Coniston Novara Phase II Drilling

Environment Plan Summary

APACHE ENERGY LTD (ABN 39 009 301 964) 100 ST GEORGES TERRACE / PERTH / WA / 6000 TEL (08) 6218 7100 / FAX (08) 6218 7200

CONTENTS

1. INTRODUCTION

Apache Energy Ltd (Apache) proposes to continue drilling seven production wells from their surface casing point to routine total depth as phase II drilling of the Coniston Novara Development Project (**Figure 1-1).**

Drilling of the intermediate and bottomhole sections of the wells is required in order for crude oil production from the wells to commence. Once completed, the Coniston and Novara production wells will tie-in to the existing Van Gogh operations.

Apache undertakes this activity as the operator of the WA-35-L permit (**Figure 1-1**).

1.1 Schedule

Phase II drilling of the Coniston Novara Development Project is expected to take at least 365 days to complete the seven wells, and is scheduled to commence in September 2013. Drilling of the wells will be undertaken by a semi-submersible MODU to be anchored on location during the operation. The MODU may move off location during the drilling activity (e.g. cyclone contingency, MODU re-tasking) however, completion of the activity is expected by December 2014.

Required timeframes to complete the seven wells will be influenced by weather and maintenance requirements during operations.

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).

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

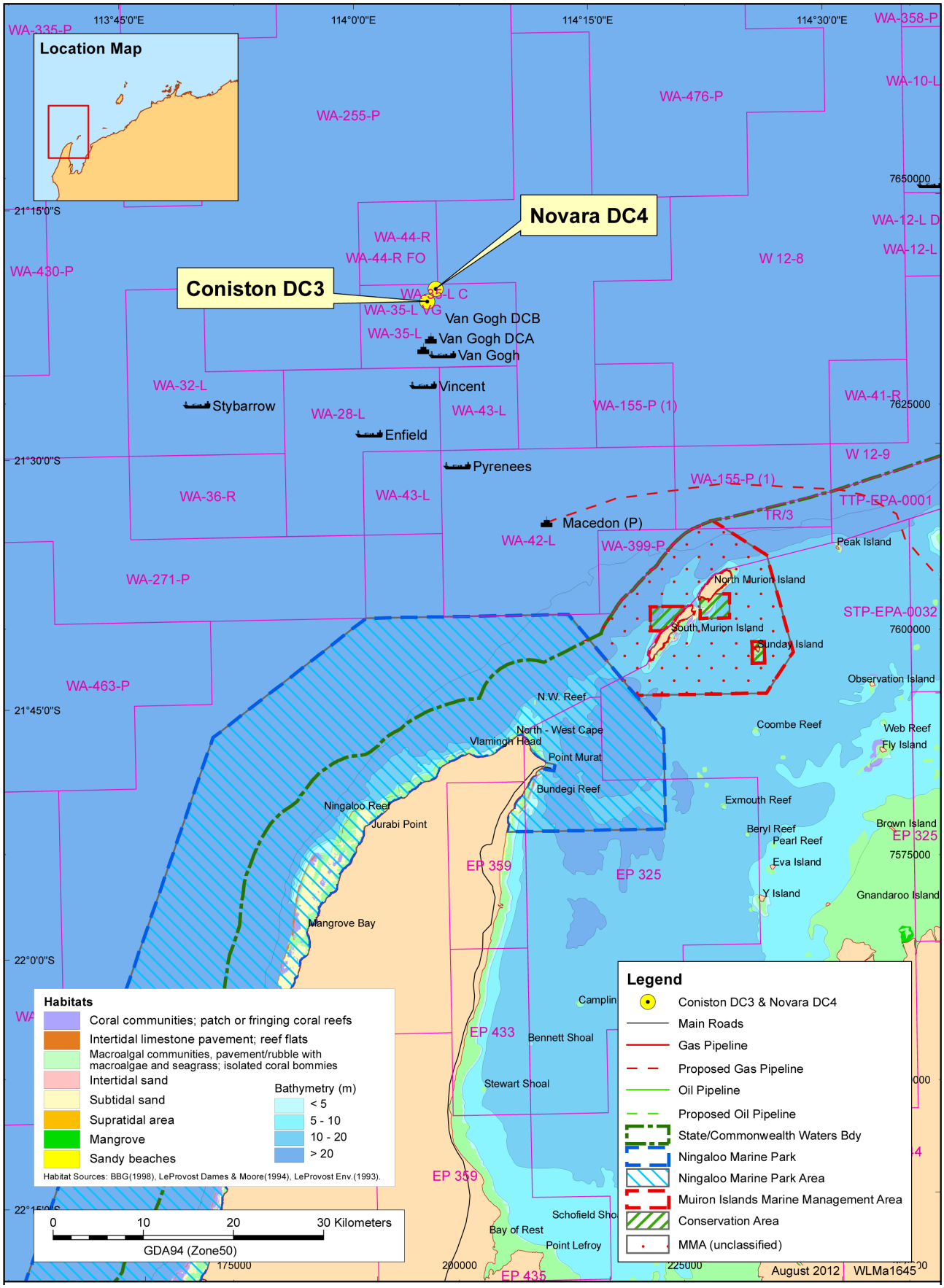

Figure 1-1: Location map for the drilling activities

2. LOCATION OF THE ACTIVITY

The location of the Coniston and Novara drill centres is provided in **Table 2-1**. The Coniston drill centre is approximately 4 km north of the Van Gogh operation. The seven production wells are in a water depth of approximately 380 m.

Table 2-1:Surface locations for the drill centres

Location	Coordinates (Datum/Projection: GDA 94 Zone 50)			
	Latitude	Longitude	Easting	Northing
Coniston drill centre (DC3)	21˚ 20’ 57.290”S	114˚ 04’ 23.613”E	196439.35	7636375.13
Novara drill centre (DC 4)	21˚ 20’ 12.47”S	114˚ 04’ 56.12”E	197350.79	7637772.22

A 500 m petroleum safety zone will be designated around the MODU when stationary onsite at the drill locations and this defines the exclusion zone and operational area for the drilling activity.

3. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical environment

The drilling activity is located on the North West Shelf (NWS). The region is typical of the arid tropics; high summer temperatures, periodic cyclones and associated rainfall. Rainfall is generally low although intense rainfall may occur during passage of summer tropical cyclones. NWS waters are usually thermally stratified with a marked change in water density at approximately 20 m (SSE, 1993). Surface temperatures vary annually, being warmest in March (32^{o}C) and coolest in August (19^{o}C). Vertical gradients are correlated to sea surface temperatures, and are greatest during the warm-water season (SSE, 1991). Near bottom water temperature is approximately 23^{o}C, with no discernible seasonal variation.

Wind shear on surface waters generates local-scale drift currents that can persist for extended periods (hours to days). Wind data from 2004–2009 sourced from the National Centre for Environmental Predictions at coordinates 20° S, 115° E (the nearest node to the activity location) provides a guide to the wind conditions expected during the project (APASA, 2013). During September–March, the prevailing non-storm winds are from the southwest ranging up to a maximum speed of ~30 knots. Winds from the south-west direction are generally strongest between September and January with wind speed frequently reaching 24 knots and weaker between February and March; with wind speed generally less than 16 knots (APASA, 2013). During April–August, winds are generally lighter and more variable in direction. Non-storm winds prevail from the east–south quadrant and can attain a maximum speed of up to 30 knots, but are generally less than 16 knots, particularly during April and May (APASA, 2013). Extreme wind conditions in the area may be generated by tropical cyclones, strong easterly pressure gradients, squalls, tornados and water spouts.

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. 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). 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).

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) and thus will have greater influence upon the trajectory of slicks over time scales exceeding a few hours (APASA, 2013).

3.2 Biological environment

The proposed drilling activity is located in Commonwealth waters, offshore from the WA mainland. Significant features and their proximities to the proposed drilling area are given in **Table 3-1** and those in close proximity are shown in **Figure 1-1**.

Table 3-1: Distance of key regional features from proposed drilling activity

Regional Feature	Approximate distance and direction from drilling location	
Gascoyne Marine Reserve	34 km	W
Ningaloo Marine Park (northern boundary)	35 km	S
Ningaloo Coast WHA	35 km	S
Muiron Islands Marine Management Area boundary	38 km	SE
North West Cape Peninsula	50 km	S
Barrow Island	138 km	NE
Barrow Island Marine Park boundary	140 km	NE
Montebello and Lowendal Islands	170 km	NE
Dampier Archipelago	256 km	NE
Shark Bay	343 km	SW

Within the NWS habitats include coral reefs, macroalgae, seagrasses, hard substrate and supported assemblages. These habitats are found near the shoreline around many of the smaller islands along the coast such as Barrow/Montebello Islands. Other habitats include mangroves, sandy beaches, intertidal and subtidal zones and rocky shorelines.

The Coniston and Novara wells are located on the continental slope, with water depths ranging across the Continental Slope from 350–900 m where the seabed slope increases more distinctly over short distances. The continental slope supports a sparse seabed community, with species diversity and abundance decreasing with increasing depth (AEL, 2008). Soft sediments can support a diverse benthic infauna consisting predominantly of mobile burrowing species which can include molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals.

Benthic surveys in waters between 50–150 m of the Exmouth region using van Veen grab samples indicated that polychaetes and crustaceans dominated in terms of species and individual abundances. While there were few detectable patterns of distribution of individual species across the depth profile, at least one species of tanaid was found at 150 m water depth and sponges and cnidarians were only found at 50 m water depth. Most other species were spread sporadically over the three depths. With the domination of polychaetes and crustaceans, these assemblages are typical of infauna samples from these depths on the NWS (Woodside, 2005). The biota is comparable to that found over similar substratum, and at similar depths in the region (Ward and Rainer, 1988; Rainer, 1991; Sainsbury *et al.,* 1992; Kinhill Pty Ltd, 1997, 1998).

An EPBC Act Protected Matters search (DSEWPaC, 2012) identified four 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 proximity to the permit area:

- Continental slope demersal fish communities;
- Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula;
- Commonwealth waters adjacent to Ningaloo Reef; and
- Exmouth Plateau.

The EPBC Act Protected Matters Database on the 21st of November 2012 (DSEWPaC, 2012) identified ten threatened species (endangered or vulnerable) of marine organisms found within proximity to the permit area. In addition a further six species are listed as migratory and ten species are protected under State legislation (*Wildlife Conservation Act 1950*).

3.3 Socio-economic environment

The drilling activity is located approximately 272 km offshore from the Port of Dampier (distance to port boundary). Smaller coastal fishing and tourism settlements occur at Onslow, approximately 110 km to the east-southeast and at Exmouth, 58 km to the south. Socio-economic activities that may occur within the spill trajectory area for the activity include commercial and recreational fishing, oil and gas exploration and production, shipping, tourism and cultural heritage values

A valuable and diverse commercial fishing industry is supported by both the offshore and coastal waters in the NWS Region, mainly dominated by the Pilbara fisheries. The major fisheries in the Pilbara region target tropical finfish, large pelagic fish species, crustaceans (prawns and scampi) and pearl oysters (AFMA, 2011; AEL, 2010; Fletcher and Santoro, 2012).

Fifteen State commercial fisheries have boundaries that overlie or are in close proximity to part or all of the drilling activity exclusion zone and the spill trajectory area in the North Coast Bioregion, Gascoyne Bioregion, West Coast Bioregion and Whole of State Fisheries.

Commonwealth fisheries in the area include the North West Slope Trawl (NWST), Southern Bluefin Tuna Fishery (SBFTF), Western Tuna and Billfish Fishery (WTBF) and Western Skipjack Tuna Fishery (WSTF) although licenced to fish within the exclusion zone and/or spill trajectory area, have had no recent fishing effort reported in the exclusion zone (AFMA, 2011). The Western Deepwater Trawl (WDTF) has reported effort within the spill trajectory area with 34.3 tonnes reported for the 2009/2010 season (AFMA, 2011).

Recreational fisheries and charter boat operators are managed by Department of Fisheries; fishing is a key component of many tourist visits, with fishers targeting predominantly tropical species such as emperors, tropical snappers, groupers, mackerels, trevallies and other game fish. Recreational fishing also occurs along the majority of the coastline (shore-based angling) along the eastern and western side of North West Cape especially over the months April to September (Apache, 2008). The region also supports extensive diving and ‘eco-tourism’ activities, including whale shark observations. Given the distance offshore (64 km offshore from Exmouth and 272 km offshore from the Port of Dampier) recreational fishers are not expected within the exclusion zone.

The proposed drilling area and surrounding waters are predominantly used for petroleum exploration and development. The nearest Floating Production Storage and Offloading Facility (FPSO) is the Van Gogh FPSO (in production licence WA-35-L); and the Woodside Vincent FPSO (in production licence WA-28-L) as shown in **Figure 1-1**.

Under the *Commonwealth Navigation Act 1912*, all vessels operating in Australian waters are required to report their location on a daily basis to the Rescue Coordination Centre (RCC) in Canberra. There is a shipping route heading northeast approximately 40 km to the west of the proposed drilling location however, a relatively small number of vessels use this (AEL, 2010; Woodside 2006).

4. ACTIVITY DESCRIPTION

Apache proposes to continue drilling seven production wells from their surface casing points to routine total depths as phase II drilling of the Coniston Novara Development Project in WA-35-L permit area.

Recent drilling undertaken in the permit included drilling of the tophole sections of the wells and placement of wellhead equipment (phase I drilling). Drilling of the intermediate and bottomhole sections of the wells is required in order for crude oil production from the wells to commence. Once completed, the Coniston and Novara production wells will tie-in to the existing Van Gogh operations.

Drilling of the wells will be undertaken by a semi-submersible 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 locations. At least one support vessel will be utilised during the activity to supply food, bulk drilling materials, transportation of equipment, monitoring and maintenance of 500 m exclusion zone around the MODU.

The *Atwood Falcon* operated by Atwood Oceanics is a semi-submersible MODU, the deck is supported by columns fixed to pontoons which can be ballasted below wave action and provide a stable drilling base. Anchoring the MODU will involve an eight anchor array on the seabed with anchors laid on the seabed up to 2 km from the MODU position. The MODU has the capacity to accommodate 130 people.

Upon arrival at the drilling location, the MODU will be anchored with the support of AHVs. Once securely in position, the MODU will drill each well to completion which will include the following steps:

- Installation of the blow-out preventer (BOP);
- Commence drilling with water based mud (WBM) (although SBM use is included as a contingency);
- Cementing of casing strings and Installation of sand screens;
- Displacement of WBM to inhibited brine; and
- Running upper completion and suspension of wells.

At the Coniston drill centre, six wells are to be completed. In this instance, the MODU will kedge between wells due to the close proximity of the surface hole locations to one another. As there is only one well at the Novara drill centre, the MODU will required to re-anchor at least once during drilling operations.

5. ENVIRONMENTAL RISK ASSESSMENT

The outcomes of a broader scale hazard identification workshop on Apache's drilling activities across the NWS (Oracle, 2013), facilitated by independent risk consultants using the combined experience of Apache's Drilling, Environment and Logistics Departments was also used to inform the environmental risk assessment workshop for this activity.

During the risk assessment workshops, environmental risks associated with the proposed activities were assessed by identifying the hazards, their causes and their potential impacts. 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 for routine and non-routine events for the Coniston Novara Phase II drilling activity centred around a hazard identification workshop attended by a subset of Apache's environmental scientists and drilling personnel, held on 11 July 2012. Throughout the preparation of this EP, further evaluation of risks were undertaken as appropriate, as the activity scope was defined. Apache environmental scientists and other participants from Drilling, Logistics and Safety departments were also involved where necessary to ensure compliance with Apache's *Environmental Risk Identification Procedure* (AE-91-IF-039*).*

These environmental risks and control measures to be applied to the drilling activity are provided summarised in **Section 9**. 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 non-routine 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 9**. 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 *Coniston Novara Phase II Drilling OSCP* (EA-00-RI-268/2);
6. Record keeping; and
7. Stakeholder consultation.

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

7. STAKEHOLDER 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 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.

Apache engages regularly with DPaW and DoT regarding the appropriateness of the proposed oil spill response strategies, as described in the OSCP, in parallel with NOPSEMA's assessment of the Environment Plan.

Relevant stakeholders identified for the drilling activity based on the defined operational area are summarised in **Table 7-1**.

Table 7-1: Summary of stakeholders relevant to the drilling activity

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA); • Department of Fisheries (DoF); • Commonwealth Fisheries Association (CFA); • A Raptis and Sons; • WestMore Seafoods; • Shark Bay Seafoods; • Austral Fisheries; • Pearl Producers Association; and • Individual fishing licence holders.
Recreational fisheries	• WAFIC; and • Recfishwest.
Marine tourism	• Marine Tourism WA.
Marine conservation	• Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC); and • Department of Parks and Wildlife (DPaW, previously DEC).
Marine activities, spill response and safety	• Australian Maritime Safety Authority (AMSA); • Department of Mines and Petroleum (DMP); • Department of Defence; • Department of Transport (DoT); and • Australian Marine Oil Spill Response Centre (AMOSC).
Exmouth community	• North West Cape Exmouth Aboriginal Corporation; • Exmouth Chamber of Commerce; • Shire of Exmouth Council; • Shire of Exmouth Administration; • Gascoyne Development Commission; • DPaW Exmouth; • Exmouth District High School; • Cape Conservation Group; • Exmouth Game Fishing Club; and • Ningaloo Station.

Apache issues quarterly updates to relevant stakeholders. These updates consist of details for the ongoing, plus proposed upcoming activities on the NWS for the next 3 to 6 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.

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

8. CONTACT DETAILS

Further information about the drilling activities can be obtained from:

Libby Howitt
Deputy Environment Manager
Apache Energy Limited
100 St Georges Terrace, Perth, Western Australia, 6000
Phone: 08 6218 7181
Email: libby.howitt@apachecorp.com

9. MANAGEMENT CONTROLS FOR THE DRILLING ACTIVITY

The following tables (**Table 9-1** and **Table 9-2**) summarise the control measures corresponding to the potential environmental hazards (nine routine and eight non-routine events) identified for the drilling activity which eliminate or reduce the environmental risks to ALARP.

9.1 Routine Events

Table 9-1: Management controls for routine events during the drilling activity

Hazard	Management Controls
Seabed disturbance	
Support vessel anchoring	Support vessels do not anchor within exclusion zone.
Pre-drilling site survey	Site surveys indicated that there are no raised seabed features or geological formations of concern for the safe movement of the MODU.
MODU positioning	The MODU must be anchored in the proposed manner to enable safe drilling operations. The MODU moved to and positioned on location in accordance with Atwood's *Marine Operations Manual (FAL-OPS-MAN-1201)* and mooring analyses specific to the wells. These procedures are reviewed and approved by Apache prior to their use.
	While drilling the Coniston wells at DC3 the MODU will kedge (skidding – by increasing/ decreasing tension of the anchor wires) between well locations negating the need to move anchors for each of these wells. Prior to kedging the MODU between wells, Atwood's Safe Work Procedure for hopping between wells is to be adhered to with 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).
	To minimise potential disturbance to the seabed the following measures will be in place: • Loss of position while cross-tensioned anchors are in place is constantly monitored using the onboard seabed acoustic monitoring system; • The MODU monitors and records anchor tensions every three 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	
Deck lighting	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.
In-sea equipment inspection	Night-time activities will be avoided, if practicable, to reduce direct lighting onto marine waters.
Noise	
Machinery maintenance	MODU and support vessel machinery will be maintained in accordance with Planned Maintenance System (PMS) and manufacturer's maintenance specifications to reduce noise emissions to marine waters.
Vessel operation	The interaction of all support vessels with cetaceans and whale sharks will be consistent with Part 8 of the EPBC Regulations, which for these drilling activities includes the following: • 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; • A vessel will not approach closer than 100 m of a cetacean (or whale shark) known to be in the area; and • 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.

Hazard	Management Controls
Fauna observation	Marine fauna identification posters and recording sheets will be available on MODU and all vessels to ensure crew have the necessary equipment available to record observations. All cetacean and whale shark sightings will be recorded in Apache's Marine Fauna Sighting Database with data submitted to DSEWPaC.
Crew Training	All crew will attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna.
Helicopter operation	To reduce sound exposure levels to cetaceans and whale sharks and minimise animal behavioural impacts, 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). By maintaining exclusion zones around whales and whale sharks adverse impacts to other nearby marine fauna (e.g. turtles) are likely to be reduced.
WBM drilling discharges	
Mud selection	Biodegradable water based muds are used wherever practicable and are considered to have the least environmental impact. Through Apache's Fluid Selection Process the most appropriate fluid is selected based on known properties of the formation and WBM is considered the best option. Alternatives for drilling and disposal of drill cuttings to sea are discussed in further detail below but this was considered the best option and the alternatives were screened out.
Chemical selection	Apache uses a risk based approach to select drilling chemical products ranked under the OCNS. Most of the drilling fluids that are proposed are CHARM rated Gold/Silver, or non-CHARM rated E/D (the chemical selection process is discussed in greater detail below). To achieve these rankings, the chemicals have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation. If they are not highly rated (Gold/Silver/D/E) and no alternative is available, a risk assessment is conducted through the *Drilling Fluids and Chemical Risk Assessment procedure* (EA-91-II-008) to ensure the product is environmentally acceptable. Justification for acceptable use will be provided in the risk assessment document and approved by both the Drilling Fluids Coordinator and Apache Environmental Manager or delegate. The drilling fluids (WBM) chosen for this program were selected to meet technical requirements to deliver the wells safely, deliver better performance thereby reducing the drilling program duration and volumes of drilling fluids used, and are considered environmentally acceptable for use in marine environments, given their low toxicity and being readily biodegradable.
Chemical and mud Storage	Hazardous drilling fluid chemicals are stored in a hazardous chemical locker or a suitably partitioned off area within bunds or in secure areas to prevent accidental overboard discharges.
	Non-hazardous products are stored mainly in the sack storage room or in containers on the deck.
Well design	The well has been designed to provide a well bore which reaches the target depth using one string of casing. Optimisation of the well in this way uses the minimum volume of drilling fluids and generates the minimum volumes of drill cuttings; in addition it also optimises the length of time taken to drill the well. If the well is drilled at too small a diameter then the risk of not reaching the target depth, and therefore the chance of mechanical sidetracking, is increased. This results in increased drilling time, producing more drill cuttings and using more fluids.
Cuttings treatment	WBM will be discharged to sea following treatment onboard the MODU through the shale shakers and centrifuges (as required) to maximise re-use of drilling fluids as per *Apache Procedure* DR-91-ID-016. To isolate the cuttings, they could be skipped and shipped to shore, however this is not considered a viable option.
	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 once BOP and riser are in place to check for wear and tear.
	Reconditioning and reuse of residual WBM, where practicable, for use on subsequent wells.
Maintenance	Mud logging units are maintained in accordance with PMS and manufacturer's maintenance specifications.
	Mud logging unit calibration is checked bi-weekly and recalibration only required if the calibration is out following this check.
	Drill cuttings shaker system is maintained in accordance with PMS and manufacturer's maintenance

Hazard	Management Controls
	specifications.
	All hoses used for pumping purposes are maintained and checked as per the MODU's PMS.
Bunkering Procedures	The MODU and supply vessel follow bunkering procedures during bunkering operations including the bunkering hoses are fitted with either dry break (in the case of fuel) or camlock connectors for non-hazardous materials in line with Apache's *Operational Guidelines and Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks* (DR-91-ID-016).
	All bunkering hoses are fitted with floats
	When loading bulk chemicals, a competent person will be stationed in view of the vent line to ensure overfilling of the silos does not occur
Reporting	Drilling fluids used are recorded in daily WBM report which is checked daily by the Apache fluid coordinator including: • The type of drilling fluids and volumes used daily; • Mud logging units volume measurements cross-checked by physical pit checks; • Drilling fluids volume balance calculations to determine whether fluid loses are taking place in the system; • WBM product usage cross-checked with product delivery and return tickets and product inventory checks; and • In the event that the interval length/diameter is changed or a sidetrack is required the overall volumes will increase or decrease accordingly.
	End of well mud usage report is completed to inform future drilling activities and identify opportunities to further reduce and control discharges and losses.
	Once a week the daily mud report will include a record of when the calibration of mud loggers was last checked.
Discharge of SBM drill cuttings, base oil and SBM drilling fluids	
Mud Selection	Biodegradable water based muds are used wherever practicable; however, SBMs are used when technically and geologically justified, or when it reduces activity duration. Following the Apache drilling fluid selection process, SBM may be required for these wells, however additional engineering work will be completed prior to the commencement of Coniston Phase II drilling to confirm whether SBM is required or a suitable WBM system can be utilised for this hole section.
Chemical Selection	Apache uses a risk based approach to select drilling chemical products ranked under the OCNS. Most of the drilling fluids that are proposed are CHARM rated Gold and Silver, or non-CHARM rated D/E. To achieve these rankings, the chemicals have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation. The drilling fluids, including base oil additive Saraline 185V, that may be used and that are not CHARM rated Gold and Silver, or non-CHARM rated D/E have been risk assessed as per the Apache *Drilling Fluids and Chemical Risk Assessment procedure* (EA-91-II-008), and determined to be environmentally acceptable. The SBM proposed is classified as slightly toxic to non-toxic drilling fluid, does not contain any aromatic hydrocarbons (known to contribute to biological toxicity) and has low water solubility.
	Justification for acceptable use will be provided in the risk assessment document and approved both by the Drilling Fluids Coordinator and Apache Environmental manager or delegate.
Chemical and mud Storage	SBM stored in bunded areas where collected liquids will be vacuumed and primarily re-used within the muds system, or directed for treatment and appropriate disposal. Where feasible, SBM may be stored on the rig for re-use in subsequent wells.
	Locking of overboard dump valves on mud pits to prevent accidental discharge and a Permit to Work (PTW) required in order to unlock the valves.
	Plugging of deck drains whilst using SBM to prevent any direct losses from the drill floor and a rig floor flood test undertaken with water prior to commencement of drilling programme to identify and repair any leaks.

Hazard	Management Controls
Handling Procedures	Apache's *Operational Guidelines and Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks* (DR-91-ID-016) is adhered to and the MODU has SBM transfer procedures to and from supply vessels to be adhered to and a fuel transfer procedure which includes a Job Safety Analysis (JSA) and Hazardous Material Transfer Checklist.
Well Design	Optimisation of the well design uses the minimum volume of drilling fluids and generates the minimum volumes of drill cuttings; in addition it also optimises the length of time taken to drill the well. If the well is drilled at too small a diameter then the risk of not reaching the target depth, and therefore the chance of mechanical sidetracking, is increased. This results in increased drilling time, producing more drill cuttings and using more fluids.
Cuttings Treatment	Through the installation of a riser the SBM will not be discharged direct to sea without treatment during drilling. SBM will be discharged to sea following treatment onboard the rig through the centrifuges and cuttings dryers to ensure oil on cuttings is <10%. To isolate the disposal of cuttings, they could be skipped and shipped to shore, however this is not considered a viable option
	When drilling with SBM, Apache will use a cuttings dryer and centrifuge system (on board cuttings management system, to maximise mud separation and reuse and significantly reduce the concentration of SBM fluid on cuttings prior to cuttings being discharged to the seabed and maximise reuse (Apache Procedure *DR-91-ID-016*).
	The percentage of oil on cuttings (OOC) measurements and calculations are carried out for the various overboard discharge points when drilling with SBM (i.e. from the dryer and the centrifuges). Oil on cuttings levels are measured daily from a cuttings sample using a retort apparatus. The ratio of SBM/ base oil on cuttings is monitored daily to ensure it does not exceed the performance criteria of <10% OOC for the drilling interval. Daily monitoring means that the performance of the oil on cuttings reduction measures can be monitored against the performance criteria of <10% for the well section. In the event that the % of SBM on cuttings is trending towards an exceedence of 10% for the drilling interval, and efforts to repair and/or optimise performance fail to achieve results below 10%, drilling will cease in this interval until a solution can be implemented to achieve <10% oil on cuttings. It is generally assumed that 80% of cuttings (larger material) are directed overboard after the cuttings dryer and that 20% (smaller material) is directed through the centrifuges and the mud system before discharging overboard (or injection down the annulus). Runtime and flow rate of the centrifuges are used to calculate the volume of solids discharged.
	When SBM and base oil tanks are required for other purposes, (e.g. for mixing WBM) the SBM and/or base oil will be backloaded to supply vessels and the tanks and mixing and transfer lines will be cleaned in compliance with Apache's *Operational Guidelines and Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks* (DR-91-ID-016). In compliance with discharge requirements (<10% oil on cuttings (OOC)), any residual cuttings and settled mud solids (e.g. barite) in the tanks will be treated through the centrifuge and/or cuttings dryer and included in OOC calculations or will be shipped back to shore for appropriate onshore disposal.
	Reconditioning and reuse of residual SBM, with disposal to an approved waste facility or landfill when the mud is no longer required or suitable for use. Thereby, no whole SBM is disposed of overboard.
Maintenance	Mud logging units are scheduled on the PMS and are maintained in accordance with manufacturer's maintenance specifications.
	Mud logging units are calibrated before each well is spud and at the start of each hole section.
	Drill cuttings shaker system, centrifuges and cuttings dryer maintenance included in PMS.
	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.
	Cuttings dryer and centrifuge system are inspected as a minimum at the end of each section, when operational, and maintained in accordance with the manufacturer's maintenance specifications.
	Drill cuttings shaker system is maintained in accordance with the manufacturer's maintenance specifications.

Hazard	Management Controls
Reporting	Drilling fluids use recorded in daily SBM report which is checked and signed by Apache fluid co-ordinator daily and records: • The type of drilling fluids and volumes used daily; • Volumes and fate of drill cuttings and fluids; • Mud logging units volume measurements cross checked by physical pit checks; • Drilling fluids volume balance calculations to determine where fluid losses are taking place in the system; • SBM product usage cross checked with product delivery and return tickets and product inventory checks; and • In the event that the interval length is changed or a sidetrack is required the overall volumes will increase or decrease accordingly.
	Regular inspections of onboard cuttings management equipment including storage and handling facilities and vessel procedures.
	A PVT (pit volume totaliser) measures the volumes of SBM within the system components, individual components also fitted with volume measuring devices.
Crew Training	Rig personnel involved with the transfer of base oil to and from the MODU will follow the rig specific transfer procedure with adherence to the procedure reflected in a PTW for the activity.
Discharge of cement	
Chemical selection	Apache uses a risk based approach to select drilling chemical products ranked under the OCNS. Most of the drilling fluids that are proposed are CHARM rated Gold/Silver, or non-CHARM rated E/D (the chemical selection process is discussed in greater detail below). To achieve these rankings, the chemicals have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation. If they are not highly rated (Gold/Silver/D/E) and no alternative is available, a risk assessment is conducted through the *Drilling Fluids and Chemical Risk Assessment procedure* (EA-91-II-008) to ensure the product is environmentally acceptable. Justification for acceptable use will be provided in the risk assessment document and approved by both the Drilling Fluids Coordinator and Apache Environmental Manager (or delegate).
Chemical and cement storage	Bulk cement will not be discharged overboard except in an emergency; it will either be left onboard for the next drilling campaign, returned to a supply vessel for re-use or will be sent back to shore for storage or appropriate onshore disposal. Through inventory control and well planning, left over product will be minimised.
	Bulk transfer procedure, storage and handling facilities on the MODU.
	Only the required volume of cement will be brought on board the MODU (plus allowable contingency) in accordance with the cement program.
	Cement additives are stored in bunded areas. If spillage occurs, collected liquids will be vacuumed and primarily re-used within the muds system, or directed for treatment and appropriate disposal.
Cement disposal and treatment	Liquid or semi liquid cement that returns to surface or is flushed during tank/pipe cleaning will be diverted overboard. If using SBM OOC measurements will be taken and included in the interval totals as per Apache's *Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks* (DR-91-ID-016)
	Hard cement which returns to surface and is removed at the shale shakers (and where possible, additional treatment via the cuttings dryer) will be diverted overboard. If using SBM OOC measurements will be taken and included in the interval totals Apache's *Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks* (DR-91-ID-016)
	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 calculation when available.
Maintenance	Shaker system maintenance included in MODU PMS.
	Routine inspection of onboard cuttings management equipment.
	Shaker screen selection is made by the Mud Engineer on location and reviewed by the Apache Fluid

Hazard	Management Controls
	Coordinator daily.
	Screens are inspected a minimum of once a day during drilling operations to check for wear and tear.
Reporting	Actual cement product and additive usage recorded on Apache Cement "Open Wells" report within 48 hours of completion of each cement job.
	Oil on cuttings of cement will be recorded whilst using SBM and recorded on the Apache *Synthetic Discharge Report* and should be less than 10% OOC for the interval average.
	Apache *Synthetic Discharge Report* is completed daily by the mud engineer and reviewed by the Apache Fluid Co-ordinator.
Planned discharges	
Untreated sewage disposal	Untreated sewage will be stored onboard and disposed of onshore at a reception facility or to a carrier licensed to receive the waste, or discharged at a distance of more than 12 nautical miles from the territorial baseline in accordance with Regulation 11 of MARPOL Annex IV.
Treated sewage disposal	Treated sewage will be discharged in compliance with Regulation 11 of MARPOL Annex IV.
Sewage (treatment) systems	Sewage system will be compliant with Regulation 9 of MARPOL Annex IV and be maintained in accordance with manufacturer's specifications and PMS. If the STP system fails or is not MARPOL compliant, untreated sewage will be stored onboard while the STP system is being repaired, and only discharged (more than 12 nm from shore) in an emergency situation if storage reaches capacity.
Sewage waste streams	MODU and support vessel masters will ensure that the maximum carrying capacity of the sewage system is not exceeded.
Food waste management plan	Food waste will be collected, stored, processed and disposed of in accordance with the MODU and support vessel's garbage or waste management plan. Placards will be displayed to provide guidance on garbage disposal requirements
Offshore food waste disposal	In accordance with Regulation 4 of MARPOL Annex V (IMO 2011), food waste will be ground or comminuted to <25 mm and discharged only when >12nm from the territorial baseline.
Macerator equipment	Food macerators will be of a design capable of macerating food to 25 mm or less, and maintained in accordance with manufacturer's specifications and PMS.
Onshore food waste disposal	In the event food cannot meet the requirements for disposal in the operational area (e.g. equipment failure or otherwise), the stored food waste will be transferred to land for disposal.
Oily water disposal	The MODU will transfer oily bilge water to a support vessel for disposal at a reception facility onshore or transferred to a carrier licensed to receive the waste oil. (If in Western Australian, oily water disposal will be managed in accordance with the *Environment Protection (Controlled Waste) Regulations 2004*.). 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 operational area.
Chemical Selection	Acid used for subsea wellhead maintenance will be CHARM rated Gold and Silver, or non-CHARM rated D/E, if not the chemical will be risk assessed as per the Apache *Drilling Fluids and Chemical Risk Assessment procedure* (EA-91-II-008), and determined to be environmentally acceptable.
	Justification for acceptable use will be provided in the risk assessment document and approved by both the Drilling Engineer and Apache Environmental Manager or delegate.
Air emissions	
Waste incineration	No incineration will occur onboard the MODU and support vessels will not use incinerators within the 500 m exclusion zone.
Fuel oil type	Fuel oil will meet regulated sulphur content levels in order to control SOx and particular manner emissions.
Engine emission control	MODU and support vessel engines will be operated in a manner so that regulated NOx emission levels are achieved.
	MODU and support vessels will hold a valid and current International Air Pollution Prevention Certificate

Hazard	Management Controls
	(IAPPC).
Ozone-depleting substance management	Ozone-depleting substances will not be deliberately released in the course of maintaining, servicing, repairing or disposing of systems or equipment and through good maintenance fugitive emissions will be minimised.
	All ODS recorded in ODS Record Book.
Interference with other users of the sea	
Vessel movements	Support vessels will not utilize the Exmouth Gulf between 15th September and 31st October as per EPBC approval conditions.
Stakeholder notification	Notification to the following Australian Government agencies will be made prior to moving to the drilling location: • The Australian Hydrographic Office of proposed activity, location (i.e. MODU location) and commencement date to enable a Notice to Mariners to be issued; • Notification of the JACC (Joint Airspace Control Cell) in advance of any aviation activities; • The AMSA RCC of proposed activity, location (i.e. MODU location) and commencement date to enable an AusCoast warning to be issued; and • Consultation with other users, e.g. fishing industry.
Navigational equipment and procedures	Drilling operations will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 1912. For the MODU and support vessels, this requires equipment and procedures to comply with AMSA Marine Orders Part 30: Prevention of Collisions and Marine Orders Part 21: Safety of Navigation and Emergency Procedures. The support vessels will also be 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).
Vessel bridge-watch	Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day.
Vessel patrols	Support vessels will be employed to aid in the detection of other vessels and to provide additional communication with other vessels where necessary. The support vessels will assist in maintaining the requested clearance of 500m around the MODU.

9.2 Non-routine Events

Table 9-2: Management controls for non-routine events during drilling activity

Hazard	Management Controls
Solid wastes	
Waste management plans	Non-biodegradable and hazardous wastes will be collected, stored, processed and disposed of in accordance with the MODU and support vessel's: • Garbage Management Plan as required under Regulation 9 of MARPOL Annex V; and • Accidental release of waste to the marine environment is reported and investigated and corrective actions are implemented.
Waste storage	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).
Offshore waste incineration	No incineration will take place onboard the MODU or on support vessels within the 500 m exclusion zone.
Onshore waste disposal	Solid non-biodegradable and hazardous wastes that cannot be incinerated be disposed of onshore at a reception facility or to a carrier licensed to receive the waste if required by jurisdictional legislation.
Incident Investigation	In the event of accidental release of waste to the marine environment, it is reported, investigated and corrective actions implemented as recommended.
Awareness and training	All crew will be required to attend an environmental induction containing basic information on waste management.
Dropped objects	
Dropped objects prevention	The *Atwood Falcon* HSE Case 2011 (FAL-HSE-SC-1002, Rev 2) includes Lifting Equipment Management System (LEMS).
	Apache *Drilling and Completions Standards Manual* (AE-91-ID-004) defines a number of measures that must be in place to ensure no dropped objects enter the marine environment.
	Detailed records of equipment lost overboard will be recorded.
	During mobilisation/demobilisation and kedging all equipment and gear on MODU and support vessels are securely sea fastened.
	Depending on the nature of the type of lift a PTW may be required as described in the Atwood Safety Management System. If a permit is not being used then a JSA and planning prompt card would be used to risk assess the lift.
	Apache *Coniston and Novara SIMOPS Plan* adhered to during simultaneous operations
Anchor handling procedures	Anchor handling procedures prevent potential for dropping or dragging anchors across subsea infrastructure
	Support vessels will not anchor within the 500 m operational boundary
Emergency Shut Down (ESD) System	In the event of an incident, ESD system detects loss of pressure and actuates shutdown valves in accordance with shutdown philosophy to limit the extent and duration of any release
	In the event of an incident manual activation of ESD after visual detection of leak
	In the event of an incident shutdown valves actuate to isolate inventories to limit the extent of any release
Post-drilling survey	A site survey will be completed at the end of the drilling activity to check for and retrieve dropped objects.
Crew training	Crew members involved with lifting and offloading equipment from the MODU aware of training and offloading requirements.
Equipment maintenance	Planned maintenance undertaken on material handling and lifting equipment in accordance with the MODU PMS.
Chemical and hydrocarbon transfer	Transfer of chemicals and hydrocarbons will only be carried out under suitable conditions at the discretion of both the MODU's Offshore Installation Manager (OIM) and the vessel master and will be monitored at all times by competent MODU and vessel crew.
	Any hydrocarbon transfer between the MODU and support vessel is carried out using a PTW and the

Hazard	Management Controls
	additional SWP/ checklists would be part of that PTW process
Design criteria	Drill centre manifolds, Christmas tree and rigid spool designed for dropped object impact and anchor drag/snag loads to prevent loss of containment
Marine fauna collision	
Marine fauna observation	Marine fauna identification posters and recording sheets will be available on the MODU and all support vessels to ensure crew have the necessary equipment available to record observations. All cetacean and whale shark sightings will be recorded on the Apache Marine Fauna Sighting Datasheet with data submitted to DSEWPaC
Crew training	All crew will attend an environmental induction containing basic information on procedures to manage interactions between the MODU, support vessels and marine fauna.
Vessel operation	**Legislative control** The interaction of all support vessels with cetaceans and whale sharks will be consistent with Part 8 of the EPBC Regulations, and as required by the EPBC approval conditions, which for these drilling activities includes: ○ A vessel will not travel >6 knots within 300 m (caution zone) of a cetacean (or whale shark) known to be in the area; ○ A vessel will not approach closer than 100 m of a cetacean (or whale shark) known to be in the area; ○ 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. **Legislative control** Any support vessels associated with the drilling activity must not use Exmouth Gulf between 15 September and 31 October as required by the EPBC approval conditions.
Spillage of hydrocarbons, environmentally hazardous chemicals and liquids waste to the sea	
Awareness and training	All crew will be required to attend an environmental induction containing basic information on chemical and hydrocarbon management, as well as spill prevention and response measures. An oil spill exercise will be conducted prior to the commencement of the drilling activities and at a minimum of every three months thereafter.
Materials storage	Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas.
	All hazardous wastes are stored onboard the MODU in closed, secure and bunded storage facilities prior to transport back to shore for disposal/recycling/treatment in accordance with local regulations. Disposal of controlled waste will follow local government requirements for transportation and disposal.
	A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals and hydrocarbons.
Vessel inspections	Chemical and hydrocarbon storage areas will be frequently inspected (at least weekly).
Spill clean-up equipment	Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) and the quantity of spill recovery materials will be appropriate to the quantity of stored chemicals onboard the vessel/MODU as per the inventory.
Spill response	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).
Deck drainage	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.
Equipment maintenance	Maintenance records on the MODU and support vessels indicate that all machinery and equipment containing hydrocarbons have maintenance scheduled on their respective planned maintenance system and are maintained in accordance with manufacturer's maintenance specifications.
	All hoses used for pumping and transfers are maintained and checked as per MODU's PMS.

Hazard	Management Controls
Fuel and oil residue transfer	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.
Bulk drilling solids handling	Left-over bulk drilling solids (e.g., barite, bentonite, cement) will be stored onboard and legally disposed of.
Untreated oily water disposal	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. (If in Western Australia, oily water disposal will be managed in accordance with the Environment Protection (Controlled Waste) Regulations 2004.). 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 exclusion zone.
Hydrocarbon spill during refuelling	
Vessel Operating Procedures: Safe work procedure and checklist for fuel transfers	Refuelling will not take place within 12 nm of territorial baseline and will only be started in daylight hours.
	Refuelling to occur under suitable weather conditions and subject to Barge Engineer and Supply Vessel Captain's agreement as per Apache's *Refuelling and Chemical Transfer Management procedure* (AE-91-IQ-098) or Atwood's refuelling procedure.
	Fully manned operation and in the event the refuelling pipe is ruptured the fuel bunkering activity will cease by turning off the pump.
	Dry-break refuelling hose couplings and hose floats will be installed on the refuelling hose assembly.
Fuel type and storage	Marine diesel will be the only fuel type used by the support vessels.
	Adequate bunding beneath the refuelling hose connections on the supply vessel and the MODU.
Deck Drainage	Drains closed in fuel transfer areas to contain spills.
	MODU and support vessels have valid and current International Oil Pollution Prevention Certificates.
Spill Response	All shipboard chemical spills and hydrocarbon spills managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP).
	Coniston Novara Phase II Drilling OSCP (EA-00-RI-268/2)
Maintenance	Diesel storage tanks and fuel transfer hoses will be maintained on the MODU and vessels in line with the PMS.
	Refuelling hoses will be replaced every six months.
Crew Training	MODU personnel involved with refuelling will follow safe work procedure and checklist for fuel transfers, with adherence to the procedure reflected in a PTW for the refuelling activity. Safety Case and Safety Case Revision are in place.
Vessel Certification	In line with MARPOL Annex 1, vessels over 400 gross tonnage will have: A current SOPEP with the following related mitigation measures in place: • Spill exercises conducted a minimum of every three months and recorded in MODU or vessel log; • Spill kit located near high risk spill areas; • Weekly inspection of spill kits is undertaken on support vessels and recorded to ensure they are intact, clearly labelled and contain adequate quantities of absorbent materials; • Spills cleaned up immediately, spill kits re-stocked and clean up material contained, and not washed overboard; • Chemicals and hydrocarbons stored within continuously bunded areas; • MODU decks bunded. Scupper plugs available to prevent liquid discharges from decks; and • Drip trays used under portable equipment and when refuelling portable equipment.
	A valid International Oil Pollution Prevention certificate (IOPP).
Hydrocarbon spill from a ruptured fuel tank	

Hazard	Management Controls
Stakeholder Notification	Notification to the following Australian Government agencies will be made prior to moving to the drilling location: • The Australian Hydrographic Office of proposed activity, location (i.e. MODU location) and commencement date to enable a Notice to Mariners to be issued; • The AMSA RCC of proposed activity, location (i.e. MODU location) and commencement date to enable a AusCoast warning to be issued; • Consultation with other users, e.g. fishing industry; and • In the event of a spill resulting in notification to AMSA (see OSCP), other sea users are informed of the incident via Marine Notices to prevent vessels entering an area where hydrocarbons have been released.
Navigational Equipment and Procedures	Vessel operations will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and *Navigation Act 1912*. For vessels, this requires equipment and procedures to 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.
SIMOPS	Apache *Coniston and Novara SIMOPS Plan* adhered to during simultaneous operations.
Vessel Bridge Watch	Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day.
Vessel Patrols	A support vessel will be employed to aid in the detection of other vessels and to provide additional communication with other vessels where necessary. The support vessel will assist in maintaining the 500 m exclusion zone around the MODU.
Fuel Type	Marine Diesel Oil compliant with the MARPOL Annex VI Regulation 14.2 (i.e. sulphur content of less than 3.50% m/m) is the only engine fuel recorded on the fuel bunkering register for MODU and support vessels.
Spill Response	Oil spill responses executed in accordance with *Coniston Novara Phase II Drilling OSCP (EA-00-RI-268/2)* and vessel's Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL.
	In the event diesel is released from a support vessel due to a ruptured fuel tank, the following tier 2 spill response source control activities would be immediately implemented in accordance with *Coniston Novara Phase II Drilling OSCP (EA-00-RI-268/2)*: • Reduce the head of cargo by dropping or pumping the tank contents into an empty or slack tank; • Consider the possibility of pumping water into the leaking tank to create a water cushion to prevent further cargo loss (only if density lower than water); • If the affected tank is not easily identified, reduce the level of the cargo in the tanks in the vicinity of the suspected area if stability of the vessel will not be compromised; • Evaluate the transfer of cargo to other vessels; and/or • Trimming or lightening the vessel to avoid further damage to intact tanks.
	Oil spill exercises are conducted every 3 months thereafter.
Crew Training	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 from a loss of well control	
Well Design	Casing sizes and lengths and the intervals where the hole is cement-sealed around the casing will be selected to maximise well control. Experience gained from the numerous wells previously drilled within the area will facilitate well design. 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.

Hazard	Management Controls
Drilling Procedures	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 philosophy is described in the Apache Drilling and Completions Barrier Standard (Document No: AE-91-ID-004, Section 11). The two barrier system to be applied when suspending the wells would also be the standard applied when abandoning wells. As such the anticipated environmental impact and risks associated with leaving the wells suspended, in respect to a loss of well control, are equivalent to an abandoned well.
	Other loss of well control prevention measures as defined in *Apache Drilling and Completions Standards Manual* (AE-91-ID-004) include: • Well control drill to be conducted and reported in daily report prior to drilling through the first hydrocarbon zones; • Well control manual is available to all personnel; and • MODU OIM, toolpusher, drillers and assistant drillers hold valid well control certificates and are competent in well control manual requirements.
	Other loss of well control prevention measures specific to Coniston and Novara are defined in Apache's *Coniston and Novara SIMOPS plan* including: • Prevention of escalation through emergency shutdown systems; and • Minimise risk of catastrophic damage to infrastructure and or MODU due to tanker collisions, vessel or MODU collisions, dropped objects
	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 operations.
Mud Selection	Offset well data reviews and seismic shallow hazard analysis of the location were undertaken to evaluate the potential presence of shallow gas in the target formations and no indications were found. The use of drilling mud to overbalance the mud column will be used to reduce the risk of gas release.
Awareness and Training	There are a number of warning signs which indicate that a kick is taking place. These include an increase in drilling fluid flow rate, an increase in the drilling bit penetration rate (indicating a change in the type of rock being drilled) and the presence of gas bubbles in the returned drilling fluid. 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.
Equipment Maintenance and Testing	Apache requires all well control equipment and installed casings and wellhead equipment to be tested to a pressure exceeding the Maximum Anticipated Surface Pressure (MASP) in accordance with the DSM, which states BOP pressure and function testing at the following intervals: • On the MODU's contracted date; • Upon initial installation (unless stump tested); • Affected connections after installation of any new wellhead body component; • Prior to penetrating the primary hydrocarbon bearing zone; and • Prior to carrying out perforating or production testing.
	Mud logging equipment to be in place and tested weekly.
	BOP regularly testing in accordance with PMS and manufacturer's maintenance specifications
Spill Response	In the event a loss of well control occurs, the following tier 3 spill response activities would be implemented in accordance with *Coniston Novara Phase II Drilling OSCP (EA-00-RI-268/2)*: 1. Source control; 2. Surveillance – including aerial and vessel surveillance, tracking buoys, spill fate modelling; 3. Containment and recovery; 4. Dispersants; 5. Protection and deflection; 6. Shoreline clean-up; 7. Oiled Wildlife Response (OWR) activities; and 8. Type II (Scientific) Monitoring.
Notifications	In the event of a spill resulting in notification to AMSA (See OSCP), other users of the sea are informed of the incident via Marine Notices to prevent vessels entering an area where hydrocarbons have been released

Hazard	Management Controls
Spill response	
Application	Dispersant: oil application rate will be 1:25.
	Aerial application of chemical dispersants will occur within the aerial application zone an area representing the six hour travel time from the source based on maximum credible current and wind data expected for the region. The area is in deep water and does not go closer than 10 km from nearby marine protected areas.
	Chemical dispersants will not be applied inside State waters.
Monitoring	Aerial observation of application of aerial dispersants will be undertaken by trained observers during dispersant operations.
	Rapid assessment and laboratory analysed operational monitoring will be undertaken to evaluate dispersant efficacy
	Ecotoxicity scientific monitoring will be undertaken to evaluate total recoverable hydrocarbon concentrations in marine waters at key locations meet pre-determined trigger values to ensure sensitive receptors susceptible to entrained oil are protected.
Assessment	Dispersant operations will be constantly reviewed by the ICT through the Incident Action Plan process taking into account NEBA of impacts to sensitive receptors of surface oil and entrained oil.
Selection of chemical dispersants	Chemical dispersants to be used are to be prioritised to those dispersants approved with the Australian NatPlan OSCA register as either 'listed'. Chemical dispersants listed as transitional on the OSCA register, or not listed with the register, are to be evaluated using Apache's *Drilling Fluids and Chemical Risk Assessment procedure* (EA-91-II-008) prior to use. Chemical dispersants are only to be used if they are found to be acceptable by the risk assessment process.

10. REFERENCES

AEL (Apache Energy Ltd) (2010). Western Australia Kultarr 3D Marine Seismic Survey - Environment Plan. Commonwealth Waters. Document No. EA-00-RI-176. February 2010.

AEL/Apache (Apache Energy Ltd) (2008). *Van Gogh Oil Development. Draft Public Environmental Report (EPBC Referral 2007/3213)*. February 2008.

AFMA (Australian Fisheries Management Authority) 2011. Annual Report 10/11. Australian Government, Canberra, Australia.

APASA (2013). Van Gogh Infill Well Quantitative Oil Spill Exposure Modelling, Asia-Pacific Applied Science Associates, Perth, Western Australia, May 2013.

APPEA (2008). Code of Environmental Practice. Australian Petroleum Production and Exploration Association. Canberra.

DSEWPaC (Department of Sustainability, Environment, Water, Population and Communities) (2012). Protected matters search tool. Database of fauna listed as Threatened and Migratory Marine Species under the EPBC Act. Department of Sustainability, Environment, Water, Population and Communities.

Fletcher, W.J. and Santoro, K. (Eds). (2012). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2011/12: The State of the Fisheries. Department of Fisheries, Western Australia.

Kinhill Pty Ltd (1997). East Spar First Post-commissioning Survey Report. A report to Apache Energy. October 1997. Report EA-00-RI-9981/B.

Kinhill Pty Ltd (1998). East Spar Benthic Survey. Biological Monitoring Program. A report to Apache Energy. October 1998. Report EA-66-RI-006/B.

Oracle Risk Consultants (2013). Atwood Falcon – Coniston Drilling SIMOPS and Commissioning and Start-up Hazard Identification Workshop Report. APA026-REP-005.

Rainer S.F. (1991). High species diversity in demersal polychaetes of the North West Shelf of Australia. Ophelia. Supplement 5. Systematics, Biology and Morphology of World Polychaeta: 497 – 505.

Sainsbury K.J., Campbell R.A. and Whitlaw A.W. (1992). Effects of trawling on the marine habitat on the North West Shelf of Australia and implications for sustainable fisheries management. In: Hancock D. A. (Editor). Sustainable Fisheries through Sustaining Fish Habitat. Canberra Australia. Australian Government Publishing Service, 1993, 137–145. Aust Soc. for Fish. Biol. Workshop, Victor Harbour, SA, 12–13 August 1992.

SSE (1991). Normal and extreme environmental design criteria. Campbell and Sinbad locations, and Varanus Island to Mainland Pipeline. Volume 1. Prepared for Hadson Energy Limited by Steedman Science and Engineering. Report E486. March 1991.

SSE (1993). Review of oceanography of North West Shelf and Timor Sea regions pertaining to the environmental impact of the offshore oil and gas industry. Vol I prepared for Woodside Offshore Petroleum and the APPEA Review Project of Environmental Consequences of Development Related to the Petroleum Production in the Marine Environment: Review of Scientific Research, Report E1379, October 1993.

Ward T.J. and Rainer S.F. (1988). Decapod crustaceans of the North West Shelf, a tropical continental shelf of North-western Australia. Australian Journal of Marine and Freshwater Research 39: 751–765.

WNI (1995). Preliminary report on ambient and non-cyclonic design criteria for the Stag location. WNI Science & Engineering. December 1995.

WNI (1996). Metocean Conditions on the North West Shelf of Australia, Cape Lambert to the North West Cape Relating to Jack-up Drilling Operation (DR-50-ED-001). July 1996.

Woodside (2005). The Vincent Development. Draft EIS. EPBC Referral 2005/2110. Woodside Energy. Perth.

Woodside (2006). Pluto LNG Development - Draft Public Environment Report / Public Environmental Review EPBC Referral 2006/2968 Assessment No. 1632 December 2006.