Airlie Island (C25), as well as a site to the south of Taunton Reef (C24). In addition, the drill sites were surveyed by Neptune on 7-8 February 2010, using side scan sonar equipment, to ensure sufficient separation from sensitive marine ecosystems. Further surveys will be carried out, if required, immediately before deployment of the spudcans to the seabed, to ensure that impacts to sensitive marine ecosystems are minimised.

### Biological environment

Barrow Island, Thevenard Island, Mary Anne Group and Airlie Island are common nesting and feeding grounds for the Hawksbill, Flatback and Green turtles. Low density nesting of Green, Flatback and Hawksbill turtles has been identified on Airlie Island.

The drilling programme between early May and early July 2010 coincides with the start of the Hawksbill turtle nesting period and the humpback whale migration period and the end of the whale shark migration period. Low level activity of dugongs might also be expected during the drilling programs.

The hawksbill turtles can be expected to forage in shallow water <20 m depth during the nesting periods. Hawksbills have been observed breeding on the NWS between July and March with peak nesting activity around the Lowendal Islands between October and December. The presence of the Ocean Shield and support vessels at the three drill sites does not coincide with the loggerhead, flatback and green turtle nesting period (**Table 2**).

Dolphins are relatively common in the region. Species known to occur in the region are the bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), Indo-pacific humpback dolphins (*Sousa chinensis*) and the striped dolphin (*Stenella coeruleoalba*).

A number of whale species, including the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), tropical byrdes whale (*Balaenoptera edeni*), southern minke whale (*Balaenoptera acutorostrata*) and humpback whale (*Megaptera novaeangliae*), also occur in the region, the most commonly sighted of these being the humpback whale.

The proposed location and timing of drilling for the three wells may partly overlap with the migration of humpback whales (*Megaptera novaeangliae*) in the Exmouth to Dampier Archipelago region (see **Table 2**). The humpback whale is a cetacean listed as 'threatened' under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Humpback whales are the most observed of the whale species in the region.

Cetacean sightings will be recorded during the drilling program and reported to Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) at the end of the drilling program.

As part of this drilling programme, there may be a requirement for vertical seismic profiling (VSP). In that case, this will be of short duration (generally less than 8 hours per well) and thus this potential source of underwater noise will be limited. To

mitigate any potential impacts on humpback whales or whale sharks from VSP, DMP's (formerly DoIR) "[Guidelines on Minimising Acoustic Disturbance to Marine Fauna](#)" (2007) will be followed when undertaking VSP (also see **Table 3**). In addition, the Environment Protection and Biodiversity Conservation Regulations 2000, [Part 8 "Interacting with cetaceans and whale watching"](#) shall be applied. Consequently, no significant impacts to humpback whales are expected.

Whale sharks (*Rhincodon typus*), the world's largest fish (growing up to 12 m in length), are oceanic and cosmopolitan in their distribution, however, they do aggregate in and near the waters of the Ningaloo Marine Park during autumn, approximately 200 km south of the proposed survey area.

The main period of the whale shark aggregation in Ningaloo Marine Park is late March to June, with the largest numbers recorded around April. However, the season is variable and individual whale sharks have been recorded at other times of the year. Whale shark presence 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 the reef.

**Table 2: North West Shelf biological resources, breeding cycles and human activity seasons**

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dugong breeding	breeding								breeding			
Hawksbill turtle nesting												
Flatback turtle nesting												
Green turtle nesting												
Loggerhead turtle nesting												
Coral spawning												
Whale migration							north		south			
Whale shark aggregation			main aggregation period									
Algae		growing				shedding fronds				growing		
Seabird nesting												
Prawn trawling												
Tourism												
Proposed Bath-1, Barberry-1 and Laurel-1 drilling												

**Key**

	Peak activity, presence reliable and predictable
	Low level of abundance/activity/presence
	Activity not occurring within the area

Whale sharks are fully protected under the Wildlife Conservation Act 1950 and the Conservation and Land Management Act 1984. The DEC [Code of Conduct](#) for whale shark interactions shall be adhered to. In addition, DMP's "[Guidelines on Minimising Acoustic Disturbance to Marine Fauna](#)" (2007) will be followed (also see **Table 3**).

Dugongs are herbivorous and are generally associated with seagrass beds, upon which they feed. They are commonly found in shallow (less than 5 m deep) sheltered areas, often near island or large bays. Dugongs are not known to occur in large numbers around the islands. Due to the location of the drill rig in relatively deeper waters (16 - 22 m) and distance from seagrass beds, dugongs are not expected to be significantly impacted by the drilling activities.

Socio-Economic Environment

Dampier and Karratha are the main service and population centres for this region. Local people seeking aquatic recreation such as boating, diving and fishing use the



coast and islands of the Pilbara. The open waters of the Commonwealth permit areas do not support significant recreational or tourism activity.

In relation to commercial fisheries, the drilling site is located in the Onslow Prawn Managed Fishery (OPMF) and the Pilbara Demersal Finfish Fisheries. The OPMF generally operates between 1 March and 15 November in the area. However, most prawning activities are concentrated in the shallower waters off the main land and not near the Montebello/Barrow islands.

Of the Pilbara Demersal Finfish Fisheries (i.e. the Pilbara Fish Trawl (Interim) Managed Fishery and the Pilbara Trap Managed Fishery) only the trap fishery fishing area extends to around the drilling location. During 2004, two vessels were active in this fishery. Trap fishing vessels normally target areas around rocky outcrops and reefs and are therefore not likely to fish near the location of the drilling rig.

It is therefore anticipated that there will be minimal impacts on commercial (and recreational) fishing and recreational pursuits, due to the limited use of the drilling location for fishery activities. Commercial fishing and all shipping (e.g. tankers) are required to comply with the 500 m exclusion zone around the drilling rig. AMSA and the commercial fisheries that may operate in the area will be notified of the drilling location and schedule.

### Major Environmental Hazards and Controls

The potential environmental impacts resulting from offshore drilling on the NWS are outlined in detail in the Generic Drilling Program EP. **Table 3** summarises the commitments for the Bath-1, Barberry-1 and Laurel-1 wells.

**Table 3: Apache Environmental Guidelines and Drilling Rig Environmental Commitments for Bath-1, Barberry-1 and Laurel-1**

(drilled under NWS 2007-2011 Generic Drilling EP: Doc [EA-00-RI-164](#))

Activity	Requirement
Disposal of drilling fluid and drilling cuttings	<ul style="list-style-type: none"> <li>• Direct WBM cuttings discharge, as defined in the <i>Generic Drilling EP</i> (<a href="#">EA-00-RI-164</a>).</li> <li>• Record volume of drilling cuttings and fluid disposed into the ocean on environmental spreadsheet. Send results to the Apache Environmental Department at the end of the well.</li> <li>• Discharge will be from a subsurface shute, extending to about 5 m below the water surface, in order to to accelerate settlelement and minimise spill to nearby shallow reef systems.</li> </ul>
Pipe Dope	<ul style="list-style-type: none"> <li>• Use pipe dope that has lowest concentration of heavy metals and hydrocarbons but still meets safety and performance criteria.</li> <li>• Record volume of pipe dope used on location on environmental spreadsheet. Send results to the Apache Environmental Department at the end of the well.</li> </ul>

Activity	Requirement
Deck drainage, chemical storage and management	<ul style="list-style-type: none"> <li>• Maintain good housekeeping practices.</li> <li>• Store chemicals in bunded areas away from open drains and chemical containers are to be intact.</li> <li>• Use drip trays under all machinery and fuel points and valves.</li> <li>• In the event of a spill, take all actions to control the spill and divert deck drainage to on board containment tanks for treatment through the oil in water separator.</li> <li>• Ensure absorbent material is on board to use in soaking up chemical or oil spills on deck.</li> <li>• Maintain oil water separators regularly to ensure 15 ppm oil concentration alarm is functional.</li> <li>• Report all releases of oil in water of &gt; 30 mg/L average (over a 24 hour period) to Apache Perth office.</li> <li>• Report all spills &gt; 80 L to DMP within 2 hours either directly by contacting the DMP Duty Inspector on 0419 960 621 or via the Apache Perth office.</li> <li>• Report all spills (including &lt; 80 L) through Apache incident reporting system.</li> <li>• All spills &lt; 80 L are Recordable Incidents under the Offshore Petroleum &amp; Greenhouse Gas Storage Regulations 2009 (26B) and must be reported to DMP at the end of each month via the Apache Perth office.</li> </ul>
Liquid Discharges	<ul style="list-style-type: none"> <li>• Discharge excess water from the water maker to sea.</li> <li>• Under routine operating conditions, discharge treated sewage, grey water and main deck drainage at sea level.</li> <li>• Discharge cooling water at barge of hull of drilling rig level to allow for sufficient cooling and oxygenation.</li> </ul>
Incident Reporting	<ul style="list-style-type: none"> <li>• Use the AEL's "<i>Hazard Reporting, Incident Notification and Investigation Procedure</i>" (<a href="#">AE-91-IF-002</a>) to report incidents to DMP within 2 hours (OPGGGS Regulations; 26A).</li> <li>• Recordable incidents to be reported to DMP at the end of each month (OPGGGS Regulations; 26B).</li> </ul>
Waste Oil Management	<ul style="list-style-type: none"> <li>• Drum waste oil and grease and return to mainland for recycling.</li> <li>• Record volume of waste oil taken off rig and forward results to the Apache Environmental Department at the end of the well.</li> </ul>
Spillage of diesel fuel or oil	<ul style="list-style-type: none"> <li>• Follow AEL's "<i>Refuelling and Chemical Transfer Management Procedure</i>" (<a href="#">AE-91-IQ-098</a>).</li> <li>• Carry out diesel refuelling during daylight hours only, weather permitting.</li> <li>• In event of a spill take all actions to control it.</li> <li>• Do not use dispersant without AMSA approval.</li> <li>• Report all releases of oil in water of &gt; 30 mg/L average (over a 24 hour period) to Apache Perth office.</li> <li>• Report all spills &gt; 80 L to DMP within 2 hours either directly by contacting the DMP Duty Inspector on 0419 960 621 or via the Apache Perth office.</li> <li>• Report all spills (including &lt; 80 L) through Apache incident reporting system.</li> <li>• All spills &lt; 80 L are Recordable Incidents under the Offshore Petroleum &amp; Greenhouse Gas Storage Regulations 2009 (26B) and must be reported to DMP at the end of each month via the Apache Perth office.</li> <li>• Implement Apache's "<i>Oil Spill Contingency Plan</i>" (OSCP), (<a href="#">AE-00- EF-008</a>) if required.</li> </ul>

Activity	Requirement
Discharge of combustion products from engines	<ul style="list-style-type: none"> <li>• Include inspections and tuning of engines and equipment on a regular maintenance schedule.</li> <li>• Optimise combustion or well test fluids and gas.</li> </ul>
Solid waste management <ul style="list-style-type: none"> <li>• Food scraps</li> <li>• Garbage</li> <li>• Litter</li> <li>• Scrap metal and wood etc</li> </ul>	<ul style="list-style-type: none"> <li>• Disposal of food scraps in accordance with MARPOL 1973/78 – no disposal of unmacrated food within 12 nm (rig is 34 km from nearest mainland).</li> <li>• Do not dispose of debris, garbage or litter into the sea (skips need covers to prevent wind blown rubbish – especially plastics and cups).</li> <li>• Segregate industrial waste (scrap metals / drums etc) wherever possible for appropriate disposal onshore.</li> <li>• Do not use polystyrene cups.</li> <li>• Reduce, reuse and recycle waste wherever practicable.</li> <li>• Record the volume and type of waste taken off rig and forward to the Apache Environmental Department at the end of the well.</li> <li>• Undertake a ROV survey to check that no rubbish is left on seabed. Remove any debris if found.</li> </ul>
Sewage discharge	<ul style="list-style-type: none"> <li>• Treat sewage to secondary level prior to discharge through the sewage plant (aerates, macerates and chlorinates). Sewage facilities to meet MARPOL 1973/78 requirements.</li> <li>• Maintain the sewage treatment plant in order to ensure effective treatment.</li> </ul>
Light Overspill	<ul style="list-style-type: none"> <li>• Minimise use of non-essential lighting, while maintaining safety standards on the drill rig and support vessel.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Minimise noise emissions when drilling near noise-sensitive environments.</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• No fishing is permitted from the drill rig whilst it is on location.</li> </ul>
Anchoring & Disturbance to the seabed	<ul style="list-style-type: none"> <li>• Side scan sonar survey results used to select a rig approach and drill site location that avoids sensitive seabed features. No sensitive seabed features in immediate vicinity of well.</li> <li>• No workboats are to anchor in areas where coral reefs occur; a designated area for mooring will be allocated. No sensitive seabed features in immediate vicinity of well.</li> <li>• Follow AEL's "<i>Environmental Requirements For Offshore Marine Vessels</i>" (<a href="#">AE-91-IQ-202</a>)</li> </ul>
Operational Environmental Awareness	<ul style="list-style-type: none"> <li>• Through inductions and educational material present on the rig, all personnel are familiar with the environmental requirements of the EP to ensure these guidelines and procedures are being followed.</li> <li>• Ensure all personnel sign off on the rig register book confirming their induction.</li> </ul>



Activity	Requirement
Large Animal Observations	<ul style="list-style-type: none"> <li>• Fill in whale and turtle observation data sheets and send to the Apache Environmental Department at the completion of the drilling program (Appendix in EP).</li> <li>• All cetacean sighting records will be reported to Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) at the end of the drilling program.</li> <li>• To mitigate any potential impacts on humpback whales or whale sharks from vertical seismic profiling (VSP), DMP's (formerly DoIR) "<a href="#">Guidelines on Minimising Acoustic Disturbance to Marine Fauna</a>" (2007) will be followed when undertaking VSP.</li> <li>• Using the DMP guidelines, the following measures will be undertaken on the rig at the commencement of the VSP:               <ul style="list-style-type: none"> <li>• Not commencing VSP unless whales/whale sharks are a minimum distance of 3 km from the rig;</li> <li>• Soft-start over a 20 minute period;</li> <li>• Rig crew being alert for whales/whale sharks during VSP, with a dedicated whale-watcher on post if a whale or whale shark is sighted with 3-5 km of the rig; and</li> <li>• Shut down of VSP if whales or whale sharks are observed within 1 km of the rig.</li> </ul> </li> <li>• The DEC Code of Conduct for whale shark interactions shall be adhered to</li> </ul>

#### Perth Office Commitments

Activity	Requirement
Prior to drilling	<ul style="list-style-type: none"> <li>• NWS generic drilling EP (2007-2011; <a href="#">EA-00-RI-164</a>) is available to all personnel involved in drilling program.</li> </ul>
Discharge of combustion products from engines	<ul style="list-style-type: none"> <li>• Report greenhouse gas emissions data to Commonwealth Government annually.</li> </ul>
Environmental Audit	<ul style="list-style-type: none"> <li>• Audit drilling rigs every six months whilst under contract to Apache (1<sup>st</sup> audit to be scheduled at start of contract).</li> <li>• Review electronic waste and chemical log received from rig at the completion of the drilling program.</li> </ul>

#### Environmental Management

Extensive environmental management guidelines are prepared for each Apache-drilled well. Apache management documents used to guide the implementation of well-specific environmental management procedures are listed below:

- Environmental Management Policy (March 2010).
- NWS generic drilling EP (2007-2011; EA-00-RI-164)
- Contaminated Waste Management Procedure (VI-SA-ON-EN-000).
- Environmental Requirements For Offshore Marine Vessels (AE-91-IQ-202)
- Refuelling and Chemical Transfer Management Procedure (AE-91-IQ-098).
- Refuelling Management Plan (DR-91-IG-001).
- Hazard Reporting, Incident Notification and Investigation Procedure (AE-91-IF-002)
- Lighting Management Plan (EA-60-RI-153).
- OSCP Volume 1 – Operations (NWS) (AE-OO-EF-008).
- OSCP Volume 2 – Resource Atlas (NWS) (AE-OO-EF-008/2).

- Quarantine Procedure (AE-91-IQ-189).
- Vermin Management Plan (EA-60-RI-131).
- Waste Management Plan (EA-60-RI-167).

### **Consultation**

In preparing the Generic NWS Drilling Program EP, Apache consulted with numerous stakeholder representatives, including:

- Department of Minerals & Petroleum (DMP)
- Department of Environment & Conservation (DEC).
- CALM (Marine branch) (now DEC).
- Fisheries WA.
- Marine and Coastal Community Network (MCCN).
- Environment Protection Agency (EPA).
- Marine Parks Reserve Authority (MPRA).
- WA Fishing Industry Council (WAFIC).
- Australian Fisheries Management Authority (AFMA)

### **Further Details**

For further information about the Legendre-South-3 drilling program, please contact:

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