



Stag-38H, Stag-39H, Stag-41 & Stag-42  
Production and Appraisal Wells  
Environment Plan: Summary  
July 2011

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*This summary of the Stag-38H, 39H, 41 & 42 Environment Plan (EP) has been submitted to comply with Regulation 11(7)(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.*

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**Introduction**

Apache Energy Ltd (Apache) proposes to drill four wells targeting the Stag oilfield in permit area WA-15-L, in Commonwealth waters. Two of these wells, Stag-38H and Stag-39H, will be drilled from the Stag Platform as deviated production wells and two are appraisal wells (i.e. Stag-41 and 42), drilled 1.5 km to the east-northeast of the Stag Platform.

Drilling is proposed to commence July 2011 dependent on rig availability; and weather conditions permitting) using the *Ensco 109* jack-up drill rig and is expected to take about 80 days to complete.

Apache’s generic Environment Plan (EP) for its drilling programme on the North West Shelf (NWS) in State and Commonwealth waters will be used to manage the well (EA-00-RI-164). A bridging document to this EP, for Stag-38H, 39H, 41 & 42, was approved by the DMP on the 24 June 2011, in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

**Project Description**

The location of the Stag-38H, 39H, 41 & 42 wells (**Figure 1**) is approximately 60 km southeast of the nearest mainland point (Burrup Peninsula), 35 km southeast of the nearest island in the Dampier Archipelago, 85 km southwest from Varanus Island, and 63 km west of the nearest Montebello Islands. A summary of the well surface hole locations, water depths, duration of drilling and total depth of wells is provided in **Table 1**. Further detail is provided in the Stag-38H, 39H, 41 & 42 EP bridging document.

**Table 1: Well Details**

Parameter	Stag-38H	Stag-39H	Stag-41	Stag-42
Surface hole location (GDA 94)	Slot B: 20° 17' 24.021" S, 116° 16' 31.059" E Slot J: 20° 17' 23.851" S, 116° 16' 31.025" E DMP to be informed once determined.		20° 17' 4.99" S, 116° 17' 19.28" E	
Approximate water depth (m)	49 m AHD	49 m AHD	49 m AHD	49 m AHD
Approximate length of drilling period (days)	35 days	33 days	12 days	
Proposed total depth of well	3,255 m MDRT	3,032 m MDRT	1,349 m RT	1,360 m RT

**Stag-38H and Stag-39H**

Drilling will be undertaken from the Ensco 109 jack-up rig (Table 2) from the existing Stag Platform, using existing slots, either J (proposed for Stag-39H) or B (for Stag 38H) on the subsea well template. After installation of the drill rig over the Stag platform (Figure 2), the existing slot will be reclaimed. A Blow-Out Preventer (BOP) and diverter will be installed and a full BOP test will be performed. Either a 762 mm (30") mudline whipstock and 473 mm (18 5/8") scab liner will be used prior to drilling the

406 mm hole or a sidetrack will be done below the existing conductor prior to drilling the 406 mm hole to 340 mm measured depth at rotary table (MDRT) with seawater and prehydrated gel (SW/PHG). A 340 mm casing will be installed and cemented in place and a wellhead spool and BOP will be installed onto the casing and pressure tested. Next the 311 mm hole will be drilled using KCl/Sildril water based mud (WBM) to 1,500m, after which a 244 mm diameter casing will be installed and cemented in place.

Continuing to use the KCl/Sildril WBM, a 216 mm diameter hole will be drilled to 2,934 m MDRT and a 178 mm liner will be installed and cemented in place. Finally, a 152 mm hole will be drilled with KCl/FloPro WBM to 3,255 m MDRT. Following the installation of the lower and upper completions, the well will be handed to Operations.

The procedure for drilling Stag-39H is the same as for Stag-38H, however, the distances drilled are different such that the 311 mm hole will be drilled to 1,400 m and the 152 mm hole will be drilled to 3,032m.

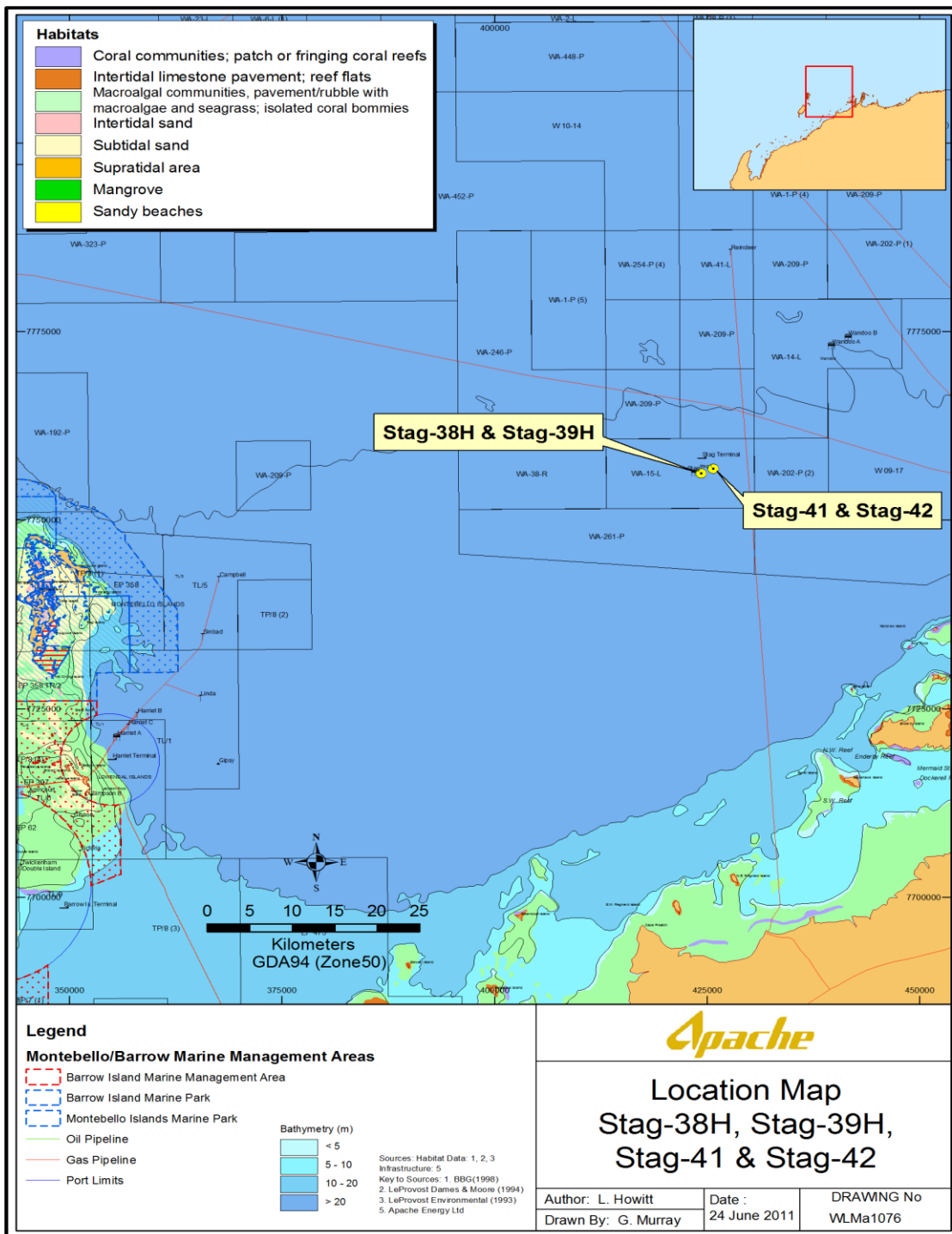
### **Stag-41 and Stag-42**

There are two options for drilling Stag-41. It may be drilled riserless with a drill-in string of 340 mm (13 3/8") casing to depth of approximately 300 m and cemented in place. Otherwise the operation will be carried out conventionally with a 406 mm (16") hole drilled vertically to 300m TVDRT and the 340 mm (13 3/8") casing run and set at the same depth. The mud system for either scenario will be a seawater and prehydrated gel (SW/PHG). Under the conventional approach the hole will be displaced to a prehydrated polymer system (KCl/Klastop/CaCO<sub>3</sub>) to keep the hole open while running casing. Following this operation, a unitized wellhead will then be installed and the BOPs will be nipped up and a full BOP pressure test conducted.

A 311 mm (12 1/4") rotary steerable directional assembly will be run in the hole, the well will be displaced to an inhibited WBM and the 340 mm (13 3/8") casing shoe track will be drilled out and a formation integrity test (FIT) will be conducted and 311 mm (12 1/4") hole will be drilled to total depth of 1,349 m MDRT. Based on learnings from drilling at Stag in 2010 it is planned that this hole section will drill through the M.Australis formation and on to total depth without any additional strings of casing. Contingencies will be in place, however, to case off this hole section prior to entering the M. Australis if hole conditions are problematic. As only a logging while drilling (LWD) quad-combo evaluation is required no wireline logs are planned. Upon reaching total depth, Stag-41 will be plugged back, isolating any hydrocarbon zones, and a sidetrack plug will then be set from the open hole up into the 340 mm (13 3/8") casing shoe.

Stag-42 drilling activity begins when the well has been successfully sidetracked from the Stag-41 well below the 340 mm (13 3/8") casing shoe. A 311mm (12 1/4") rotary steerable directional assembly will be run in the hole and directionally drilled to total depth of 1,349 m MDRT. As for Stag-41 only a LWD quad-combo evaluation is required so no wireline logs are planned. Upon reaching total depth the Stag-42 well will be permanently abandoned.

After abandoning the wells the anchors will be pulled up and the drill rig moved off location.



**Figure 1: Location of the proposed wells: Stag-38H, 39H, 41 & 42.**

All work on the wells will be undertaken in accordance with the regulations and guidelines set out in the *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGSA)* and the associated *OPGG(E) Regulations 2009* and *Petroleum (Submerged Lands) Act Schedule of Specific Requirements as to Offshore Petroleum Exploration and Production (2005)*.

## Receiving Environment

### Physical Environment

A summary of the climatic conditions for the Northwest Shelf (NWS) region is provided below. The NWS lies in the arid tropics region of Australia, which experiences high summer temperatures and periodic cyclones (with associated rainfall). Rainfall is generally low, with evaporation exceeding rainfall. Mean ocean temperatures range from a minimum of 11°C in winter to a maximum of 37°C in summer. Shelf waters are usually thermally stratified at a depth of about 20 m.

In general, wind patterns are monsoonal with a marked seasonal pattern. From October to March, prevailing non-storm winds are from the south-west, west and north-west at an average speed of less than 10 knots. From June to August, winds are generally lighter and more variable in direction than in spring and summer.

Non-storm winds prevail from north-east through to south-east at average speeds of 5-6 knots. Transitional wind periods, during which either pattern may predominate, can be experienced in April, May and September each year.

### Biological Environment

The key environmental considerations associated with the Stag-38H, Stag-39H, Stag-41 and Stag-42 programme (**Table 2**) and their potential for and likelihood of impact on the marine fauna is outlined below.

A search of the EPBC Act Protected Matters Search Tool in May 2010 identified a total of 9 threatened species listed under the EPBC Act database as threatened marine species that may occur within the proposed drilling area, with 15 species listed as migratory (nine of these being the same as the threatened species). All 15 species, with the exception of the humpback whale (*Megaptera novaeangliae*), are widely distributed and/or oceanic species and would most likely occur as vagrant transients through the area. The drilling programme coincides with the humpback whale migration period (**Table 2**).

### Whales

A number of whale species occur in the region. The most commonly sighted whale is the humpback whale. This species migrates between the Antarctic waters and the Kimberly region of Western Australia. The peak of the northerly migration occurs around late July on the North West Shelf, while the southerly return migration peaks around September – October. The northern migratory whale route, where most whales are observed, occurs in deeper waters (> 200 metres), passing to the west and north of Serrurier Island, westward of Barrow Island and north of the Montebello Islands (Woodside, 2002). Peak southerly migration occurs from September onwards as whales migrate southward and in shallower waters.

### Whale Sharks

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. The main period of the whale shark aggregation is late March to June, with the largest numbers being recorded around April (Wilson *et al.*, 2001). 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.

Whale sharks are occasionally observed from Apache's offshore oil and gas facilities on the NWS (Harriet Alpha and Stag platforms). The proposed activity is outside the whale shark aggregation period, while any interactions can be adequately managed through implementation of the DEC Code of Conduct for whale shark interactions, as well DMP (2007) guideline on Minimising Acoustic Disturbance to Marine Fauna.

## Sea Turtles

Four species of marine turtle nest on sandy shore sites of Dampier Archipelago, Montebello Islands, Lowendal Islands, Barrow Island, Airlie Island, Thevenard Island, other coastal islands and the Exmouth region. These are the green turtle (*Chelonia mydas*), the flatback turtle (*Natator depressus*), the hawksbill turtle (*Eretmochelys imbricata*), and the loggerhead turtle (*Caretta caretta*). The leatherback turtle (*Dermochelys coriacia*) may also visit the open waters of the region. These 5 species are on the National List of Threatened Species as either endangered or vulnerable under the EPBC Act.

The nearest turtle nesting sites are located about 35 km to the east (Dampier Archipelago), and at least 60 km to the south-west (Barrow, Montebello and Lowendal Islands) from the proposed Stag well sites. The peak turtle nesting and hatching period broadly occurs from September to March, which is largely outside of the proposed drilling period (**Table 2**). For all species, hatching emergence occurs 6 to 8 weeks after the females have nested.

The across shelf distribution of turtles is not well known, but does vary among the species. For example, green turtles are herbivores and therefore concentrate over depths of less than 20 m that support benthic plant life. Hawksbill turtles also forage in shallow waters on sponges in areas of coral reef. In contrast, loggerhead, flatback and leatherback turtles are known to feed on mid-water plankton and benthic animals, and can forage in mid-shelf water depths (about 50 m). EPA Draft Guideline No. 5 (EPA, 2010) provides current information on the population size and distribution of turtles off Western Australia. Considering this, impacts from the proposed drilling activities on turtle populations is considered to be minimal.

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

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hawksbill turtle nesting	Peak	Peak	Low	Low	Low	None	None	Low	Low	Peak	Peak	Peak
Flatback turtle nesting	Peak	Peak	Low	Low	None	None	Low	Low	Low	Low	Peak	Peak
Green turtle nesting	Peak	Peak	Low	Low	None	None	None	Low	Low	Peak	Peak	Peak
Loggerhead turtle nesting	Low	Low	Low	Low	None	None	None	Low	Low	Low	Low	Low
Whale migration	None	None	None	None	None	None	North	Low	South	None	None	None
Whale-sharks	None	None	Main aggregation period	Main aggregation period	Main aggregation period	None	None	None	None	None	None	None
Seabird nesting (terns and shearwaters)	Peak	Low	Low	None	None	None	None	Low	Low	Peak	Peak	Peak
Proposed drilling activity	None	None	None	None	None	None	Proposed drilling programme	Proposed drilling programme	Proposed drilling programme	None	None	None

**Key**

Peak	Peak activity, presence reliable and predictable
Low	Low level of abundance/activity/presence
None	Activity not occurring within the area
Proposed drilling programme	Proposed drilling programme

There is no contingency for vertical seismic profiling (VSP) as part of this drilling activity; however in the event that it should be required Apache would inform DMP prior to carrying out. Should VSP be required, then 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 4). Using the DMP guidelines, the following measures will be undertaken on the rig at the commencement of the VSP:

- Not commencing VSP unless whales/whale sharks are a minimum distance of 3 km from the rig;
- Soft-start over a 20 minute period;
- 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
- Shut down of VSP if whales or whale sharks are observed within 1 km of the rig.

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.

#### 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. Recreational fishing tends to be active within State waters in closer proximity to population centres associated with high number of local visitors and tourism. Commercial fisheries are active along the Pilbara coast; however fishing effort in the open Commonwealth waters is low, with operators favouring the inshore areas.

Further information on recreational and commercial activities that fall under the North Coast Bioregion is addressed in the in the Stag Operations EP and NWS Generic Drilling EP (EA-00-RI-164).

#### **Major Environmental Hazards and Controls**

The potential environmental impacts resulting from offshore drilling on the NWS are outlined in detail in Apache’s Generic Drilling Programme EP (EA-00-RI-164). **Table 3** summarises the guidelines and environmental commitments for the Stag-38H, 39H, 41 & 42 drilling programme.

#### **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 (February 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)
- Lighting Management Plan (EA-60-RI-153).
- Refuelling and Chemical Transfer Management Procedure (AE-91-IQ-098)
- OSCP Volume 1 – Operations (NWS) (AE-OO-EF-008/1).
- OSCP Volume 2 – Resource Atlas (NWS) (AE-OO-EF-008/2).
- Hazard Reporting, Incident Notification and Investigation Procedure (AE-91-IF-002).
- Quarantine Procedure (AE-91-IQ-189).
- Vermin Management Plan (EA-60-RI-131).
- Waste Management Plan (EA-60-RI-167).

## Consultation

Stakeholders of relevance to the drilling of the Stag wells are limited to fisheries organisations with interests in Commonwealth waters. These organisations are:

- Australian Fisheries Management Authority (AFMA)
- Commonwealth Fisheries Association (CFA)
- Northern fishing Companies Association (NFCA)
- Western Australian Fishing Industry Council (WAFIC)
- A Raptis and Sons

They will be notified via email once the wells have been approved. A summary of this bridging document will be attached to the notification email.

**Table 3: Summary of Apache Environmental Guidelines and Drilling Rig Environmental Commitments for Stag-38H, 39H, 41 & 42**

(Stag-38H, 39H, 41 & 42 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>• Dispose of WBM cuttings directly to the seafloor.</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 campaign.</li> </ul>
Pipe Dope	<ul style="list-style-type: none"> <li>• Use pipe dope that has the 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 the environmental spreadsheet. Send results to the Apache Environmental Department at the end of the well campaign.</li> </ul>
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 mg/L oil concentration alarm is functional.</li> <li>• <b>Report all releases of oil in water of &gt; 30 mg/L (over a 24 hour period) to Apache Perth office.</b></li> <li>• <b>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.</b></li> <li>• Report all spills (including &lt; 80 L) through Apache incident reporting system.</li> <li>• <b>All spills &lt; 80 L are Recordable Incidents under the Offshore Petroleum &amp; Greenhouse Gas Storage (Environment) Regulations 2009 (26B) and must be reported to DMP no later than 15 days after the end of the calendar month via the Apache Perth office.</b></li> </ul>

Activity	Requirement
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 Apache incident reporting system to report incidents within 2 hours (OPGGS(E) Regulations; 26A).</li> <li>Recordable incidents to be reported to DMP at the end of each month (OPGGS(E) 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 campaign.</li> </ul>
Spillage of diesel fuel or oil	<ul style="list-style-type: none"> <li>Follow Apache refuelling procedures (AE-91-IQ-098).</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><b>Report all spills &gt;80L to DMP within 2 hours either directly by contacting the DMP Duty Inspector on 0419 960 621 or via Apache Perth office.</b></li> <li>Report all spills &lt;80L through the Apache incident reporting system.</li> <li><b>All spills &lt; 80 L are Recordable Incidents under the Offshore Petroleum &amp; Greenhouse Gas Storage (Environment) Regulations 2009 (26B) and must be reported to DMP no later than 15 days after the end of the calendar month via the Apache Perth office.</b></li> <li>Implement Apache's Oil Spill Contingency Plan (OSCP) if required.</li> </ul>
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> </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><b>Macerate all food scraps prior to ocean disposal (rig is 35 km from nearest land mass).</b></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). This unit meets 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>



Activity	Requirement
Noise	<ul style="list-style-type: none"> <li>Minimise noise emissions when drilling near noise-sensitive environments.</li> <li>Should VSP be required, then DMP's "Guidelines on Minimising Acoustic Disturbance to Marine Fauna" (2007) will be followed, to mitigate any potential impacts on humpback whales or whale sharks from vertical seismic profiling (VSP). 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> </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 the 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 the wells.</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>
Large Animal Observations	<ul style="list-style-type: none"> <li>The DEC Code of Conduct for whale shark interactions shall be adhered to.</li> <li>Fill in Marine Fauna Sighting Datasheet and send to the Apache Environmental Department at the completion of the drilling program.</li> <li><b>Humpback whale southern migration will likely have commenced nearing the end of drilling at Stag while the northern migration generally occurs in deeper waters (&gt;200m). Any interactions will be managed through implementation of the EPBC regulations Part 8, as well as DMP (2007) guideline on Minimising Acoustic Disturbance to Marine Fauna and EPBC Policy Statement 2.1: Interaction between offshore seismic exploration and whales.</b></li> </ul>

### Perth Office Commitments

Activity	Requirement
Prior to drilling	<ul style="list-style-type: none"> <li>NWS generic drilling EP 2007-2011 (EA-00-RI-164) is available to all personnel involved in drilling programme.</li> <li>Ongoing consultations are part of each drilling campaign. In preparing the Generic NWS Drilling Programme EP, Apache consulted with numerous stakeholder representatives. Key stakeholders representatives such as fisheries will be notified in writing of the Stag-38H, 39H, 41 &amp; 42 campaign prior to commencement of drilling.</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 (1st audit to be scheduled at start of contract).</li> </ul>

Activity	Requirement
	<ul style="list-style-type: none"><li>• Review electronic waste and chemical log received from rig at the completion of the drilling programme.</li></ul>

## Further Details

For further information about the Stag-38H, 39H, 41 & 42 drilling programme, please contact:

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