Phoenix South-1 Drilling

Environment Plan Summary

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1. INTRODUCTION

Apache Energy Ltd (Apache) proposes to drill the Phoenix South-1 exploration well located in Commonwealth waters offshore of Port Hedland, Western Australia, in permit area WA-435-P (**Figure 2–1**). The objective of the drilling program is to target the Lower Keraudren Sandstone formation that is expected to contain gas-condensate.

Phoenix South-1 will fulfil a farm-in commitment to earn Apache an interest in permit area WA-435-P alongside joint venture partners, JX Nippon, Finder Petroleum and Carnarvon Petroleum.

1.1 Schedule

Phoenix South-1 exploration well will take approximately 50 to 60 days to complete and is scheduled to commence as early as November 2013, although may be delayed into early 2014, depending on weather, rig availability and drilling schedules.

1.2 Compliance

The EP has been prepared to comply with the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E)). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 8th November 2013.

This EP summary has been prepared in accordance with the requirements of Regulation 11 (7) and (8) of the referenced OPGGS(E) Regulations.

2. LOCATION OF THE ACTIVITY

The location of the Phoenix South-1 well is provided in Table 2-1. The well is in a water depth of between 130–140 m.

Table 2-1: Surface location for the well

Location	Permit Area	Coordinates (Datum/Projection: GDA 94 Zone 50)				Approx. Water Depth (m)
		Latitude	Longitude	Easting	Northing	
Phoenix South-1	WA-435-P	18° 43' 13.60" S	118° 42' 14.28" E	679,660	7,929,246	130-140 m

A 500 m petroleum safety zone around the Mobile Offshore Drilling Unit (MODU), when stationary onsite at the drill location, will define the exclusion zone and operational area for the drilling activity.

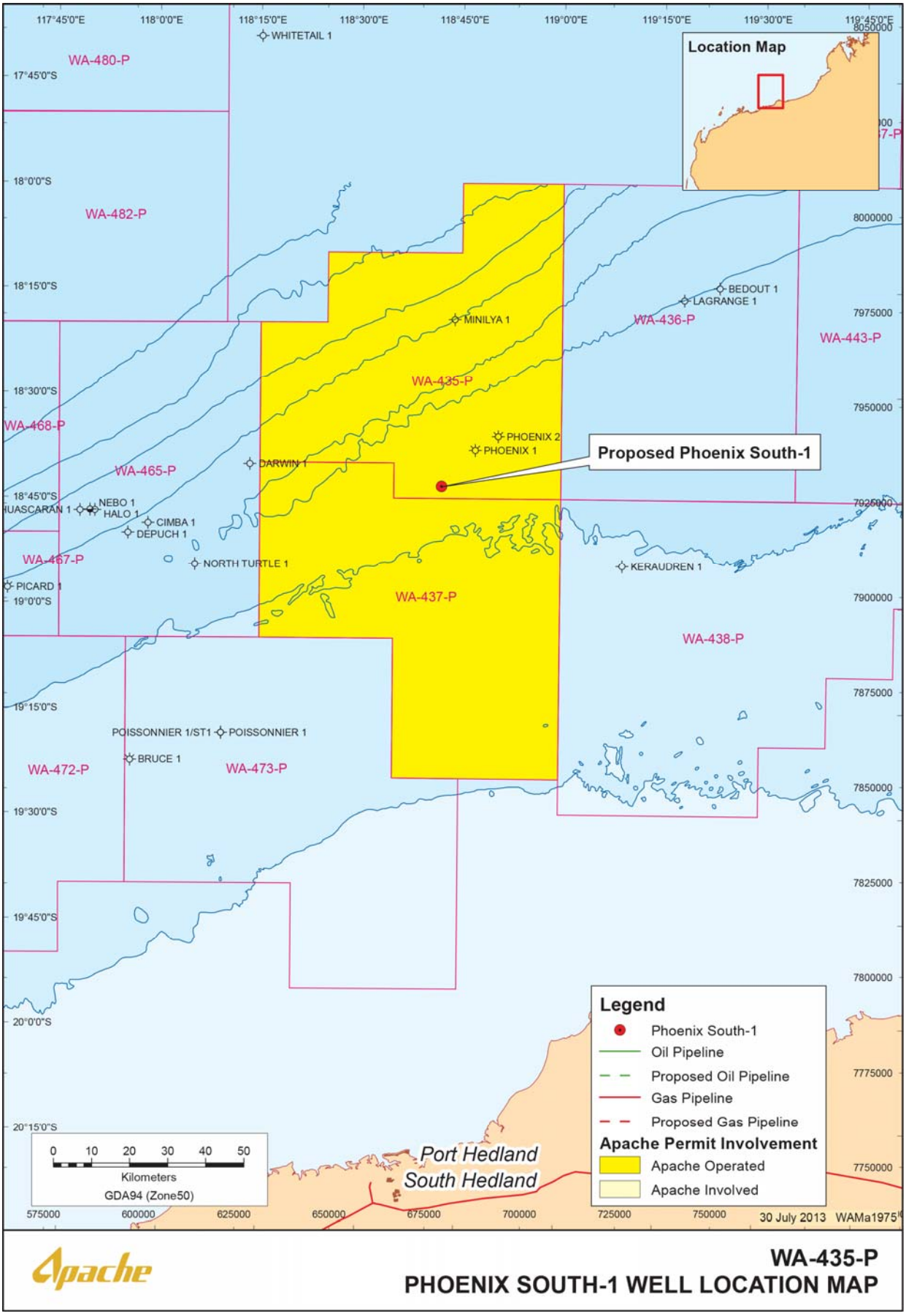

Figure 2-1: Location map for the Phoenix South-1 Drilling Activity

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The drilling activity is located on the North West Shelf. The region lies in the arid tropics experiencing high summer temperatures, periodic cyclones and associated rainfall. Rainfall in the region is generally low with evaporation exceeding rainfall throughout the year. Intense rainfall may occur during the passage of summer tropical cyclones and thunderstorms (NSR, 1995). Mean sea surface temperatures over the NWS range from a minimum of 15°C in winter to a maximum of 33°C in summer (WNI, 1996). Due to the arid climate, daytime visibility in the area is generally greater than five nautical miles (SSE, 1991).

During the summer period, the prevailing non-storm winds are from the southwest, west and northwest, bringing with them warm, humid air. Average wind speeds are less than 10 knots, with peak average speeds of 15–25 knots, and maximum speeds of 30 knots. The hotter and more humid summer season (October–March) is also associated with higher rainfall and periodic tropical cyclones and thunderstorms (NSR, 1995). During extreme cyclonic events, winds may reach 95 knots.

Winds in winter (May–August) are more variable in direction than in summer. Non-storm winds prevail from the northeast through to southeast, carrying dry air from the continent's interior. Winds during this period are generally lighter, with average speeds of 5–6 knots, peak average speeds of 10–15 knots, and maximum speeds of 20 knots. Transitional wind periods, during which either pattern may predominate, can be experienced in April and September of each year.

The wave climate is generally composed of locally generated wind waves (seas) and swells that are propagated from distant areas (WNI, 1995; 1996). In summer, seas typically approach from the west and southwest, while in winter from the south and east. Mean sea wave heights of less than 1 m with peak heights of less than 2 m are experienced in all months of the year (WNI, 1995). Mean swell heights are low at around 0.4–0.6 m in all months of the year. Tropical cyclones have generated significant swell heights of up to 5 m in this area, although the predicted frequency of swells exceeding 2 m is less than 5% (WNI, 1995). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway and Nye, 1985).

The dominant sea surface offshore current (typically seaward of the 200 m isobath) is the Leeuwin Current, which carries warm tropical water south along the edge of WA's continental shelf, reaching its peak strength in winter and becoming weaker and more variable in summer. The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer NWS (Woodside, 2005).

Offshore drift currents are represented as a series of interconnected eddies and connecting flows that can generate relatively fast (1–2 knots) and complex water movement. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals).

3.2 Biological environment

Benthic habitats within the exclusion zone comprise soft sediments and associated benthic fauna. Soft sediments support a diverse benthic infauna consisting predominantly of mobile burrowing species which include molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals.

Within the wider environment considered in impact assessment of unplanned spill scenarios, benthic habitats including coral reefs, macroalgae, seagrasses, hard substrate and associated assemblages are also found. These habitats are found near the shoreline of the mainland coast and offshore reefs such as the Rowley Shoals. Shoreline habitats within the impact assessment for spill scenarios included sandy beaches, intertidal and subtidal zones and rocky shorelines, as well as marine protected areas.

An EPBC Act Protected Matters search (DSEWPaC, 2013) identified 9 Key Ecological Features (KEF) (parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area) within the environment assessed for impacts resulting

from the worst case credible spill scenario due to a loss of well control. The EPBC search of the area identified 111 listed marine species and 35 whales and other cetaceans. Of these listed species, 29 threatened species (endangered or vulnerable) of marine fauna were identified, 20 of which are also migratory species. The species listed, or habitat important for these species, may occur within the predicted PSTA impact as a result of a loss of well control.

3.3 Socio-economic environment

Both the offshore and coastal waters in the NWC Region support a valuable and diverse commercial fishing industry, mainly dominated by the Pilbara fisheries. The Commonwealth licensed fisheries Western Tuna and Billfish Fishery (WTBF) and the Western Skipjack Tuna Fishery (WSTF) fall within the operational boundary and worst case credible spill assessment area, although neither of these fisheries have had recent fishing effort reported.

In addition, 9 State managed fisheries have boundaries that overlie or are in close proximity to part or all of the operational boundary and the worst case credible spill assessment area (Fletcher and Santoro, 2012): Pilbara Trap Managed Fishery, Pearl Oyster Managed Fishery, Pilbara Fish Trawl Managed Fishery, Mackerel Fishery, Beche-de-Mer Fishery, Marine Aquarium Fish Managed Fishery, West Coast Deep Sea Crab Managed Fishery, Octopus and Specimen Shell Managed Fishery.

The worst case credible spill assessment area falls primarily within the North Coast Bioregion (Fletcher and Santoro, 2012). Within the North Coast Bioregion, recreational fishing is experiencing significant growth, with a distinct seasonal peak in winter when the local population increases significantly from tourists visiting the Exmouth/Onslow area and Dampier Archipelago (Fletcher and Santoro, 2012). Offshore islands, coral reefs and continental shelf provide species of major recreational interest (DoF, 2011). However, recreational fishing within the exclusion zone is unlikely given the distance offshore.

The drilling centre is situated between two north-south oriented lanes, one to the west and one to the east. Both of these lanes service Port Hedland. The closest shipping lane is 10.5 km to the west from the drill centre. The shipping lanes are frequented by bulk ore carriers related to the Pilbara iron ore industry.

The area of activity occurs in a particularly isolated area of the NWS with respect to the main oil and gas operational and exploratory fields. There are currently no operating fields in the WA-435-P permit area. The nearest operating facility is Woodside's Angel oil field and associated infrastructure, located approximately 240 km southwest from the proposed drilling locations.

In the waters immediately surrounding the operational area, tourism activities are limited due to its distance from the mainland and island shorelines. The Rowley Shoals are used for diving, fishing, swimming and snorkelling; however the area is 114 km from the Rowley Shoals. The likelihood of vessel traffic involved with tourism-based activity, to be transiting through the operational area is low.

There are no World Heritage, Commonwealth Heritage or National Heritage sites, or Wetlands of International Importance (Ramsar sites) in or adjacent to the operational boundary. No registered Aboriginal heritage sites are located within or in close proximity to the drilling activity location.

No shipwrecks were recorded within the operational area.

4. DESCRIPTION OF THE ACTIVITY

The activity covered by this EP includes drilling and abandonment of the Phoenix South-1 exploration well. The work will be undertaken by a semi-submersible mobile offshore drilling unit (MODU) to be anchored on location during the operation. Anchor-handling vessels (AHV) will be required to deploy and retrieve the anchors upon arrival and departure from the drilling location. At least one support vessel will be utilised during the drilling activity to monitor and maintain the 500 m exclusion zone around the MODU, whilst further support vessel/s will be utilised to supply food, bulk drilling materials, transportation of equipment as required.

5. ENVIRONMENTAL HAZARDS AND CONTROLS

The environmental risk assessment for routine and accidental events for the drilling activity centred around hazard identification workshops attended by a subset of Apache's environmental scientists and drilling personnel, held on 5 June and 26 June 2013, respectively. Throughout the preparation of this EP, further evaluation of risks were undertaken as appropriate, as the activity scope was defined. Apache's Environmental Scientists and other participants from Drilling, Logistics and Safety were also involved where necessary.

The purpose of the risk assessment was to understand and identify the potential environmental hazards, their causes and the potential impacts associated with the drilling activity to ensure they are reduced to As Low As Reasonably Practicable (ALARP). Apache's management and mitigation actions corresponding to the potential hazards and impacts have been developed from experience in the environmental management of offshore petroleum activities in Australia, and are based on Australian petroleum industry best practice environmental management guidelines, as defined by the APPEA Code of Environmental Practice (2008).

The environmental risk assessment identified eight routine environmental hazards and nine non-routine (unplanned events) environmental risks. These environmental hazards, risks and control measures to be applied to the drilling activity are provided in **Section 10**. The control measures are consistent with Apache corporate and project specific performance objectives, standards and criteria. All commitments associated with these will be used to reduce environmental risk to ALARP and will be of an acceptable level.

6. MANAGEMENT APPROACH

The drilling activity will be managed in compliance with all measures and controls detailed within the EP accepted by NOPSEMA under the OPGGS(E) Regulations, other environmental legislation and Apache's Management System (e.g. Apache Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts associated with routine operational events and unplanned events associated with the drilling activity, are identified and assessed and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the marine environment to ALARP.

The EP details specific performance objectives, standards and procedures, and identifies the range of controls to be implemented (consistent with the standards) to achieve the performance objectives. The controls for the drilling activity are summarised in **Section 10**. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

As described in the EP, the implementation strategy includes the following:

1. Details on the systems, practices and procedures to be implemented;
2. Key roles and responsibilities;
3. Training and competencies;
4. Monitoring, auditing, management of non-conformance and review;
5. Incident response including an OSCP (*Phoenix South-1 Drilling OSCP*);
6. Record keeping; and
7. Consultation.

The reporting requirements for routine events and environmental incidents (recordable and reportable) and reporting on overall compliance of the activity with the EP are also detailed.

7. HYDROCARBON SPILL PREPAREDNESS AND RESPONSE

Credible hydrocarbon spill scenarios are identified in the EP requiring 1, 2, and 3 spill response tiers include:

- **Tier 1:** spill during refuelling;
- **Tier 2:** spill from a vessel collision resulting in a ruptured fuel tank; and
- **Tier 3:** spill from a loss of well control discharging at the seabed or at the MODU floor.

These oil spill scenarios include the worst-case spill scenario. Strategies for oil spill response are outlined in the *Phoenix South-1 Drilling OSCP*. The response strategies include:

- **Source control:** relief well and well intervention – all tiers;
- **Monitoring and evaluation:** surveillance and spill fate modelling – all tiers;
- **Mechanical dispersion:** used to assist with the natural dispersion process of hydrocarbon at sea surface – tier 2 spills;
- **Oiled wildlife response:** hazing; pre-emptive capture and cleaning/rehabilitation – tier 2 and 3 spills; and
- **Scientific monitoring:** impact and recovery assessment of sensitive marine receptors exposed to oil – tier 3 spills.

8. CONSULTATION

As stated in Apache's Environmental Management Policy, our company is committed to maintaining open community and government consultation regarding its activities and environmental performance.

Apache's operating presence (e.g., gas processing facilities at Devil Creek and Varanus Island) off the North West Shelf ensures that communication is regular with relevant stakeholders, including those potentially affected by this activity.

The identified stakeholders are commercial fishers in the region, fishing bodies, federal departments and regulators. Relevant stakeholders identified for the drilling activity based on the defined operational area are summarised in Table 8-1.

Table 8-1: Summary of stakeholders relevant to the drilling activity

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA) • Department of Fisheries (DoF) • Western Australian Fishing Industry Council (WAFIC) • Commonwealth Fisheries Association (CFA) • A Raptis and Sons • WestMore Seafoods • Shark Bay Seafoods • Austral Fisheries • MG Kalis • Pearl Producers Association
Recreational fisheries	• RecFish West
Marine conservation	• Department of Environmental Regulation (DER) – following the separation of the former DEC. • Western Australian Department of Parks and Recreation (DPaW) – following the separation of the former DEC.
Shipping safety and security	• Australian Maritime Safety Authority (AMSA) • Port Hedland Port Authority (PHPA) • Department of Defence
Hydrocarbon spill response	• Australian Marine Oil Spill Centre (AMOSC) • Western Australian Department of Transport (DoT)
Adjacent regulators	• Western Australian Department of Mines and Petroleum (DMP) • Commonwealth Department of the Environment (formerly DSEWPaC)- now DoE
Other	• Town of Port Hedland • Marine Tourism WA

Apache has commenced with issuing quarterly updates to relevant stakeholders. These updates consist of details for the ongoing, plus proposed upcoming activities on the NWS for the next 6–9 months. This update provides the stakeholders with information inclusive of proposed activity, activity location and the activity duration, and gives the stakeholders an opportunity to request additional information on the specific activities that may be of interest to them. The quarterly update issued in June 2013, included this drilling activity.

During the consultation process, where stakeholders have raised queries, Apache has conducted additional meetings and provided additional information in response to the stakeholder queries.

9. CONTACT DETAILS

Further information about the Phoenix South-1 exploration drilling activity can be obtained from:

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10. MANAGEMENT CONTROLS FOR THE DRILLING ACTIVITY

The following tables (Table 10-1 and Table 10-2) summarise the control measures corresponding to the potential environmental hazards identified for the drilling activity which eliminate or reduce the environmental risks to ALARP.

Table 10-1: Management controls for planned events during drilling activity

Hazard	Management Controls
Seabed disturbance	• Support vessels do not anchor within the exclusion zone. • The MODU must be anchored in the proposed manner to enable safe drilling operations. The MODU is moved to and positioned on location in accordance with *Atwood's Marine Operations Manual (Eagle: AO52OM-001; Falcon: FAL-OPS-MAN-1201*) and mooring analyses specific to the well. These procedures are reviewed and approved by Apache prior to their use. • The drilling activity will be undertaken according to Atwood's Safe Work Procedure and all moves recorded on the MODU vessel log. • A Job Safety Analysis (JSA) and Permit to Work (PTW) will be completed for the activity as per the Safe Work Procedure (SWP). • Rig positioning during mooring activities is monitored by a 3rd party surveying company with representatives on board to cover 24-hour operations. • The MODU monitors and records anchor tensions every four hours in the Deck Log; and • If constant slippage is experienced, anchor holding power can be increased by changing the angles of the flukes or by piggy backs.
Artificial light	• MODU and support vessel deck lights will be switched off and spot lights directed inboard to reduce light spill onto marine waters unless inconsistent with navigation and vessel safety standards.
Noise emissions	• MODU and support vessel machinery will be regularly maintained to reduce noise emissions to marine waters. • The interaction of all support vessels with cetaceans and whale sharks will be consistent with Part 8 of the EPBC Regulations. • Fauna observation kits will be available on MODU and all vessels. All cetacean and whale shark sightings will be recorded on the Apache Marine Fauna Sighting Datasheet with data submitted to DSEWPaC. • All crew will attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna. • Helicopters will maintain industry accepted horizontal, altitude and hovering exclusion zones. The helicopter exclusion zones will be consistent with the Australian National Guideline for Whale and Dolphin Watching (2005)
Discharge of drill cuttings and fluids	• Apache drilling fluid selection process ensures biodegradable water based fluids selected wherever practicable • Through a risk based approach, select chemicals which have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation.

Hazard	Management Controls
	• Hazardous drilling fluid chemicals are stored in sack room which is bunded to prevent accidental overboard discharges. • Non-hazardous products are stored mainly in the sack storage room or in bunded areas on the deck. • Prior to riser installation, drill cuttings being disposed of directly to the seabed thereby minimising water column turbidity. • WBM will be discharged to sea following treatment on board the MODU through the shale shakers and centrifuges (as required) to maximise re-use of drilling fluids • WBM that is flushed during tank/pipe cleaning will be diverted overboard. The amount discharged will be quantified by the mud engineers and reported within the Open Well report, and within the daily mud report if applicable. • Shaker screen selection is made by the Mud Engineer on location and reviewed by the Apache Fluid Coordinator daily. • Screens are inspected a minimum of once a day during drilling operations once BOP and riser are in place to check for wear and tear. • Reconditioning and re-use of residual WBM, where practicable, for use on subsequent wells. • Mud logging units are maintained in accordance with planned maintenance system (PMS) • Mud pit sensor calibration is checked every two weeks and recalibration only required if the calibration is out following this check. • Cuttings dryer and centrifuge system are inspected as a minimum at the end of each section, when operational • Use of drilling fluids recorded in daily mud reports. • Regular inspection of cuttings management equipment. • End of well report confirms estimated volumes of drilling fluid used. • Once a week the daily mud report will include a record of when the calibration of mud loggers was last checked • Crew involved with base oil transfer follow MODU mud transfer procedures.
Discharge of cement	• Through a risk based approach, select chemicals which have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation. • Bulk cement will not be discharged overboard except in emergency. • Bulk transfer procedure, storage and handling facilities on the rig • Only the required volume of cement will be brought on board the MODU (plus allowable contingency) in accordance with the cement program • Cement additives stored in bunded areas, if spillage occurs, collected liquids are vacuumed and reused where possible, or directed for treatment and appropriate disposal. • Cement discharged at seabed during cementing of conductor. All other returns discharged at sea surface. • Residual cement will be discharged to sea following treatment to ensure oil on cuttings is <10% • Hard cement which returns to surface and is removed at the shale shakers will be diverted overboard. • Mix and use cement as required to reduce wastage. Cement volume requirements are calculated using the volume of cement necessary plus industry accepted excess volumes to meet the downhole requirements and minimise surface discharges. Calliper logs will be used for this

Hazard	Management Controls
	calculation when available • Shaker system maintained in accordance with PMS. • Routine inspection of cuttings management system. • Shaker screen selection is made by the Consultant Mud Engineer on location and reviewed by the Apache Fluid Coordinator daily • Screens are inspected a minimum of once a day during drilling operations to check for wear and tear • Actual cement product and additive usage recorded on Apache Cement "Open wells" report within 48 hours of cement job.
Planned discharges	• Untreated sewage stored and disposed in accordance with MARPOL Annex IV; Treated sewage discharged in accordance with MARPOL Annex IV. Sewage system compliant with MARPOL Annex IV. • Sewage system maintained in accordance with manufacturer's specifications • Vessel masters ensure maximum carrying capacity not exceeded. • Food waste collected, stored, processed and disposed in accordance with MODU/support vessel Garbage or Waste Management Plan. Placards will be displayed to provide guidance on garbage disposal requirements • Offshore food waste disposal in accordance with MARPOL Annex V. • Food macerators capable of macerating food to 25 mm or less and maintained to manufacturer specifications. • Food waste not discharged or incinerated stored and disposed at approved onshore facility. • The MODU will hold oily bilge water onboard and dispose of the oily water on return to port. Onshore oily water disposal will be at a reception facility or to a carrier licensed to receive the waste oil and details recorded in Oil Record Book • Support vessels will not discharge oily water within the operational area
Air emissions	• No incineration will occur onboard the MODU and support vessels will not use incinerators within the 500 m operational boundary. • Fuel oil will meet regulated sulphur content levels in order to control SOx and particular manner emissions. • Vessel engines will be operated in a manner to achieve regulated NOx emission levels. • Vessels will hold a valid and current International Air Pollution Prevention Certificate (IAPPC). • Ozone-depleting substances (ODS) will not be deliberately released in the course of maintaining, servicing, repairing or disposing of systems or equipment. All ODS recorded in ODS Record Book.
Interference with other users of the sea	• AHO, AMSA and commercial fishing stakeholders notified prior to moving to the drilling location. • Drilling activity follows all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 1912. MODU and support vessels equipment and procedures comply with AMSA Marine Orders Part 30: Prevention of Collisions and Marine Orders Part 21: Safety of Navigation and Emergency Procedures. • MODU and support vessels equipped with an automatic radar plotting aid (ARPA) system capable of identifying, tracking and projecting the closest approach for any vessel (time and location) within the operational area and radar range (up to approximately 70 km).

Hazard	Management Controls
	• Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day. • Support vessels employed to aid the detection of other vessels and provide additional communication with other vessels where necessary. • The support vessels will assist in maintaining the requested clearance of 500m around the MODU.

Table 10-2: Management controls for unplanned events during drilling activity

Hazard	Management Controls
Introduction of invasive marine pest species	• The exchange of ballast water must follow AQIS guidelines. Where a vessel has entered Australian waters from International waters, evidence that AQIS guidelines have been followed will be required. Details of AQIS requirements can be found in The Australian Ballast Water Management Requirements available at http://www.environment.gov.au/soe/2006/publications/drs/pubs/390/co/co_51_australian_bw_requirements.pdf • No ballast water exchange will take place in waters less than 200 m or within 12 nautical miles from nearest land in accordance with Australian Ballast Water Management Requirements (AQIS, 2011). • All ballast water exchange details are recorded in ballast water log. • International vessels arriving in Australia from a foreign port or location should adhere to Australian quarantine requirements. • All international vessels must meet all standard "AQIS Commercial Vessel Requirements" (DAFF, 2009a) before arrival at an Apache operated location in Australia, including exploration or construction sites outside the 12 nm limit. • A biofouling vessel risk assessment (VRASS) must be carried out within sufficient time prior to mobilisation to Australia to enable any required cleaning operations to be undertaken. • All international vessels contracted by Apache must adhere to the International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008) and follow the "*National Biofouling Management Guidance for the Petroleum Production and Exploration Industry*" (Commonwealth of Australia, 2008) before entering Australian waters. • Where possible, the MODU and support vessels will mobilise to the drilling site from locations within Australian waters; and • The MODU/support vessels will be in possession of a current International Anti-fouling System Certificate to verify that it complies with the International Convention on the Control of Harmful Anti-fouling Systems on Ships. • If a IMP has been identified or is suspected, then the contractor or Apache team member is obliged to immediately (within 24 hours) notify the applicable government agency (Department of Fisheries in the State of WA; or Department of Agriculture, Fisheries and Forestry in Commonwealth waters) • Under consultation from State and Commonwealth government agencies, Apache will develop an action plan to manager and reduce the IMP risk status.
Solid waste discharges	• Non-biodegradable and hazardous wastes are collected, stored, processed and disposed of in accordance with the Garbage Management Plan as required under Regulation 9 of MARPOL 73/78 Annex V • Accidental release of waste to the marine environment is reported, investigated, and corrective actions are implemented. • All crew will be required to attend an environmental induction containing basic information on waste management. • Hazardous wastes (e.g. used oils, lithium batteries, chemical and metallic wastes) will be segregated, labelled and stored onboard with secondary containment (e.g. bin located in a bund). • No incineration will take place onboard the MODU or on support vessels within the 500 m exclusion zone. • Solid non-biodegradable and hazardous wastes that cannot be incinerated will be disposed of onshore at a reception facility or to a carrier licensed to receive the waste if required by jurisdictional legislation.

Hazard	Management Controls
Dropped objects	• During the drilling activity, any lifting of equipment will be in accordance with Lifting Equipment Management System (LEMS) outlined in the Drilling contractor's HSE system. • During the drilling activity, the Apache *Drilling and Completions Standards Manual (AE-91-ID-004)* defines a number of measures that must be in place to ensure no objects are dropped into the marine environment • During the drilling activity, detailed records of equipment lost overboard will be recorded. • During mobilisation/demobilisation, all equipment and gear on the MODU and vessels are securely sea fastened. • During the drilling activity, depending on the nature of the type of lift, a PTW may be required. If a permit is not being used then a JSA and planning prompt card will be used to risk assess the lift. • During the drilling activity, anchor handling procedures prevent potential for dropping or dragging anchors across subsea infrastructure. • During the drilling activity, support vessels will not anchor within the 500 m exclusion zone around the MODU unless in an emergency (and if safe to do so). • Planned maintenance undertaken on material handling and lifting equipment in accordance with the MODU and vessels' PMS. • MODU/support vessel crew members involved with lifting and offloading equipment from the MODU will be aware of MODU/vessel lifting and offloading requirements as appropriate. • Subsea infrastructure such as BOPs designed for dropped object impact and anchor drag/snag loads to prevent loss of containment.
Marine fauna collisions	• Fauna observation kits will be available on MODU and support vessels. • All cetacean and whale shark sightings will be recorded on the Apache Marine Fauna Sighting Datasheet with data submitted to DoE • All crew will attend an environmental induction containing basic information on procedures to manage interactions between MODU, support vessels and marine fauna. • Interaction of support vessels with cetaceans and whale sharks will be consistent with Part 8 of the EPBC regulations, including: o A vessel will not travel at greater than 6 knots within 300 m (caution zone) of a cetacean (or whale shark) known to be in the area. o A vessel will not approach closer than 100 m of a cetacean (or whale shark) known to be in the area. o If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly.
Spillage of hydrocarbons environmentally hazardous chemicals and liquid waste to the sea	• All crew will be required to attend an environmental induction containing basic information on chemical and hydrocarbon management, and spill prevention and response measures. • An oil spill exercise will be conducted prior to the commencement of the drilling activity and at a minimum of every three months thereafter. • Training records show that MODU personnel who are involved in lifting and offloading are trained in Atwood *Lifting Tackle Procedure*. • Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas • All hazardous wastes are stored onboard the rig in closed, secure and bunded storage facilities prior to transport back to shore for disposal/recycling/treatment in accordance with local regulations

Hazard	Management Controls
	• A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals and hydrocarbons. • Chemical and hydrocarbon storage areas will be frequently inspected (at least weekly). • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas). • Chemical and hydrocarbon spills will be immediately cleaned up and contaminated material will be contained onboard for onshore disposal • All shipboard chemical and hydrocarbon spills will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP)/ Shipboard Marine Pollution Emergency Plan (SMPEP) and the *Phoenix South-1 Drilling OSCP*. • Scupper plugs or equivalent will be available on MODU and support vessel decks where chemicals and hydrocarbons are stored and frequently handled (i.e.' high risk' areas). • Non-hazardous, biodegradable detergents will be used for deck washing • Any equipment or machinery with the potential to leak oil will be enclosed in continuous bunding • All vessel machinery and equipment containing hydrocarbons will be included on the vessel's PMS and maintained in accordance with manufacturer's specifications. • All hoses used for pumping and transfers are maintained and checked as per MODU's planned maintenance schedule (PMS) • Any oil or fuel transferred to an onshore, reception facility, another vessel or to a carrier is transferred in compliance with MODU procedures and bunkering procedures and the receiver of the oily waste must be licensed to receive it. • Left-over bulk drilling solids (e.g., barite, bentonite, cement) will be stored onboard and legally disposed of. • Uncontrolled discharge of dry cement dust will be prevented by blocking vents when bunkering is occurring and having a crew member posted at the vent during filling to oversee the operation • MODU will hold oily bilge water on-board and dispose of the oily water on return to port. Onshore oily water disposal will be at a reception facility or to a carrier licensed to receive the waste oil. • The vessel operator will record the quantity, time and onshore location of the oily water disposal in the vessel Oil Record Book. • Support vessels will not discharge oily water within the 500 m operational boundary
Hydrocarbon spill during at sea refuelling	• Fully manned operations. Fuel bunkering will cease by turning off pump if refuelling pipe ruptures. • Dry-break refuelling hose couplings and hose floats installed on refuelling hose assembly. • Marine diesel is the only fuel type used by support vessels. • Adequate bunding beneath refuelling hose connections on supply vessels and MODU. • Drains closed in fuel transfer areas to contain spills. • MODU and support vessels have valid and current International Oil Pollution Prevention Certificates • All shipboard chemical spills are managed in accordance with the SOPEP/SMPEP. • Spill response in accordance with *Phoenix South-1 Drilling OSCP*. • Diesel storage tanks and fuel transfer hoses maintained in line with vessel PMS.

Hazard	Management Controls
	• Refuelling hoses on MODU replaced every six months. • MODU personnel involved with refuelling follow appropriate documentation and checklists which includes fuel transfer with a PTW reflecting the activity. • MODU safety case and safety case revision in place. • Vessels over 400 gross tonnes have current SOPEP/SMPEP in line with MARPOL Annex 1. • Vessels hold a valid International Oil Pollution Prevention certificate (IOPP)
Hydrocarbon spill from ruptured vessel fuel tank.	• AHO is notified of drilling activity prior to mobilisation to the location to enable a Notice to Mariners to be issued. • AMSA RCC is notified of drilling activity prior to mobilisation to the location to enable an AusCoast warning to be issued. • Consultation with other users, e.g. fishing industry prior to mobilisation to the location. • Vessel operations will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the SOLAS 1974 and Navigation Act 1912. Vessels equipment and procedures comply with AMSA Marine Orders Part 30: Prevention of Collisions and Marine Orders Part 21: Safety of Navigation and Emergency Procedures, Marine Orders Parts 3 and 6 – Seagoing Qualifications and Marine Radio Qualifications Marine Orders Part 27 – Radio Equipment. • 24 hour visual observations maintained by all vessels by trained watch keepers. • A support vessel will be employed to maintain the exclusion zone, aid in the detection of other vessels and provide additional communication with other vessels where necessary. • Marine diesel oil compliant with MARPOL Annex IV Regulation 14.2 (sulphur content less than 3.5%m/m) is the only engine fuel recorded on the fuel bunkering register for MODU and support vessels. • Oil spill response executed in accordance with the OSCP and vessel SOPEP/SMPEP as required under MARPOL. • If spill event occurs as a result of ruptured fuel tank, implement a tier 2 response in accordance with the OSCP. • Conduct oil spill exercise prior to commencement of drilling activity and every three months thereafter. • Support vessel crew will be experienced and competent to standards required by the International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW95) and/ or AMSA marine orders, seagoing qualifications. • All crew must attend an environmental induction containing basic information on spill response measures.
Hydrocarbon spill due to loss of well control	• Casing sizes and lengths and the intervals where the hole is cement-sealed around the casing will be selected to maximise well control. Well design is conservative to ensure a margin of safety to control any higher than expected pressures • Safety risks associated with a blowout are considered within the MODU HSE Safety case which details safety risks associated with a well blowout, that are reduced to ALARP • Apache requires two barriers between the environment and hydrocarbon flow to be maintained during drilling and completion activities, and suspension and abandonment periods. The two barrier system to be applied when suspending the wells would also be the standard applied when abandoning wells • Other loss of well control prevention measures are defined in *Apache Drilling and Completions Standards Manual* • Blowout prevention and control of wells is managed through implementation of Apache's *Well Management Drilling System (WMDS)* • Key elements of the well control standards are detailed within the WOMP which requires acceptance by NOPSEMA prior to commencement of well

Hazard	Management Controls
	operations • The use of drilling mud to overbalance the mud column will be used to reduce the risk of gas release. If one or more warning signs of a kick are observed, steps are taken to check for flow from the well and the well is immediately shut-in. The well can then be easily brought under control by adjusting the density and weight of the drilling fluid • Crew will be trained in oil spill response procedures and will undertake an oil spill exercise every 3 months and prior to the activity commencing • Mud logging equipment to be in place and tested weekly • BOP regularly testing in accordance with PMS and manufacturer's maintenance specifications • In the event a loss of well control occurs, tier 3 spill response activities would be implemented in accordance with *Phoenix South-1 Drilling OSCP*
Hydrocarbon Spill Response	Management controls for activities and associated hazards relating to the following are described in Table 10-1 and Table 10-2 above: • Additional seabed disturbance from rig anchoring, dropped objects and disposal of cuttings • Generation of additional artificial lights and noise associated with response vessels and aircraft. • Additional drilling discharges associated with drilling a relief well • Additional planned discharges from MODU and support vessels. • Release of air emissions from response vessels and aircraft. • Interference with other users of the sea during operation of response vessels. • A risk of unplanned solid waste discharges that may occur from response vessels. • A risk of marine fauna collisions. • A risk of unplanned chemical/hydrocarbon spills that may arise from response rig, vessels and aircraft. • Affected stakeholders. In addition, oiled wildlife response activities may be required which include the following management controls: • **Hazing**: used to deter or scare animals away from an area. This can lead to the separation of groups or adults/juveniles, collision with marine fauna and introduction of further stress generally to marine fauna present; • **Pre-emptive capture:** used to relocate marine fauna that has not been contacted by oil to reduce the risk of impact due to oil exposure. Relocation to inappropriate areas that will not support the animals' requirements (e.g. habitat, food sources, predator presence) may not achieve a net environmental benefit; • **Capture and collection**: during capture and collection animals may be injured and if there condition is already poor due to oil contact inexperienced handling can exacerbate their condition rapidly; and • **Field stabilisation**: required prior to further treatment of oiled animals to ensure they can cope with the cleaning and rehabilitation that will follow. Effective field stabilisation response requires deployment of adequate experienced handlers to the appropriate locations in a timely manner.

11. REFERENCES

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