



## **Brunello Topholes (Bru-A-2,3,4,5) Environment Plan Summary**

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## **1. INTRODUCTION**

Apache Energy Ltd (Apache) proposes to drill the tophole sections (914mm and 444mm sections) for the four development wells (BruA-2, BruA-3, BruA-4 and BruA-5, referred to throughout this document as the 'Brunello Topholes') at the Brunello manifold location, in permit area WA-49-L in Commonwealth Waters. Apache is 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.

Drilling of the Brunello Topholes is scheduled to commence in August 2012 and is expected to take approximately 29 days. This activity is part of the first phase of development for the Julimar/Brunello Gas Field Development project, the primary objective of which is to develop hydrocarbons (gas) from multiple Mungaroo reservoirs for the Julimar/Wheatstone development project. The proposed Brunello Topholes surface location is approximately 49 km northwest of the Montebello Islands and 78 km northwest from Varanus Island in approximately 148 m of water depth

The Brunello Topholes Environment Plan (EP) has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGs (E) Regulations). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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

## 2. LOCATION OF THE ACTIVITY

The Brunello Topholes are located in Commonwealth waters in Exploration Permit Area WA-49-L (**Figure 1**) in approximately 148 m of water. The surface hole location coordinates are given in **Table 1** below and are approximately 49 km northwest of the Montebello Islands and 78 km northwest of Varanus Island (

). The closest boundary of the Montebello/Barrow Island Marine Conservation Reserves (Montebello Marine Park) is approximately 41 km away (Error! Reference source not found.).

**Table 1: Surface location for Brunello Topholes**

Well	Co-ordinates
BruA-2 Surface hole location (GDA 94 Zone 50)	20° 1' 48.607" N (Lat) 115° 12' 5.687" E (Long) 311,887.9 (Easting) 7,784,168.80 (Northing)
BruA-3 Surface hole location (GDA 94 Zone 50)	20° 1' 47.88" N (Lat) 115° 12' 7.05" E (Long) 311927.30 (Easting) 7784191.60 (Northing)
BruA-4 Surface hole location (GDA 94 Zone 50)	20° 1' 48.14" N (Lat) 115° 12' 7.58" E (Long) 311942.80 (Easting) 7784183.80 (Northing)
BruA-5 Surface hole location (GDA 94 Zone 50)	20° 1' 49.169" N (Lat) 115° 12' 5.646" E (Long) 311,886.90 (Easting) 7,784,151.50 (Northing)

**Table 2: Distances from Surface hole location to key regional features**

Regional Feature	Distance from Brunello Topholes	Direction to feature
Closest boundary to Montebello Marine Park	41 km	SE
Closest Montebello Island	49 km	SE
Varanus Island	78 km	SSE
Barrow Island	75 km	SSE
Distance to Ningaloo World Heritage Area	208 km	SSW

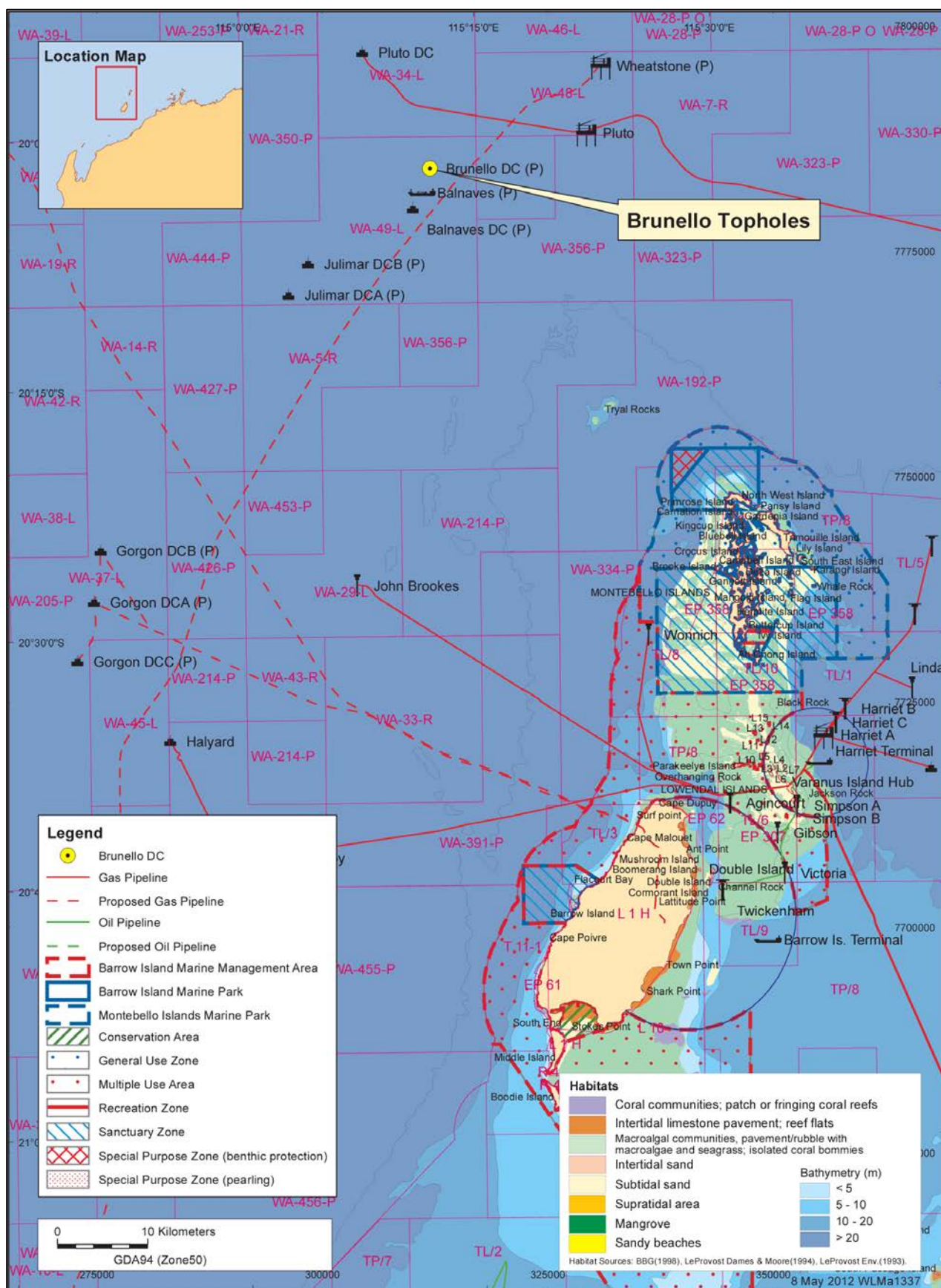


Figure 1: Location Map for Brunello Topholes

### 3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

#### 3.1 Physical environment

The Brunello Topholes are located in the North-West Marine Bioregion in the NWS Province (DEWHA, 2008). The region lies in the arid tropics experiencing high summer temperatures, periodic cyclones and associated rainfall. Rainfall in the region is generally low with evaporation exceeding rainfall throughout the year. The summer and winter seasons fall into the periods September–March and May–July, respectively. Winters are characterised by clear skies, fine weather, predominantly strong east to south-east winds and infrequent rain. Summer winds are more variable, with strong south-westerlies dominating. Three to four cyclones per year are typical, primarily between December and March (WNI, 1995), and can generate wind speeds 50–120 knots within the region.

The dominant 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). This current brings warm and relatively fresh water to the region from the western Pacific via the Indonesian Archipelago. Initial modelling undertaken by Woodside indicates that significant east-west flows across the NWS to the north of the North West Cape, possibly linking water masses in the area (Woodside, 2005). The site of the Brunello Topholes location experiences significant drift currents that can be relatively fast (1 to 2 knots) and complex, and persist longer than daily tidal current flows.

Bathymetry within a 4 km x 4 km grid around the surface location ranges from 130 m Lowest Astronomical Tide (LAT) in the southern corner to 165.3 m LAT in the western corner and shoals very gently to the southeast at a gradient of <1 degree. The seabed within this area is of low relief unconsolidated calcareous material spilt into three categories: sandy clayey silt, sandy silt and fine to coarse sand.

#### 3.2 Biological environment

The EPBC Act Protected Matters Search Database lists nine species of marine fauna, found within one kilometre radius of the Brunello Topholes area, listed as threatened (endangered or vulnerable) under the EPBC Act. In addition, these species are also listed as migratory along with six other marine species (DSEWPaC, 2012). The timing of the Brunello Topholes drilling activity coincides with the humpback whale southern migration (peaking early September) and it is therefore possible that humpback whales will be observed, however pods of humpback whales prefer to travel in waters 30 to 100 m deep during the southern migration (Jenner *et al.*, 2001) which is shallower than the depth of the Brunello Topholes (approximately 148 m). The area has no other known feeding, resting, breeding and/or nesting areas or constricted migratory pathways.

#### 3.3 Socio-economic environment

Oil exploration and production and commercial fisheries are the two main activities operating in the NWS region. There are four Commonwealth fisheries zones adjacent to the Brunello Topholes location: the North West Slope Trawl Fishery, the Western Tuna and Billfish Fishery (North of 34° South), Southern Bluefin Tuna Fishery and the Western Skipjack Tuna Fishery. Although these Commonwealth fisheries are permitted to operate within the proposed Brunello Topholes drilling location, effective fishing effort is either non-existent or of very limited nature (AFMA, 2010). In addition, seven State managed fisheries have boundaries that overlie or are in close proximity to part or all of the survey area (Woodside, 2006; AEL, 2010; DoF, 2011). However, of these, only the Pilbara Demersal Scalefish Fishery (trap and line) would potentially operate in the vicinity due to the depth and offshore location of the Brunello Topholes area.

There are no recognised shipping routes through the proposed Brunello Topholes drilling location. There is a shipping route heading northeast to the west of the proposed drilling location however, a relatively low number of vessels use this (AEL, 2010; Woodside 2006).

The proposed Brunello Topholes location and surrounding waters are also used for petroleum exploration and development. The nearest production activity is the Pluto Production Platform and subsea pipeline located in Exploration Permit WA-356-P.

There are no listed Commonwealth Heritage Places or National Heritage Places within, or in the immediate vicinity of the Brunello Topholes location. Marine Parks and Reserves of Conservation Significance are within the region with the closest marine reserve (Montebello/Barrow Islands Marine Conservation Reserves) located 41 km to the southeast.

#### 4. DESCRIPTION OF THE ACTION

The drilling activity will follow on from the drilling of Balnaves Deep-2 & 3 wells (located 35 m to the SW of Brunello). The drilling activity is scheduled for August 2012 and will take approximately 29 days. The *Atwood Falcon* semi-submersible drilling rig, operated by Atwood Oceanics, will be used to undertake the Brunello Topholes drilling. The support vessels *Skandi Atlantic* and *UOS Endeavour*, operated by DOF Subsea, will be used to supply fresh water, food, bulk drilling fluid materials and transportation of the equipment used in the drilling process. Personnel transfers will be by helicopter between the rig and the nearest airports at Barrow Island and Karratha.

Each of the planned four wells will have a 762mm x 508mm (30" x 20") conductor set just below seabed. A Low Pressure Wellhead Housing (LPWHH) will be set at the mud line. A 444mm (17.5") hole will then be drilled riser less to the Mandu formation and 340mm (13-3/8") casing run on a High Pressure Wellhead Housing (HPWHH) and cemented. Once cement has been pumped in place for the 340mm (13-3/8") surface casing, a casing pressure test will be performed to confirm wellbore integrity and formation isolation. A corrosion cap will then be installed on the wellhead system to complete the suspension of the wellbore. The rig will then kedge to the next wellbore to repeat the process. Upon installing the corrosion cap and subsequent suspension on the last well in the phase 1 sequence, the rig will be prepared to commence with drilling the next phase of these wells, dependant on regulatory approvals OR rig down to move to the next well location.

Julimar/Brunello Gas Field Development Phase 1 drilling activity does not penetrate hydrocarbon bearing zones, thus a riser and BOP system will not be used.



## 5. MAJOR ENVIRONMENTAL HAZARD AND CONTROLS

Apache undertook an environmental risk assessment for routine and non-routine events for Brunello Topholes drilling centred around a hazard identification workshop attended by a subset of Apache's environmental scientists and drilling personnel. The outcomes of a broader scale hazard identification workshop on Apache's drilling activities across the NWS (Oracle, 2011), independently facilitated by risk consultants using the combined experience of Apache's Drilling, Environment and Logistics Departments, was used to inform the Brunello Topholes workshop.

The purpose of the risk assessment was to understand and identify the potential environmental risks to ensure they are reduced to As Low As Reasonably Practicable (ALARP) utilising Apache's management and mitigation actions which have been developed from experience in the environmental management of offshore exploration 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 key environmental hazards and control measures to be applied to the Brunello Tophole drilling activities are shown in **Section 9**. These 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 Brunello Topholes drilling activity will be managed in compliance with the *Brunello Topholes (Bru-A-2,3,4,5) Environment Plan (EA-72-RI-003/2 Revision 1)* 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 the Brunello Topholes during both routine and non-routine activities, 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 for each environmental impact identified (and assessed in the Environmental Risk Assessment) specific performance objectives, standards and procedures and identifies the range of controls to be implemented (**Section 9**) to be implemented (consistent with the standards) to achieve the performance objectives and also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

The goal of the environmental implementation strategy detailed in the EP is 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 drilling activity. It includes the following;

1. Details on the systems, practices and procedures to be implemented
2. Key roles and responsibilities
3. Training and competencies for all personnel (Apache and contractors)
4. Monitoring, auditing, management of non-conformance and review
5. Incident Response including Oil Spill Contingency Plan
6. Record Keeping

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. close out reports submitted to NOPSEMA within 3 months of drilling completion) are also detailed.

## 7. CONSULTATION

The proposed Brunello Topholes drilling activity is located in waters approximately 148 m deep and approximately 49 km northwest of the nearest WA shoreline at the Montebello Islands. At this location, the proposed activity falls within the jurisdiction of the Commonwealth government.

Relevant interested parties for consultation of the proposed drilling activity were identified based on the extent of the modelled zone of potential impact (ZPI) and identified sensitive resources. Each identified stakeholder was initially emailed a summary of the proposed Brunello Topholes activities in June 2012 which was followed up by emails and phone calls in August 2012.

Key stakeholders contacted prior to commencement of drilling activities are detailed in **Table 3** together with their feedback.

**Table 3: Stakeholders feedback and assessment for the Brunello Topholes drilling activity**

Stakeholder	Feedback	Assessment of Feedback
AMSA	No impact, and advice (map) regarding potential for local traffic.	Map received identified shipping activity / traffic was forwarded to <i>Atwood Falcon</i> for information. No additional consultation is required for the Brunello Topholes drilling activity.
Recfishwest	No issues or conflict.	Based on drilling activity being far from shore, this was the expected outcome. No further consultation required for Brunello Topholes drilling activity.
A Raptis Westmore Seafoods Austral Fisheries Shark Bay Seafoods.	Whilst located in delineated fishery, proposal has no effect.	No further consultation required for Brunello Topholes drilling activity.
Com fish	Confirmed that information was disseminated to members for comment, no feedback received from Comfish members.	For the Brunello Tophole drilling activity no further consultation required. As this information has previously been provided in June 2012, 2 months is considered adequate time for response. Continue to liaise with Comfish regarding future proposed NWS drilling activities.
AFMA	Advised if any concerns they would let us know.	As email stated that AFMA would get back to us with concerns, and haven't to date, no further consultation required for Brunello Topholes drilling activity. As this information has previously been provided in June 2012, 2 months is considered adequate time for response.

## 8. CONTACT DETAILS

Further information about the Brunello Topholes drilling activity can be obtained from:

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## 9. ENVIRONMENTAL ASPECTS, IMPACTS AND CONTROLS

The following tables (**Table 4** and **Table 5**) provide a summary of potential environmental impacts that could be expected from the drilling of the Brunello Topholes. It lists the activities which might give rise to the environmental impact and the controls and measures which eliminate or ensure the residual risk is reduced to ALARP.

**Table 4: Environmental risk summary for Brunello Topholes – routine activities**

Activity and Cause of Impact	Potential Impacts	Risk treatment (Avoidance, Mitigation and Management Measures)
Introduction of invasive marine pest species to permit area through contaminated ballast water or from vessel hulls	Introduction and possible establishment and spread of marine pests.	<ul style="list-style-type: none"> <li>Vessels imported into Australian waters will meet Australian Quarantine and Inspection Service (AQIS) quarantine requirements.</li> <li>All vessels will comply with AQIS <i>Aus. Ballast Water Management Requirements</i> and the <i>National Biofouling Management Guidance for the Petroleum Production and Exploration Industry</i>.</li> <li>Will only use support vessels that, after IMPS risk assessment (in accordance with AQIS guidelines), are deemed to pose negligible risk.</li> <li><i>Atwood Falcon</i> is being mobilised from site (Balnaves Deep 2/3 wells) located on the northwest shelf of Australia (in Australian waters) and immediately adjacent to Brunello Topholes area</li> </ul>
Hydrocarbon spill resulting from vessel collision with rig or support vessels.	Damage to support vessels, rig and/or platform, leading to oil spill.	<ul style="list-style-type: none"> <li>Apache's <i>Drilling and Completions Standards Manual (AE-91-004)</i> will be adhered to</li> <li>Anchors will not be re-set following the Balnaves Deep-2 &amp; 3 drilling programme</li> <li>Implementation of the NOPSEMA approved <i>Brunello Topholes Oil Spill Contingency Plan (EA-72-RI-003/2)</i> as the control in event of spill to minimise impact</li> <li>Rig move procedures in place, <i>Atwood Falcon HSE Case (FAL-HSE-SC-1002)</i></li> <li>No anchoring planned by support vessels.</li> <li>Adherence to Australian Maritime Safety Authority (AMSA)'s marine notices and marine orders (maritime safety measures)</li> <li>500m gazetted exclusion zone monitored by support vessels.</li> <li>Notice to Mariners issued for site.</li> <li>Vessel illumination at night and during times of low visibility to assist navigation and make rig visible.</li> <li>Support vessel crew experienced and competent (<i>International Convention of Standards of Training, Certification and Watch keeping for Seafarers, 2010</i>)</li> <li>Consultation with relevant fisheries on proposed activities and dates.</li> <li>Rig is mobilising to site outside of the cyclone season (November to March), less likely to have poor weather conditions.</li> <li>Automatic Identification System (AIS) which allows tracking of the rig by surrounding vessels.</li> <li>Support vessel radar watch during drilling activities</li> </ul>
Marine Fauna interaction resulting from collision with vessel	Marine fauna disturbance, injury or death	<ul style="list-style-type: none"> <li>Cetacean observations to be logged in Apache's Marine Fauna database and record sent to DSEWPaC.</li> <li>Adherence to Australian National Guidelines for Whale and Dolphin Watching (DEWHA 2005).</li> <li>Rig will only mobilise a short distance from its current location (Balnaves Deep 2/3 wells) for drilling the Brunello Topholes</li> </ul>
Seabed disturbance from rig positioning	Localised disturbance to seabed, resulting in loss of or change in benthic habitat.	<ul style="list-style-type: none"> <li>Site survey (seabed characterisation, substrate geotechnical information) undertaken prior to rig arriving in area and incorporated into the positioning analysis for Balnaves Deep 2 &amp; 3</li> <li>Drill rig anchoring procedure in <i>Ocean Tow Plan Atwood Falcon (FAL-OPS-0001)</i></li> <li>Anchors will not be re-set following the Balnaves Deep-2 &amp; 3 drilling programme</li> <li>No anchoring planned by support vessels.</li> </ul>
Damage to existing subsea infrastructure during mobilisation/demobilisation	Release of hydrocarbons to the marine environment	<ul style="list-style-type: none"> <li>Anchors will not be re-set following the Balnaves Deep-2 &amp; 3 drilling programme but may be retrieved following drilling of Brunello Topholes before demobilisation</li> <li>Balnaves Deep Site survey (seabed characterisation, substrate geotechnical information) was undertaken prior to rig arriving on site at Balnaves Deep 2 &amp; 3, and incorporated into the positioning analysis for the Atwood Falcon</li> <li>Adherence to AMSA's marine notices and marine orders (maritime safety measures)</li> <li><i>Atwood Falcon HSE Case (FAL-HSE-SC-1002)</i></li> <li>Nearest identified subsea infrastructure &gt;5km radius from drilling activities.</li> <li>No anchoring planned by support vessels.</li> <li>Implementation of <i>Brunello Topholes Oil Spill Contingency Plan (EA-72-RI-003/2)</i> to minimise impact in event of hydrocarbon release</li> </ul>
Continuous lighting in the same location for an extended period of time which is required for safety purposes on rig and vessels	Attraction of fauna such as migratory birds and turtles, leading to possible increased predation.	<ul style="list-style-type: none"> <li>No nearby breeding, nesting, feeding or aggregation areas for marine fauna.</li> <li>Lighting levels are not significantly different from lighting levels on vessels, platforms etc. operating on the NWS.</li> <li>Minimum safe lighting requirements for vessels and rigs to meet relevant Safety and Industry Regulations.</li> <li><i>Atwood Falcon HSE Case (FAL-HSE-SC-1002)</i></li> <li>No well clean-up or well test activities involving flaring will be carried out.</li> <li>Non-essential lighting will be switched off when possible without compromising safety</li> </ul>

Activity and Cause of Impact	Potential Impacts	Risk treatment (Avoidance, Mitigation and Management Measures)
Underwater noise generated by VSP, drill rig, vessels and helicopters during routine operations	Potential negative physiological or behavioural effects to some threatened cetaceans, fish and other marine fauna.	<ul style="list-style-type: none"> <li>No nearby breeding, nesting, feeding or aggregation areas for marine fauna.</li> <li>Helicopters will fly at a minimum altitude of 150 m (except for take offs, landings and adverse weather).</li> <li>Cetacean observations to be logged in Apache's Marine Fauna database and record sent to DSEWPaC.</li> <li>VSP operations will comply with DSEWPaC / EPBC Act Policy Statement 2.1 (2008) – Part A and will last for only several hours</li> <li>Adherence to Australian National Guidelines for Whale and Dolphin Watching (DEWHA 2005)</li> <li>All Atwood Falcon personnel will complete the Apache/ Atwood Falcon environmental induction (incorporating VSP operations and marine fauna interaction mitigation measures)</li> <li>All noise generating equipment is serviced and maintained in accordance with Atwood's planned maintenance system and support vessel owners planned maintenance systems</li> </ul>
Discharge of drill cuttings and WBM drilling fluids through routine drilling activity	Temporary and localised water column turbidity and seabed deposition potentially causing benthic fauna smothering in some situations.	<ul style="list-style-type: none"> <li>No nearby breeding, nesting, feeding or aggregation areas for marine fauna.</li> <li>The well is designed to minimise the generation of drill cuttings within the technical constraints of achieving the well's target depth safely.</li> <li>Apache fluid selection process to determine most appropriate choice of drilling fluids(in this case biodegradable water based muds will be used wherever practicable)</li> <li>Risk based approach to select products that reduce the potential impacts to the marine environment (i.e. CHARM gold rated or non-CHARM rated E) and achieve the technical requirements.</li> <li>Approved contractors will control the storage and handling of drilling fluid chemicals in conjunction with National Code for the control of Workplace Hazardous Substances</li> <li>During the use of WBM, drilling fluid volumes are digitally recorded from the mud logging units. Drilling fluid volume balance calculations are made daily to determine where fluid losses are taking place in the system.</li> <li>Drill cuttings from upper hole sections drilled with seawater and high viscosity gel sweeps will be disposed of directly to seabed, minimising water column turbidity.</li> <li>Drill cuttings shaker system maintenance included in <i>Atwood Falcon</i> Planned Maintenance System</li> <li>Shaker screen selection is made by the Consultant Mud Engineer on location and reviewed by the Apache Fluid Coordinator daily.</li> <li>Screens are inspected a minimum of once a day during drilling operations to check for wear and tear.</li> <li>Mud logging units are scheduled on Geoservices (a Schlumberger company) planned maintenance system and are maintained in accordance with manufacturer's maintenance specifications.</li> <li>Mud logging units are calibrated before each well is spud and at the start of each hole section.</li> <li>Where practicable re-use of drilling fluids on subsequent wells</li> </ul>
Disposal of non-hazardous wastes (brine, cooling water) during routine activities	Localised increase in surface water temperature. Thermal impacts to pelagic species (e.g. plankton). Localised increased water salinity levels.	<ul style="list-style-type: none"> <li>Potable water system will be maintained in line with the manufacturer's specifications</li> <li>Biocide dosage is maintained at the minimum dosage required to maintain the system or anti-scale chemicals.</li> <li>Waste water stream from RO plant is pumped down a chute, and has time to cool to ambient temperature before entering the marine environment</li> </ul>
Release of combustion emissions to the atmosphere through operation of machinery and engines	Temporary and localised decrease in air quality. Global contribution to greenhouse effect.	<ul style="list-style-type: none"> <li>Equipment fuel consumption monitored by barge engineer.</li> <li>All rig equipment maintained in accordance with the Planned Maintenance System.</li> <li>MARPOL 73/78 – air pollution prevention certificate</li> <li>No waste incineration.</li> <li>Records of diesel usage maintained by Atwood Falcon operators.</li> <li>Use of marine diesel, which is low in sulphur content, minimising the generation of Sulphur Oxides</li> <li>No well clean-up or well test activities will be carried out</li> </ul>
Release of treated and macerated sewage and putrescible waste through routine rig and vessel discharges as a result of accommodating personnel	Temporary and localised decrease in water quality due to nutrient enrichment. Modification in feeding habits of pelagic fish species and seabirds. Increased suspended sediment load in water column.	<ul style="list-style-type: none"> <li>Rig and support vessels will use approved Sewage Treatment Plant (STP) and compliant organic waste macerator in accordance with MARPOL Annex IV.</li> <li>STPs and macerator will be maintained in line with manufacturers' specifications.</li> <li>All non-food galley wastes will be bagged and shipped to shore for recycling or disposal in accordance with Environmental Protection (Controlled Waste) Regulations 2004.</li> </ul>

Activity and Cause of Impact	Potential Impacts	Risk treatment (Avoidance, Mitigation and Management Measures)
<p>Discharge of contaminated water to the ocean consists of wash down water, occasional rainwater which may contain oil, grease, chemicals or detergent. E.g. through poor housekeeping practice, washdown or rainwater, or corrosion of bunds</p> <p>(Areas include deck drainage, machinery space spillage and drainage, enclosed storage area drainage, drill floor, moon pool and pipe deck drainage and drainage from support vessels).</p>	<p>Temporary and localised reduction of water quality.</p> <p>Physiological damage to marine fauna ingesting contaminated water.</p>	<ul style="list-style-type: none"> <li>Atwood Falcon’s procedures for the collection and treatment of drainage ensure that no contaminated waste streams are routinely discharged from the drainage system to the marine environment.</li> <li>Drainage and discharge in accordance with MARPOL Annex I</li> <li>The oily water system is routinely monitored and regularly maintained</li> <li>Bulk hydrocarbon and chemicals will be stored in designated storage areas, which are bunded.</li> <li>Deck drains which contain rainwater only are directed overboard.</li> <li>Biodegradable washdown detergents used.</li> <li>Material Safety Data Sheets (MSDS) are available for all chemicals used on the Atwood Falcon (which includes spill response requirements).</li> <li>Fully stocked and maintained oil spill kits, located in accessible location, on board to clean deck spills.</li> <li>Drainage from bunded areas will be collected through a closed drain system and processed to ensure discharge water has less than 15 ppm OIW. Over-spec fluids will be re-directed through the separator again or held for future offloading and onshore disposal.</li> <li>Spill exercises are to be conducted quarterly and recorded on daily report.</li> <li>Minor oil/lubricant spills will be mopped up immediately with absorbent materials that will then be disposed of onshore as hazardous waste, and not washed overboard.</li> <li>Main deck drain scuppers closed in the event of a spill on deck.</li> <li>Recovered oil stored onboard rig for appropriate onshore disposal.</li> <li>Used lubricants will be stored in bunded areas aboard the rig and subsequently transported onshore for recycling or disposal at approved locations.</li> <li>In non-drill floor areas, drainage to MARPOL Annex I requirements.</li> <li>Daily inspections will ensure that deck areas are clean of spillages and accumulations of oil/grease and chemicals, and that all spills and leaks are recorded/reported.</li> </ul>
<p>Interference with commercial shipping or fishing vessels due to e.g. breakdown in navigation equipment, poor weather, poor communications or human error</p>	<p>Vessel collision.</p> <p>Fuel spill (see hydrocarbon spill above).</p> <p>Fishing gear snags.</p>	<ul style="list-style-type: none"> <li>Notice to Mariners (rig move notice) will be issued.</li> <li>A 500m radius safety exclusion zone around the rig will be gazetted when on location.</li> <li>Standard maritime safety measures to be applied.</li> <li>Written and radio warnings to other vessels (via AMSA notification).</li> <li>Support vessel crew experienced and competent</li> <li>Bridge watch and radio standby on all vessels.</li> <li>Pre-drilling stakeholder consultation.</li> <li>Support vessels to patrol safety exclusion zone and act as chase vessels</li> </ul>



**Table 5: Environmental risk summary for Brunello Topholes – non-routine activities**

Activity and Cause of Impact	Potential Impacts	Risk treatment (Avoidance, Mitigation and Management Measures)
Spill of hydro-carbons to the sea (excluding vessel-to-rig refuelling) e.g. through equipment malfunction, corrosion, inadequate bunding, spillage during transfer.	Short-term impact to water quality. Impact on pelagic fauna.	<ul style="list-style-type: none"> <li>Equipment maintained in accordance with Atwood Falcon Planned Maintenance System.</li> <li>Drainage maintained according to MARPOL 73/78 Annex I</li> <li>Atwood Falcon and support vessels hold an International Oil Pollution Prevention Certificate</li> <li>Use marine diesel rather than HFO</li> <li>Drip trays used under portable equipment and when refuelling portable equipment.</li> <li>Rig decks bunded. Scupper plugs available to prevent liquid discharges from decks.</li> <li>Chemicals and hydrocarbons stored within continuously bunded areas.</li> <li>Spill kits placed strategically around Ensco 104 and support vessel work areas.</li> <li>Weekly inspection of spill kits is undertaken and recorded to ensure they are intact, clearly labelled and contain adequate quantities of absorbent materials.</li> <li>Oily water discharged in accordance with MARPOL requirements</li> <li><i>Atwood Falcon</i> SOPEP</li> <li>Spills cleaned up immediately and clean up material contained, and not washed overboard.</li> <li>Spill exercises conducted quarterly and recorded on daily report.</li> <li>Implement Atwood refuelling procedures approved by Apache.</li> <li>All Atwood Falcon personnel to complete the Apache-Atwood environmental induction that includes response to spills.</li> </ul>
Dropped objects (e.g., Blowout preventer (BOP), anchor, drill pipe, bulkis, tools). E.g. due to equipment failure, human error, adverse weather	Oil leak from subsea equipment. Seabed disturbance.	<ul style="list-style-type: none"> <li>No environmentally sensitive seabed features/ habitat identified in proximity of proposed drilling.</li> <li><i>Atwood Falcon HSE Case 2011</i> (FAL-HSE-SC-1002, Rev 2) includes Lifting Equipment Management System (LEMS).</li> <li>ROV survey at completion of drilling campaign to retrieve any dropped objects.</li> <li>Planned maintenance undertaken on lifting equipment.</li> <li>Apache's Drilling and Completions Standards Manual (AE-91-004)</li> <li>Offloading procedures.</li> <li>Use of competent, trained rig and support vessel crew.</li> <li>Certification of lifting equipment.</li> </ul>
Overboard loss/ accidental disposal of non-hazardous wastes e.g. If waste is not properly contained, waste management procedures not in place and/or not communicated	Marine pollution. Injury or death of marine fauna through ingestion or entanglement	<ul style="list-style-type: none"> <li>Procurement and contract process will ensure only essential items brought on board the rig in line with well design requirements.</li> <li>MARPOL 73/78 Annex V</li> <li>Wastes to be collected in covered bins (and compacted where possible) for appropriate onshore disposal.</li> <li>All scrap metal to be collected in bins for appropriate onshore disposal</li> <li>Apache and Atwood Falcon waste management procedure</li> <li>The volume of concrete mixed will be accurately calculated to ensure only that which is necessary for drilling requirements is mixed</li> </ul>

Activity and Cause of Impact	Potential Impacts	Risk treatment (Avoidance, Mitigation and Management Measures)
Over-board loss of hazardous waste.	Death or injury of marine fauna through ingestion. Short-term reduction in water quality.	<ul style="list-style-type: none"> <li>MARPOL 73/78 Annex V</li> <li><i>Atwood Falcon HSE Case 2011</i> (FAL-HSE-SC-1002, Rev 2)- Section 11</li> <li>Environment Protection (Controlled Waste) Regulations 2004.</li> <li>Waste segregation, onshore disposal of hazardous waste</li> <li>MSDS and handling procedures for hazardous goods will be available in locations nearby to where the wastes are stored.</li> <li>Onshore disposal of controlled waste will follow DEC requirements for transportation and disposal.</li> <li>OCNS will be used in chemical selection to select products that have the least environmental impact. (Chemicals that are either ranked Gold and Silver using the OCNS CHARM model or non-CHARMable E and D).</li> <li>Bunding around stored bulk wet chemicals or hazardous waste storage areas are continuous around the entire area.</li> <li>Spill kits placed strategically around Atwood Falcon and support vessel work areas.</li> <li>All hazardous wastes are documented, tracked and segregated from non-hazardous wastes (via waste tracking records).</li> <li>Minor spills will be mopped up immediately with absorbent materials that will then be disposed of onshore as hazardous waste and not washed overboard.</li> <li>If spillage occurs in bunded area it will be removed, and treated as hazardous or oil waste.</li> <li>Atwood Falcon Oil Record Book is up to date and records waste oil disposal.</li> <li>Weekly inspection of spill kits is undertaken and recorded to ensure they are intact, clearly labelled and contain adequate quantities of absorbent materials.</li> <li>Spill exercises are to be conducted quarterly and recorded on daily report.</li> </ul>
Spill of diesel oil to sea during refuelling through e.g. Equipment failure, support vessel runs over refuelling hose	Widespread surface water diesel slick, with death or physiological impacts on sensitive species such as planktonic crustaceans. Decrease in surface water quality.	<ul style="list-style-type: none"> <li>No nearby breeding, nesting, feeding or aggregation areas for marine fauna.</li> <li>Fully manned operation</li> <li>Diesel storage tanks and fuel transfer hoses will be maintained on the rig and vessels in line with the planned maintenance systems.</li> <li>Use of marine diesel rather than heavy fuel oil (HFO).</li> <li><i>Atwood Falcon HSE Case 2011</i> (FAL-HSE-SC-1002, Rev 2)</li> <li>MARPOL 73/78 Annex I</li> <li>Adherence to Apache refuelling procedure including: <ul style="list-style-type: none"> <li>Fuel transfer hoses fitted with dry break couplings.</li> <li>PTW system must be used to commence refuelling.</li> <li>Emergency Shut Down (ESD) must be tested prior to refuelling.</li> <li>Hoses must be fitted with floatation equipment.</li> <li>Refuelling to occur under suitable weather conditions.</li> </ul> </li> <li>Vessels equipped with sophisticated navigation aids and competent marine crew.</li> <li>Atwood Falcon and support vessel Shipboard Oil Pollution Emergency Plan (SOPEP) available and personnel trained in use. SOPEP will be exercised prior to commencement of drilling activity.</li> <li>Weekly inspection of spill kits is undertaken and recorded to ensure they are intact, clearly labelled and contain adequate quantities of absorbent materials</li> <li>Spill exercises are to be conducted quarterly and recorded on daily report.</li> <li>Drains closed in fuel transfer area to contain spills.</li> <li><i>Brunello Topholes Oil Spill Contingency Plan (EA-72-RI-003/2)</i> will be in place and implemented immediately upon a diesel spill if necessary.</li> </ul>
Oil spill response due to a spill to the marine environment	Increased emissions Reduction in water quality Continued release of hydrocarbon into the pelagic environment, with death or physiological impacts to sensitive species.	<ul style="list-style-type: none"> <li>NEBA incorporated in the planning stages and part of the response strategy process.</li> <li>Monitoring of the spill and response strategy.</li> <li>Undertake lessons learnt on oil spill exercises and response activities.</li> </ul>

## 10. REFERENCES

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