Balnaves Stage 1 Drilling
(Revision 3 of Brunello Topholes – Bru-A-2,3,4,5)

Environment Plan Summary

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1. INTRODUCTION

Apache Energy Ltd (Apache) proposes to undertake Stage 1 of Balnaves drilling (tophole and intermediate sections above the reservoir) (herein referred to as the **drilling activity**) within the Northern Carnarvon Basin of the North West Shelf in production Licence WA-49-L in Commonwealth waters in order to carry out its obligations under the permit.

The proposed activity, Balnaves Stage 1 drilling, is a new stage of an existing activity; Brunello Topholes, which has an in force EP with the same drilling rig (*Atwood Falcon*) and same support vessels (*Skandi Atlantic* and *Pacific Hornbill*), with activities being undertaken in a similar manner with the same management controls in place.

The primary objective of the Balnaves Development wells is to develop hydrocarbons (light oil) from the Muderong Sandstone. From a single drill centre location (Balnaves Manifold), the drilling activity includes drilling operations for five wellbores including two producers, one gas injector and two water injectors to be drilled and completed in a single phase utilizing batched operations.

Apache undertakes the drilling activity as the operator of the WA-49-L permit, with its subsidiary Apache Julimar Pty Ltd holding a 65% share, and its joint venture partner Kufpec Australia (Julimar) Pty Ltd (35%) holding the remaining portion of the permit.

1.1 Schedule

The drilling activity will take approximately 100 days and is scheduled to commence as early as March 2013, but depending on weather delays, drilling schedules and the acceptance of the EP, may not commence until May 2013. Depending on commencement, completion of the activity may be as late as August 2013.

1.2 Compliance

The drilling activity was referred under the Environment Protection and Biodiversity Conservation (EPBC) Act to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) on the 10th of November 2011 (Ref 2011: 6188). A decision on this action was subsequently provided on the 10th of April 2012, approving the development on the basis that it is 'Not a controlled action if undertaken in a particular manner'.

The drilling activity EP (Revision 3 of *Brunello Topholes Bru-A-2,3,4,5 – EA-72-RI-003* – 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 18th April 2013 (Ref A291734 ID2201).

This EP summary has been prepared in accordance with the requirements of Regulation 11 (7) and (8) of the referenced OPGGS(E) Regulations, as well as the NOPSEMA Guidance Note on Environment Plan Preparation (N-04700-GL0931, Revision 0 April 2012).

2. LOCATION OF THE ACTIVITY

The drilling activity is located approximately 48 km northwest of the Montebello Islands and 76 km northwest from Varanus Island in approximately 135 m of water depth (**Figure 2-1**). The drill centre/manifold location is located approximately 2 km south, southwest of the proposed Floating Production, Storage and Offloading vessel (FPSO) location. The wells will be located within a 100 m radius of the Balnaves Manifold (**Table 2-1**).

Table 2-1: Surface locations for the drilling activity infrastructure

Parameter	Coordinates (Datum/Projection: GDA 94 Zone 50)			
	Latitude	Longitude	Easting	Northing
Balnaves Manifold	-20° 04’ 13.624”	115° 11’ 00.813”	310 051.00	7 779 689.00

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

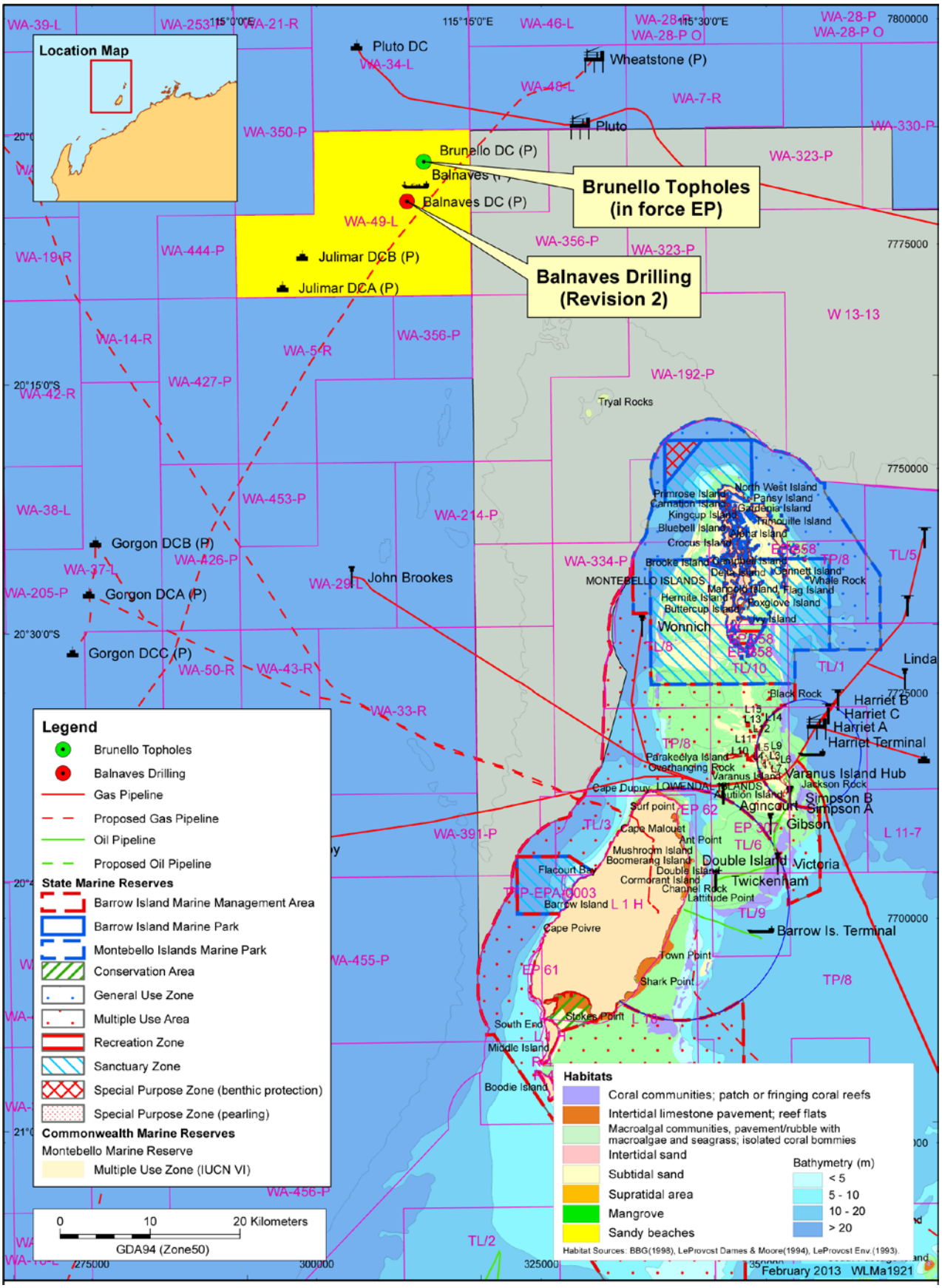

Figure 2-1: Location map for the drilling activity

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The drilling activity is located in 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 patterns are monsoonal with a marked seasonal pattern. During summer (October–March), the prevailing non-storm winds are from the southwest, west and northwest at an average speed of less than 10 knots, peak average speeds of 15–25 knots, and maximum speeds of 30 knots. Winds from the southeast to northeast quadrant are experienced less than 10% over summer. In winter (May–August), winds are generally lighter and more variable in direction than in summer. Non-storm winds prevail from the northeast through to southeast at 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. 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, 2011).

3.2 Biological environment

Benthic habitats within the zone of potential impact (**ZPI**) 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, spinculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals.

The spatial and temporal distribution and density of these organisms depends on factors such as substrate composition, season, depth and water temperature (Ward and Rainer, 1988; Rainer, 1991; Kinhill, 1997). Ward and Rainer (1988) reported a seasonal pattern in the abundance of small species of decapod crustaceans in this region. It was not clear if this pattern was related to season or to other factors, such as storm events, which operate on much shorter time scales. By comparison, the diversity and abundance of large encrusting animal species in this region is relatively low (Ward and Rainer, 1988; LeProvost Environmental Consultants (LEC), 1990). This is probably due to instability of the sediment and the lack of exposed and colonisable reef.

The drilling activity is located in Commonwealth waters, offshore from the WA mainland. Significant features in the region include Dampier Archipelago (146 km SE), Varanus Island (76 km SE), Montebello Marine Park (40 km SE), Barrow Island (72 km SE), Montebello and Lowendal Island group (48km SE), and

the Ningaloo World Heritage Area (187 km SW). The ZPI overlaps the Montebello Commonwealth Marine Reserve by 375 m and the total area of the ZPI within the marine reserve is 118 ha. No other features mentioned above are influenced by the ZPI.

An EPBC Act Protected Matters search (DSEWPaC, 2012a) identified a Key Ecological Feature (**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 ZPI: Ancient coastline at 125 m contour. The KEF is a unique seafloor feature which may be used by migratory species as a guide when moving throughout the region.

The EPBC Act Protected Matters Database search also identified nine species of marine fauna in the ZPI listed as threatened species (endangered or vulnerable) under the EPBC Act, all of which are migratory, and a further six migratory species were also identified. The species listed included three fish, six cetaceans, five turtles and one seabird.

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. There is one Commonwealth fishery overlapping or close to the area of the development - the North West Slope Trawl Fishery. Other Commonwealth fisheries, such as the Western Tuna and Billfish Fishery (WTBF), Southern Bluefin Tuna Fishery (SBFTF) and the Western Skipjack Tuna Fishery (WSTF), are licenced to fish within the defined area, but no recent fishing effort has been reported. In addition, eight State managed fisheries have boundaries that overlie or are in close proximity to part or all of the activity location (DoF, 2011): Onslow Prawn Managed Fishery (OPMF), Mackerel Fishery, Pilbara Demersal Scalefish Fishery (Trap and Trawl), Pearl Oyster Managed Fishery, North Coast Shark (closed), Beche-de-mer Fishery, Marine Aquarium Fish Fishery and Specimen Shell Managed Fishery.

The ZPI falls within the North Coast Bioregion (DoF, 2011) where recreational fishing is experiencing significant growth. Offshore islands, coral reefs and continental shelf provide species of major recreational interest (DoF, 2011). However, recreational fishing within the ZPI is unlikely given the distance offshore.

There are no recognised shipping routes in or near the drilling activity location. The nearest designated shipping route is approximately 40 km northwest of the drilling activity location (AMSA, 2012).

The drilling activity area and surrounding waters are also used for petroleum exploration and development. The defined area is located approximately 2-3 km south of the Brunello gas field, approximately 13 km northeast of the Julimar gas field and approximately 1.83 km northwest of the proposed pipeline from the Wheatstone offshore facilities to the proposed LNG plant at Ashburton.

Tourism activities are concentrated in the vicinity of Exmouth, Dampier, Onslow, Point Samson and Port Hedland. In the waters immediately surrounding the Balnaves development area, tourism activities are limited due to its distance from the mainland and island shorelines.

There are no World Heritage, Commonwealth Heritage or National Heritage sites, or Wetlands of International Importance (Ramsar sites) in or adjacent to the drilling activity location. The nearest sites are Ningaloo World Heritage Area (187 km SW), Ningaloo Marine Area (205 km SW) and Mermaid Reef (570 km northeast). No registered Aboriginal heritage sites are located within or in close proximity to the drilling activity location. The National Shipwrecks Database lists seven shipwrecks in the ‘Montebellos Area’ (DSEWPaC, 2012b), 183 shipwrecks near/around ‘Broome Area’, and eight shipwrecks in the ’Onslow Area’. The Wild Wave shipwreck is approximately 8 km northwest of the drilling activity location. As activities will not occur outside of the operational area, no impact is expected on the Wild Wave shipwreck.

4. DESCRIPTION OF THE ACTIVITY

The drilling activity involves five wellbores including two producers, one gas injector and two water injectors to be drilled and completed in a single phase utilizing batched operations. The two producing wells will include horizontal sections in the oil reservoir while the gas injection well will include a deviated wellbore section in the shallower gas reservoir. The water injector wells will penetrate the deeper sections of the B20 reservoir in order to maintain reservoir pressure.

The wells will be developed from a single drill location (Balnaves Manifold). The MODU will kedge between different well locations.

The drilling activity is limited to the tophole and intermediate hole sections only and do not access any hydrocarbon bearing formations.

5. ENVIRONMENTAL HAZARDS AND CONTROLS

The environmental risk assessment for operational activities and unplanned events associated with the drilling activity centred around a hazard identification workshop. The workshops, held on the 13th September and 2nd October 2012, were attended by a subset of Apache's environmental scientists and drilling personnel. The outcomes of a broader scale hazard identification workshop on the Balnaves Development (Oracle, 2012), facilitated by an independent risk consultant using the combined experience of Apache's Drilling, Operations, Environment and Logistics Departments, was used to inform the Balnaves Development construction and installation workshop.

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 risks and seven non-routine (unplanned events) environmental risks. The key environmental hazards and control measures to be applied to the drilling activity are provided 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 Revision 3 of *Brunello Topholes Bru-A-2,3,4,5 (EA-72-RI-003)* (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 activities 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 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 goals of the environmental implementation strategy are to direct, review and manage activities so that environmental impacts and risks are continually being reduced to ALARP, and performance objectives and standards are met over the duration of the construction and installation activity. 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, inspections, management of non-conformance and review;
5. Emergency Response and preparedness including an OSCP (EA-72-RI-005/2);
6. Record Management;
7. Consultation; and
8. End of Activity Phase Reporting and Incident Reporting

The reporting requirements for routine activities and environmental incidents (recordable and reportable) and reporting on overall compliance of the activity with the EP (e.g. environmental performance reporting submitted to NOPSEMA within 3 months of the completion of the drilling activity) are also detailed.

7. CONSULTATION

Apache maintains a comprehensive stakeholder database containing fishing interest groups, government and non-government authorities and other stakeholder parties including the community of Exmouth and adheres to its Stakeholder Consultation Strategy. The database was used to identify stakeholders located, or operating, in the proximity of the drilling activity. Apache maintains relationships with key stakeholders and regularly communicates with stakeholders on a variety of activities, to assist information sharing, feedback and fielding enquiries.

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). • Western Australian Fishing Industry Council (WAFIC). • Commonwealth Fisheries Association (CFA); • A Raptis and Sons. • WestMore Seafoods. • Shark Bay Seafoods. • Austral Fisheries. • Pearl Producers Association.
Recreational fisheries	• RecFish West
Marine conservation	• Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). • Department of Environment and Conservation (DEC).
Shipping safety and security	• Australian Maritime Safety Authority (AMSA). • Royal Australian Navy and General Defence. • Department of Defence
Hydrocarbon spill response	• Department of Transport (DoT). • Australian Marine Oil Spill Centre (AMOSC).
Adjacent regulators	• Department of Mines and Petroleum (DMP);

In December 2012, Apache Energy disseminated to all stakeholders advanced notification of proposed activities in a quarterly update for quarters Q1 and Q2 2013. In addition, an information package detailing drilling activity proposed to commence in April 2013 was sent to stakeholders on the 23rd of January 2013. On March 20, 2013 Apache Energy released the March 2013 Quarterly Update.

During the consultation process, where stakeholders have raised queries, Apache has conducted additional meetings and provided additional information in response to the stakeholder queries. Apache has worked closely with the stakeholders in providing them with the correct level of information associated with the drilling activity, to enable them to assess if the activity will impact them.

Apache considers that the consultation with regulators and relevant stakeholders has been adequate, all stakeholders and relevant parties, have been actively engaged by Apache regarding the drilling activity.

As stated in Apache's Environmental Management Policy, Apache is committed to maintaining open community and government consultation regarding its activities and environmental performance. Consultation on the drilling activity will be ongoing through to completion.

8. CONTACT DETAILS

Further information about the Balnaves Field Development activities can be obtained from:

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9. ENVIRONMENTAL ASPECTS, IMPACTS AND CONTROLS FOR THE DRILLING ACTIVITY

The following tables (**Table 9-1** and **Table 9-2**) summarises the control measures corresponding to the potential environmental hazards identified for the drilling activity which eliminate or reduces the environmental risks to ALARP.

Table 9-1: Environmental risk summary for operational activities for drilling activity.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Seabed disturbance	Anchoring of MODU, kedging of MODU between wells, anchor wires contact with seabed, dropped objects and deposition of drill cuttings.	Localised disturbance to seabed, resulting in loss of or change in benthic habitat and key ecological feature.	• Support vessels do not anchor within the exclusion zone. • Site survey indicates no raised seabed features or geological formations of concern for the safe movement of the rig including key ecological features. • MODU is anchored in accordance with MODU *Marine Operations Manual* and *Mooring Analysis*. MODU is kedged and not moved between well locations. • Potential seabed disturbance is minimised through: o Constant monitoring of loss of position through seabed acoustic monitoring system. o Monitoring and recording of anchor tensions every three hours. • MODU safety case includes Lifting Operations and Materials Handling procedures. • Detailed record of dropped objects and post-completion survey to check for and retrieve dropped objects. • All equipment on MODU and support vessels are sea fastened during mobilisation, demobilisation and kedging. • Job Safety Assessments considers weather limits, operator competency and equipment certification to minimise dropped objects. • Crew trained in Dropped Object Prevention Scheme, MODU Lifting Tackle procedures, and lifting and offloading requirements. • Material handling and lifting equipment are maintained in accordance with MODU Planned Maintenance System (PMS). • Transfer of hydrocarbon and chemicals carried out under suitable conditions and monitored at all times by competent crew.
Artificial light	Deck floodlights and maritime navigational lighting kept on 24 hours a day for maritime safety.	Attraction of fauna such as fish, turtles and migratory birds, altering orientation, navigation, foraging and breeding activities.	• 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. • Night-time activities will be avoided, if practicable, to reduce direct lighting onto marine waters.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Noise emissions	Underwater noise generated by vessels and helicopters within operational area.	Potential physiological or behavioural effects to threatened marine fauna.	• MODU and support vessel machinery will be regularly maintained to reduce noise emissions to marine waters. • Support vessels adhere to stand off distances and/or speed restrictions to reduce sound exposure. • Fauna observation kits will be available on all vessels. Sightings of cetaceans and whale sharks will be recorded and reported 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.
Discharge of drill cuttings, base oil and fluids	During well drilling seawater and high viscosity sweeps and SBM discharged to the seabed and sea surface	Temporary reduction of water quality in the vicinity of the release point and the potential for toxicological impacts to marine flora and fauna.	• Apache drilling fluid selection process ensures biodegradable water based fluids selected wherever possible • Through a risk based approach, select chemicals which have the least environmental impact in terms of ecotoxicity, biodegradation and bioaccumulation. • SBM stored in bunded areas where collected liquids are vaccumed and re-used where possible or directed for treatment and disposal. • Locking of overboard dump valves on mud pits to prevent accidental discharge. • Permit to Work required to unlock dump valves • Plugging of deck drains while using SBM to prevent direct losses from drill floor and rig floor flood test undertaken with water prior to activity. • Optimisation of well design to minimise number of strings of casing. • SBM cuttings will be treated through a dryer and centrifuge system to ensure oil on cuttings is <10%. • 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. • No whole SBM is disposed of overboard • Shaker screens are selected by mud engineer and inspected minimum once daily once BOP and riser are in place. • Mud logging units and cuttings dryer, shaker and centrifuge systems maintained in accordance with PMS. • Use of drilling fluids recorded in daily mud reports. • Regular inspection of cuttings management equipment. • A PVT (pit volume totaliser) measures the volumes of SBM within the system components, individual components also fitted with volume measuring devices, these volumes are recorded in the Daily mud report. • End of well report confirms estimated volumes of drilling fluid used. • Crew involved with base oil transfer follow MODU mud transfer procedures.
Discharge of cement	During well interval sealing, minor cement volumes	Temporary reduction of water quality in the vicinity of the release	• 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. • Cement additives stored in bunded areas where collected liquids are vacuumed and reused where possible.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
	may return when cementing sections back to surface.	point and the potential for toxicological impacts to marine flora and fauna, smothering of benthic organisms.	• Cement discharged at seabed during cementing of conductor. All other returns discharged at sea surface. No discharge of cement without treatment when using SBM. • Mix and use cement as required to reduce wastage. • Shaker system maintained in accordance with PMS. • Routine inspection of cuttings management system. • Oil on cuttings of cement recorded while using SBM. Oil on cuttings <10%. • Mud report completed daily. • Actual cement product and additive usage recorded on open wells report within 48 hours of cement job.
Planned discharges	Cooling water, brine, anti-scalant, sewage, putrescible food waste, oily water discharges from support vessels and deck drainage.	Localised nutrient enrichment, organic and particulate loading, thermal loading, and increased salinity.	• Untreated sewage stored and disposed in accordance with MARPOL 73/78 Annex IV; Treated sewage discharged in accordance with MARPOL 73/78 Annex IV. Sewage system compliant with MARPOL 73/78 Annex IV. • Vessel masters ensure maximum carrying capacity not exceeded. • Food waste collected, stored and disposed in accordance with vessel Garbage Management Plan. • Offshore food waste disposal in accordance with MARPOL 73/78 Annex V. • Food macerators capable of macerating food to 25 mm or less and maintained to manufacturer specifications. • Food waste not discharged or incinerated are stored and disposed at approved onshore facility. • Scupper plugs are available where chemicals are stored and frequently handled. Use non-hazardous, biodegradable detergents for deck washing. • Oil filtration residue disposed at onshore reception facility or to a carrier licensed to receive the waste. • Support vessels without oil filtering equipment will hold bilge water onboard and dispose of upon return to port at reception facility or to a carrier licensed to receive the waste. The Oil Record Book will be current and valid. • Oily water are stored on MODU; support vessels will not discharge oily water within exclusion zone.
Air emissions	Combustion of fuel (marine diesel) to power rig and vessel engines, generators and mobile and fixed plant and equipment.	Temporary and localised decrease in air quality, contribution to greenhouse gas loadings.	• Incinerators will be operated in accordance with a manufacturer's operating manual and the incineration of certain substances will be prohibited. • 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. Vessel machinery are maintained in accordance with manufacturer's specifications and vessel PMS. • 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. ODS will only be handled by qualified and trained personnel. • All ODS recorded in ODS Record Book.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Interference with other users of the sea	500 m exclusion zone around the MODU.	Temporary loss of fishing area or inconvenience to fishing practices. Fishing gear snags or equipment damage. Navigational hazard and vessel collision.	• AFMA, Department of Fisheries and commercial fishing stakeholders 5 days prior and 3 days after demobilization. • Australian Hydrographic Office (AHO) notified at least six weeks prior to trigger issue of Notice to Mariners. • Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) notified two weeks prior to trigger issue of AusCoast Warning. • 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). • 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 9-2: Environmental risk assessment summary for unplanned events for drilling activity.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Solid waste discharges	Overfull and/or uncovered bins, incorrect disposal or spillage.	Marine pollution, damage to benthic habitats, injury or death of marine fauna through ingestion or entanglement.	• Non-biodegradable and hazardous wastes are collected, stored, processed and disposed of in accordance with the vessel's: o Garbage Management Plan as required under Regulation 9 of MARPOL 73/78 Annex V; and o Shipboard Waste Management Plan as required under AMSA Marine Order 95: Marine Pollution Prevention – Garbage. • 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). • Incinerators will be operated in accordance with a manufacturer's operating manual and the incineration of certain substances will be prohibited (as defined in Regulation 16 (2) in MARPOL 73/78 Annex VI). • 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.
Marine fauna collisions	Support vessel operations.	Interference, injury or death of marine fauna.	• Fauna observation kits will be available on MODU and support vessels. • 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 and chemicals to the sea	Equipment malfunction, corrosion and inadequate bunding.	Short term decrease in surface water quality and subsequent contamination of marine organisms.	• 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. • Rig personnel involved in lifting and offloading are trained in DROPS and MODU Lifting Tackle procedures. • Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex III regulations. • 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). • All vessel machinery will be included on the vessel's PMS and maintained in accordance with manufacturer's

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
			specifications. • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas). • All shipboard chemical and hydrocarbon spills will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP) and the *Balnaves Stage 1 Drilling OSCP (EA-72-RI-005/2*). • Any oil or fuel transferred to an onshore, reception facility, another vessel or to a carrier is transferred in compliance with *Atwood Falcons* safe work 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. • Oily water are stored onboard the *Atwood Falcon*. Support vessels will not discharge treated oil water within the 500 m exclusion zone • Oily filtration residue (sludge) will be disposed of onshore at a reception facility or to a carrier licensed to receive the waste • Vessels without oil filtering equipment 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
Hydrocarbon spill during at sea refuelling	Hose breaks, coupling failures or tank overfilling	Surface water diesel slick, with death or physiological impacts on sensitive species such as planktonic crustaceans; decrease in surface water quality.	• Refuelling will not take place within 12 nm of any coastline. • Refuelling to occur under suitable weather conditions and subject to Barge Engineer and Supply Vessel Captain's agreement. Fuel transfer shall be conducted only during daylight hours. • 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. • All shipboard chemical spills are managed in accordance with the SOPEP. • Spill response in accordance with *Balnaves Stage 1 Drilling OSCP* (EA-72-RI-005/2) (the **OSCP**). • Diesel storage tanks and fuel transfer hoses maintained in line with vessel PMS. • 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 in line with MARPOL 73/78 Annex 1. • Vessels hold a valid International Oil Pollution Prevention certificate (IOPP)
Hydrocarbon spill from ruptured	Vessel collision.	Surface water diesel slick, with death, physiological or	• AHO is notified of drilling activity to enable a Notice to Mariners to be issued. • AMSA RCC is notified of drilling activity to enable an AusCoast warning to be issued. • Consultation with other users, e.g. fishing industry.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
vessel fuel tank.		behavioural impacts to marine fauna; decrease in surface water quality.	• 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. 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. • A support vessel will be employed to maintain 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). • Oil spill response executed in accordance with the OSCP and vessel SOPEP as required under MARPOL 73/78. • If spill event occurs as a result of ruptured fuel tank, implement 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 Response	Implementation of hydrocarbon spill response strategies.	Increased emissions, light, noise, reduction in water quality, continued release of hydrocarbon into the pelagic environment, with death or physiological impacts to sensitive species.	Management controls for activities and associated hazards relating to the following are described in **Table 9-1** and **Table 9-2** above: • Generation of additional artificial lights and noise associated with response vessels and aircraft • 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 and liquid 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 support vessels. • Affected stakeholders. In addition, hazing activities may be required which would include the following management controls: • Vessel-based hazing activities only to be initiated if marine fauna are considered at risk of coming into contact with the spill area • Vessels to travel at slow speeds near fauna, and to approach fauna from the spill toward the animals at risk • Noise deterrence to be initiated only if all animals in an aggregation are together

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