Balnaves West-1 Exploration Drilling

Environment Plan Summary

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CONTENTS

1. INTRODUCTION

Apache Energy Ltd (Apache) proposes to drill the Balnaves West-1 exploration well located in Commonwealth waters offshore of Western Australia, in permit area WA-49-L (**Figure 2-1**). The objective of the drilling program is to target the B20 oil sands expected to contain crude oil.

1.1 Schedule

The Balnaves West-1 exploration well is expected to commence in Q1/Q2 2014 but may be delayed until later in the year, taking approximately 40 days to complete. The required timeframe to complete the well will be influenced by weather 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) Regulations). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 21 January 2014.

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

2. LOCATION OF THE ACTIVITY

The Balnaves West-1 well will be located approximately 2.5 km west of the Balnaves Development and in an approximately water depth of 146 m. The location of the Balnaves West-1 well is provided in **Table 2-1**.

Table 2-1: Surface location for the well

Location	Permit Area	Coordinates (Datum/Projection: GDA 94 Zone 50)				Approx. Water Depth (m)
		Latitude	Longitude	Easting	Northing	
Balnaves West-1	WA-49-L	20° 04' 09.06" S	115° 09' 41.51" E	307,745.2	7,779,804	146 m

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

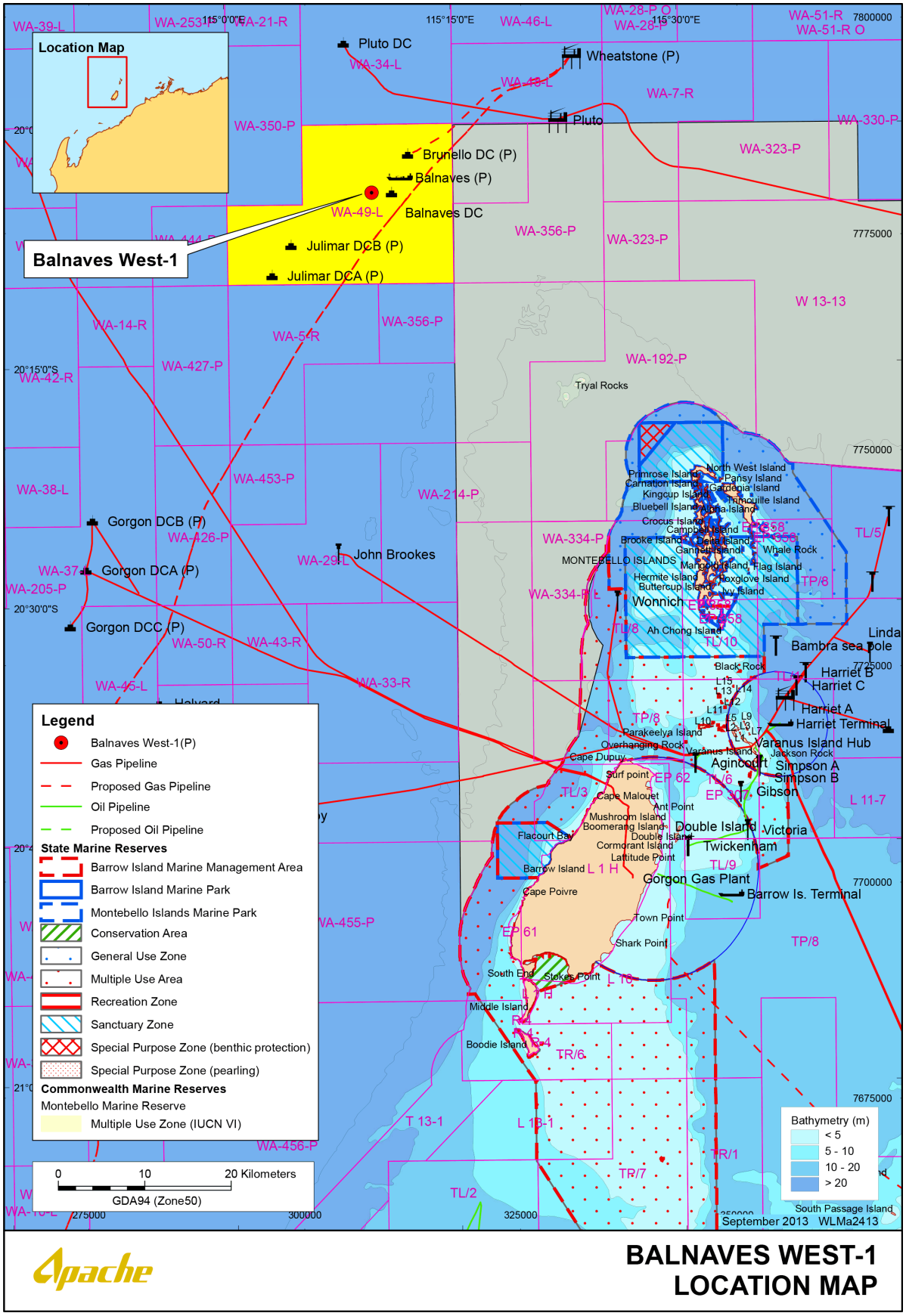

Figure 2-1: Location map for the Balnaves West-1 drilling activity

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical environment

The drilling activity is located on the North West Shelf. The region lies in the arid tropics experiencing high summer temperatures, periodic cyclones and associated rainfall. 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°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°C, with no discernible seasonal variation.

Winds in winter tend to be predominantly from the east and can be strong, gusting up to 60 knots offshore. Summer winds are mainly from the west or southwest, while the seasonal changeovers in April and September have the most variable and weakest winds (DEC, 2007).

Wind shear on surface waters generates local-scale drift currents that can persist for extended periods (hours to days). The wind is most frequently from the east to east–southeast during May to July, with speeds most frequently in the range of 2 to 12 m/s. The wind speeds then tend to decrease from this sector and shift south to south–southwest over September/October and west–southwest by November. By December, the most frequent direction is southwesterly. Higher wind speeds (6–14 m/s) from the southwest become more frequent in January and February. Wind speeds then decrease in March and shift to southerly in April. The wind direction is rarely from the northwest or north (i.e. directly towards the coastline) and wind from that direction persists for short periods only (APASA, 2013).

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

Currents in the Indian Ocean are dominated by two rotating gyres. The larger gyre is in the southern hemisphere driven by trade winds and mid-latitude westerlies and rotates counter clockwise. The eastern arm of this gyre, the Western Australian Current, flows northward off the continent's west coast, bending counter-clockwise to form the South Equatorial Current which flows toward Mozambique (Schott and McCreary, 2001; Shankar *et al*., 2002).

The gyre in the Northern Indian Ocean is driven predominantly the Indo-Australian Monsoon system, and as such, is more seasonally variable than the sub-tropical gyre in the south. During the Australian winter the gyre rotates clockwise, while in summer it rotates counter-clockwise (Shankar *et al*., 2002).

Semi-diurnal tidal currents on the NWS are extremely strong. The tidal amplitude is magnified on the shelf resulting in one of the largest tidal ranges of any open coastline in the world. Tidal ranges can be as high as 6 m along the Pilbara coast and 10 m along coastal sections of the Kimberley. This can result in oscillatory currents of up to 1 m/s.

Peak tidal flows are from the north-northwest on the ebb, and to the south-southeast on the flood. Measurements of tidal currents mid shelf are predicted to attain average speeds of 0.25 knots during neap tides and up to 0.5 knots during spring tides (NSR, 1995; WNI, 1995).

3.2 Biological environment

Benthic habitats within the 500 m exclusion zone around the MODU comprise soft sediments and associated epifauna and infauna, with no areas of hard substrate or significant habitat identified (RPS, 2012). Based on the nearby survey by RPS (2012) and review of scientific literature, it is anticipated that the

benthic habitat at the drill site is low in biological density comprising sparse benthic infauna, inhabiting soft sediments, which is well represented regionally.

An EPBC Act Protected Matters search (DoE, 2013) identified 13 Key Ecological Features (KEF) (parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area) within the environment assessed for impacts resulting from the worst case credible spill scenario due to a loss of well control. The EPBC search of the area identified 120 listed marine species, 26 of which are threatened species (endangered or vulnerable) and 47 of which are migratory species. The EPBC search also identified 38 whales and other cetaceans, of which 5 are threatened species (endangered or vulnerable) and 15 of which are migratory. The species listed, or habitat important for these species, may occur within the predicted PSTA impact as a result of a loss of well control.

3.3 Socio-economic environment

A valuable and diverse commercial fishing industry is supported by 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; Fletcher and Santoro, 2012). Five Commonwealth managed commercial fisheries have boundaries that overlie or are in close proximity to part or all of the oil spill trajectory area: Western Tuna and Billfish Fishery, North West Slope Trawl Fishery, the Western Skipjack Tuna Fishery, Western Deepwater Trawl Fishery and the Southern Bluefin Tuna Fishery, although none of these fisheries have had recent fishing effort reported.

In addition, 33 State managed fisheries have boundaries that overlie or are in close proximity to part or all of the operational boundary and the worst case credible spill assessment area (Fletcher and Santoro, 2012):

- Pilbara Trap Managed Fishery;
- Pilbara Fish Trawl Managed Fishery;
- Pearl Oyster Managed Fishery (Zones 1, 2 and 3);
- Onslow Prawn Managed Fishery;
- Nickol Bay Prawn Managed Fishery;
- Kimberley Prawn Managed Fishery;
- Broome Prawn Managed Fishery;
- West Coast Purse Seine Fishery;
- Northern Demersal Scalefish Fishery;
- Aquaculture Pearling Sites;
- West Coast Rock Lobster Managed Fishery;
- Roe's Abalone Fishery;
- Abrolhos Islands and Mid-West Trawl Managed Fishery;
- West Coast Deep Sea Crab Managed Fishery;
- West Coast Demersal Gillnet and Demersal Longline Managed Fishery;
- West Coast Demersal Scalefish Managed Fishery;
- Cockburn Sound Crab Managed Fishery;
- Cockburn Sound Fish Net Managed Fishery;
- Cockburn Sound Line and Pot Fishery;
- South West Coast Salmon Managed Fishery;
- West Coast Estuarine Fishery;
- West Coast Beach Bait Managed Fishery;;
- South West Beach Seine Fishery;
- Exmouth Gulf Prawn Managed Fishery;
- Gasgoyne Demersal Scalefish Fishery;
- Shark Bay Prawn and Scallop Managed Fishery;
- Shark Bay Crab Managed Fishery;
- Shark Bay Beach Seine and Mesh Net Managed Fishery;
- Mackerel Managed Fishery;
- Beche-de-Mer Fishery;
- Marine Aquarium Fish Managed Fishery;
- Octopus; and
- Specimen Shell Managed Fishery.

Within the North Coast Bioregion (the area within which the operational area lies), recreational fishing is experiencing significant growth, with a distinct seasonal peak in winter when the local population increases

significantly from tourists visiting the Exmouth/Onslow area and Dampier Archipelago (Fletcher and Santoro, 2012).

Increased recreational fishing has also been attributed to those involved in the construction or operation of developments within the region. Offshore islands, coral reefs, shoals (e.g. Rankin Bank and Glomar Shoals) and the continental shelf provide species of major recreational interest including saddletail snapper, red emperor, cods, coral and coronation trout, sharks, trevally, tuskfish, tunas, mackerels and billfish (Fletcher and Santoro, 2012).

In order to reduce collisions between vessels and offshore infrastructure, AMSA has established a network of Shipping Fairways off the Pilbara coast. The Balnaves West-1 well lies outside these shipping lanes. The closest shipping lane is approximately 40 km to the east of Balnaves West-1 well location.

The area of the NWS is a major oil and gas hub in Australia, with several companies operating on the Shelf. The Balnaves Development is situated within production licence WA-49-L, awarded for the Julimar development in September 2011 and was originated from exploration permit WA-356-P. The Balnaves Development is expected to be commissioned in Q1/Q2 2014. The Balnaves FPSO (the Armada Claire) will be located approximately 3.5 km from the proposed Balnaves West-1 well location.

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

No shipwrecks were recorded within the operational area. Two shipwrecks lie within the spill trajectory area.

4. DESCRIPTION OF THE ACTIVITY

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

5. ENVIRONMENTAL HAZARDS AND CONTROLS

The environmental risk assessment for routine and accidental events for the Activity centred around hazard identification workshop attended by a subset of Apache's environmental scientists and drilling personnel, held on 21 October 2013. Throughout the preparation of this EP, further evaluation of risks were undertaken as appropriate, as the activity scope was defined. Apache's Environmental Scientists and other participants from Drilling, Logistics and Safety were also involved where necessary.

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

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

6. MANAGEMENT APPROACH

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

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

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

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

1. Details on the systems, practices and procedures to be implemented;
2. Key roles and responsibilities;
3. Training, competencies and on-going awareness;
4. Monitoring, auditing, management of non-conformance and review;
5. Incident response including an Oil Spill Contingency Plan (*Balnaves West-1 Exploration Drilling OSCP*);
6. Record management; and
7. Stakeholder consultation.

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

7. HYDROCARBON SPILL PREPAREDNESS AND RESPONSE

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

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

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

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

8. CONSULTATION

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

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

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

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

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA) • Department of Fisheries (State) • Western Australian Fishing Industry Council (WAFIC) • Commonwealth Fisheries Association (CFA) • A Raptis and Sons • WestMore Seafoods • Shark Bay Seafoods • Austral Fisheries • MG Kalis • Pearl Producers Association • Individual fishing licence holders
Recreational fisheries	• RecFish West
Marine conservation	• Department of Parks and Wildlife (State)
Marine activities, spill response and safety	• Australian Marine Oil Spill Centre (AMOSC) • Australian Maritime Safety Authority (AMSA) • Department of Mines and Petroleum (State) • Department of Defence (State) • Department of Transport (State) • Department of the Environment (formerly DSEWPaC)
Tourism	• Marine Tourism WA

Stakeholders have been consulted regarding projects for the Balnaves Development in permit WA-49-L extensively, including information packages for Balnaves Operations in June 2013, Balnaves Drilling in January 2013 and Balnaves Construction and Installation in December 2012.

Apache has commenced with issuing quarterly updates to relevant stakeholders. These updates consist of details for the on-going, plus proposed upcoming activities on the NWS for the next 6–9 months. This update provides the stakeholders with information inclusive of proposed activity, activity location and the activity duration, and gives the stakeholders an opportunity to request additional information on the specific activities that may be of interest to them. The Balnaves West-1 drilling activity was first presented to stakeholders as part of Apache's September 2013 Quarterly Project Update and more extensively in October 2013 with a Balnaves West-1 Stakeholder Consultation Package.

No stakeholders raised any objections to the information, primarily because these stakeholders are now familiar with projects within this permit area.

9. CONTACT DETAILS

Further information about the Balnaves West-1 exploration drilling activity can be obtained from:

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10. MANAGEMENT CONTROLS FOR THE DRILLING ACTIVITY

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

Table 10-1: Management controls and performance standards for planned events during the Activity

Hazard	Management Control Measures and Performance Standards
MODU positioning	• Support vessels do not anchor within the operational area; • The MODU is anchored according to the MODU anchoring procedure to avoid placement of anchor assembly on identified seabed features; • Contractor MODU positioning procedures are reviewed and approved by Apache prior to their use; • 3D software program Star Fix Moor to be utilised during anchoring to ensure anchor positions are within areas defined in the mooring analysis • MODU anchorage to consist of up to 8 anchors • Length of each anchoring chain to follow engineering design and not exceed 1.5 km
Artificial light	• Deck lighting managed in accordance with Apache procedures or a MODU/ Vessel Master safety directive and in accordance with Environmental Requirements for offshore marine vessels

Noise emissions	• MODU and support vessel machinery will be regularly maintained in accordance with the planned maintenance system (PMS)
	• Unless an action is reasonably necessary to prevent a risk to human health or to deal with an emergency, helicopters will operate in accordance with Part 8 of the EPBC Regulations (Aircraft). In particular:
	  ○ Must not operate at a height lower than 1,650 feet (500 m) or within a horizontal radius of 500 m of a cetacean;
	  ○ Must not allow the aircraft to approach a cetacean from head on; and
	  ○ Must not land the aircraft on water so that the aircraft comes within a 500 m radius of a cetacean (if the aircraft can land on water).
	• In accordance with Part 8 of the EPBC Regulations (Vessels), all vessels must travel at less than 6 knots and minimise noise within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area.
	• Check-shot survey activities will implement mitigation measures outlined in EPBC Act Policy Statement 2.1 Part A (DEWHA, 2008b) as appropriate for the activity:
	  ○ Precaution zones will be implemented (Observation, Low Power and Shut down)
	  ○ Pre-start up visual observation of precaution zones (>30 mins before soft start)
	  ○ Relevant crew members are briefed on EPBC Act Policy Statement requirements
	  ○ Soft start, start-up delay, operations and stop work procedures
	  ○ Night time and low visibility procedures

Hazard	Management Control Measures and Performance Standards
Discharge of drill cuttings and fluids (water-based muds)	• Apache's drilling fluid selection process is utilised to ensure the mud selected for the Activity presents the lowest environmental impact based on the formation properties. • The drilling chemicals selected are either Gold/Silver/D or E rated through OCNS or Apache's risk assessment procedure as per Apache's procedure Drilling Fluid and Chemical Selection (EA-91-II-007) to ensure product is environmentally acceptable. • Chemicals which are not Gold/Silver/D or E rated have a complete risk assessment of the environmental impact of the chemicals to ensure product is environmentally acceptable. • WBM cuttings returned to the MODU are treated through the on board cuttings management system (shale shakers and centrifuges – if required) to maximise recondition and re-use of residual mud and minimise the discharge of drilling fluids. • Shaker screens are selected and inspected daily during drilling operations once the BOP and riser are in place, by the Mud Engineer on location and are in an acceptable condition for treatment of drill cuttings ensuring efficient re-use. • Re-use and treatment of mud maximised by maintaining the cuttings management system in accordance with the PMS. • To ensure correct volumes are recorded, mud pit sensor calibration is checked every two weeks, with re-calibration only required if calibration is out. • If cuttings centrifuge system is required, it is inspected daily during drilling operations • All hoses used for pumping of mud and drilling fluids are maintained according to PMS to ensure 'fit for purpose'.
Discharge of drill cuttings and fluids (synthetic-based muds)	• Apache's drilling fluid selection process is utilised to ensure the mud selected for the Activity presents the lowest environmental impact based on the formation properties. • The drilling chemicals selected are either Gold/Silver/D or E rated through OCNS or Apache's risk assessment procedure as per Apache's procedure Drilling Fluid and Chemical Selection (EA-91-II-007) to ensure product is environmentally acceptable. • Chemicals which are not Gold/Silver/D or E rated have a complete risk assessment of the environmental impact of the chemicals to ensure product is environmentally acceptable. • SBM cuttings returned to the MODU are treated through the on board cuttings management system (shale shakers, centrifuges and cuttings dryers) and discharged with an average of <10% oil on cuttings for each section. Measurement is made with a retort and is reported as weight percentage of oil on dry rock. Measurement method as per Apache's *Operational Guidelines and Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks (DR-91-ID-016)*. • Shaker screens are selected by the mud engineer on location and are in an acceptable condition for treatment of drill cuttings. • SBM displaced from the well bore (and returned base oil, surfactant/solvent/high viscosity pills) are collected and stored for reuse or onshore disposal. Only interface fluids (seawater/brine/WBM) with residual oil (SBM) content <1% is discharged overboard, measurement is made with a hand crank 100 ml centrifuge as per Apache's Operational Guidelines and Environmental Performance Measures for Handling and Usage of Drilling Fluids and Bulks (DR-91-ID-016). • The volume and oil content of seawater/brine/WBM discharged overboard as part of SBM displacement is recorded and the total volume of oil included in the calculation of oil on cuttings for the well selection.

Hazard	Management Control Measures and Performance Standards
	• Average oil on cuttings is <10% for each well section. • Re-use and treatment of mud maximised by maintaining the cuttings management system in accordance with the PMS. • Cuttings dryer and centrifuge system are inspected daily during drilling operations. • All hoses used for pumping of mud and drilling fluids are maintained according to PMS to ensure 'fit for purpose'.
Discharge of cement	• The chemicals selected are either Gold/Silver/D or E rated and have a complete risk assessment of the environmental impact of the chemicals as per Apache's *Drilling Fluid and Chemical Selection in Activities (EA-91-II-007)* to ensure produce is environmentally acceptable. • Chemicals which are not Gold/Silver/D or E rated have a complete risk assessment of the environmental impact of the chemicals as per Apache's Drilling Fluid and Chemical Risk Assessment Procedure (EA-91-II-008) to ensure product is environmentally acceptable. • Left-over bulk cement will be stored on board and transferred to a licensed carrier or to an onshore reception facility, in accordance with the *Environmental Protection (Controlled Waste) Regulations (2004)*. • While cementing prior to riser installation, a remotely operated vehicle (ROV) will monitor the top of the well to ensure excessive volumes of cement are not pumped. • Liquid or semi liquid cement that returns to surface or is flushed during tank/pipe cleaning will be diverted overboard. • Hard cement which returns to surface and is removed at the shale shakers will be diverted overboard. • Bulk cement will not be discharged overboard except in an emergency; it will either be left on board for the subsequent campaign, returned to a supply vessel for re-use or will be sent back to shore for storage or appropriate disposal. The majority of cement will be mixed and used downhole below the seabed, resulting in limited discharges of any mixed cement. Through inventory control and well planning, left over cement product will be minimised. • 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. • PMS is up to date and includes drill cuttings management system equipment.
Planned discharges	• Untreated sewage will be stored on board and only discharged at a distance of more than 12 nautical miles from the territorial baseline in accordance with Regulation 11 of MARPOL Annex IV or disposed of onshore at a reception facility or to a carrier licensed to receive the waste. • Treated sewage will be discharge in compliance with Regulation 11 of MARPOL Annex IV. • Sewage treatment system will be compliant with Regulation 9 of MARPOL Annex IV and maintained in accordance with PMS. • Sewage system maintained in accordance with PMS; • Persons on board (POB) do not exceed the maximum carrying capacity of the MODU or support vessels' sewage system. • Food waste collected, stored, processed and disposed of in accordance with MODU/support vessel Garbage Management Plan (as required under Regulation 9 of MARPOL; and/ or Shipboard Waste Management Plan (as required under AMSA Marine Order 95: Marine Pollution Prevention – Garbage). • In accordance with MARPOL Annex V Regulation 9.1, AMSA placards will be displayed on support vessels and MODU to provide guidance on

Hazard	Management Control Measures and Performance Standards
	garbage disposal requirements. • In accordance with Regulation 4 of MARPOL Annex V (IMO, 2011), food waste discharge from the MODU and support vessels (when inside the 500 m exclusion zone) must be ground or comminuted to <25 mm and discharged only when >12 nautical miles from the territorial baseline. • Macerators are maintained in accordance with PMS. • Food waste that cannot meet the requirements for disposal in the operational area (e.g. due to equipment failure or otherwise) will be transferred to land for disposal. • As required by MARPOL Annex I Regulations, while in the operational area, support vessels may discharge oily water after treatment to 15 ppm in a MARPOL compliant oily water filter system. • To discharge oily water, the support vessels will require a current International Oil Pollution Prevention (IOPP) certificate for oily water filtering equipment. • If a MARPOL approved OWS is not present/functioning, the MODU/support vessel will store machinery space oily water which will be shipped to shore for appropriate disposal at a reception facility or to a carrier licensed to receive the waste. • Scupper plugs or equivalent deck drainage control measures available where chemicals and hydrocarbons are stored and frequently handled. • Only non-hazardous, biodegradable detergents used for deck washing. • Continuous bunding will be in place around all machinery or equipment with potential to leak.
Atmospheric emissions	• No incineration will occur on board the MODU and support vessels will not use incinerators within the 500 m exclusion zone. • Fuel oil will meet regulated sulphur content levels in order to control SOx and particular manner emissions in accordance with Regulation 14 of MARPOL Annex VI. • MODU and support vessel engines meet NOx emission levels as required by Regulation 13 of MARPOL Annex VI. • MODU/ vessel machinery maintained in accordance with PMS. • Ozone-depleting substances (ODS) will be managed in accordance with Regulation 13 of MARPOL Annex VI.
Interference with other users of the sea	• Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of operational area, activity and duration prior to mobilisation to the drill location, which will trigger AHO to issue a 'Notice to Mariners'. • AMSA RCC notified of operational area, activity and duration prior to mobilisation, which triggers RCC to issue an AusCoast Warning. • Relevant stakeholders identified and notified of operational area, activity and duration prior to mobilisation. • Navigation equipment and vessel procedures compliant with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 2012 (or equivalent) • Support vessels equipped with an automatic identification system (AIS) and an ARPA system which can identify, track and project the closest approach for any vessel (time and location) within the operational area and radar range (<70 km away). • Bridge-watch on all support vessels 24 hours per day. • At least one support vessel monitoring the MODU 500 m exclusion zone at all times to aid in the detection of other vessels and to provide

Hazard	Management Control Measures and Performance Standards
	additional communication with other vessels where necessary.

Table 10-2: Management control measures and performance standards for unplanned events during the Activity

Hazard	Management Control Measures and Performance Standards
Introduction of marine pest species	• Vessel anti-foulant systems are maintained in compliance with International Convention on the Control of Harmful Anti-fouling Systems on Ships. • MODU has AQIS clearance to be in Australian waters. • A biofouling vessel risk assessment (VRASS) is completed prior to mobilisation to Australia as defined within the *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2008)* and ranked as 'low'. • No ballast water exchange will take place in waters less than 200 m or within 12 nautical miles from nearest land in accordance with Australian *Ballast Water Management Requirements (AQIS, 2011)*. • Vessels shall exchange 'high-risk' ballast water, as defined in Australian *Ballast Water Management Requirements (AQIS, 2011)*, outside Australian territorial seas and in waters at least 200 m deep. • On board ballast water exchange logs detailing uptake and discharge volumes and position and water depth of exchange.
Solid waste discharges	• Non-hazardous and hazardous wastes collected, stored, processed and disposed of in accordance with the MODU and support vessels' Garbage Management Plan, as required under Regulation 9 of MARPOL Annex V. • Accidental release of waste to the marine environment is reported, investigated and investigated, and corrective actions are implemented. • Hazardous wastes (e.g. used oils, lithium batteries, chemical and metallic wastes) will be segregated, labelled and stored on board with secondary containment (e.g. bin located in a bund) and non-hazardous waste is stored within suitably enclosed bins. • As a minimum, non-hazardous waste produced on the MODU will be recycled/ segregated from general waste to include paper, cardboard, aluminium cans, scrap metal and empty containers/drums (plastic, tin, metal). • Bunding around stored bulk wet chemicals or hazardous waste storage areas around the entire area. • Solid non-biodegradable and hazardous waste will be disposed of onshore at a suitable waste facility or to a carrier licensed to receive the waste if required by jurisdictional legislation. • Accidental release of waste to the marine environment is reported and investigated and corrective actions are implemented.

Dropped objects	• Compliance with anchor handling procedures which includes:
	  ○ Restrictions during unsafe weather conditions;
	  ○ Double securing of anchors; and
	  ○ No passing of anchors to anchor handling vessels directly over subsea infrastructure;
	• Support vessels will not anchor within the 500 m exclusion zone around the MODU unless in an emergency (and only if safe to do so).
	• Material handling and lifting equipment maintained in accordance with the PMS.
	• Lifting equipment certified.
	• All lifts to be completed in accordance with the LEMS as described in the MODU HSE Case and the Apache *Drilling and Completions Standards Manual (AE-*

Hazard	Management Control Measures and Performance Standards
	91-ID-004). • Detailed records of any equipment lost overboard completed. • Equipment securely sea fastened prior to MODU moving. • Compliance with equipment handling and lifting procedures demonstrated by mitigation measures being included in JSA. • BOP designed for withstand dropped object impact and to prevent loss of containment.
Marine fauna collisions	• Marine fauna identification posters and Marine Fauna Sighting Datasheets will be available on MODU and all support vessels. • In accordance with Part 9 of the EPBC Regulations (Vessels), all vessels must travel at less than 6 knots and minimize noise within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area.
Spillage of hydrocarbons, environmentally hazardous chemicals and liquid wastes to the sea	• Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL Annex III regulations. • Chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas • Chemicals (environmentally hazardous) and hydrocarbons will be stored in accordance with relevant Material Safety Data Sheet (MSDS). • All hazardous wastes stored onboard the MODU in closed, secure and bunded storage areas prior to transport back to shore for disposal/recycling/treatment in accordance with local regulations • Chemical and hydrocarbon storage areas will be inspected weekly. • Contaminated material contained on board for onshore disposal in accordance with the Environmental Protection (Controlled Waste) Regulations (2004). • All shipboard chemical spills and hydrocarbon spills will be managed in accordance with SOPEP/ SMPEP. • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled. • Left-over bulk drilling solids (e.g., barite, bentonite) will be stored onboard and transferred to a licensed carrier or onshore reception facility, in accordance with the Environmental Protection (controlled waste) Regulations (2004). • During bulk loading of silos, a crew member will be posted at the vent and will remain in contact with the supply vessel to prevent overfilling. • Scupper plugs or equivalent deck drainage control measures available where chemicals and hydrocarbons are stored and frequently handled. • Only non-hazardous, biodegradable detergents will be used for deck washing. • Continuous bunding, or drip trays where appropriate, will be in place around all machinery or equipment with potential to leak hydrocarbons. • Following rainfall events, bunded areas on open decks of the vessels will be cleared of rainwater. • Maintenance records on the MODU and support vessels indicate that all machinery and equipment containing hydrocarbons and equipment involved in the discharge and transfer of liquids have maintenance scheduled on their respective PMS. • Only licensed facility or carrier to receive fuel or oily waste. • Transfer of fuel to and from the MODU in compliance with the MODU's fuel transfer procedure. • All MODU oily water waste will be disposed of at a licensed onshore reception facility or to a carrier licenced to receive the waste. • As required by MARPOL Annex I Regulations, while in the operational area, support vessels may discharge oily water after treatment to 15 ppm in a MARPOL compliant oily water filter system.

Hazard	Management Control Measures and Performance Standards
	• To discharge, the support vessels will require a current International Oil Pollution Prevention (IOPP) certificate for oily water filtering equipment.

Hydrocarbon spill during refuelling, base oil transfer, failure of slip joint packer, or inadvertent release of bulk synthetic base mud	• Refuelling will only take place if more than 12 nautical miles from the territorial baseline.
	• Fuel transfers will be undertaken in accordance with Apache's/ Atwood's Refuelling and Chemical Transfer Management Procedure, safe work procedure and checklist for fuel transfers, including but not limited to:
	  ○ Manual sounding of fuel tanks;
	  ○ Visual inspection of dry break couplings and hoses;
	  ○ Fully manned operation;
	  ○ Permit-to-work documentation is complete and signed off to ensure refuelling is undertaken in accordance with the refuelling procedure; and
	  ○ All refuelling hoses fitted with dry break couplings and are buoyant or fitted with floats.
	• Sulphur content of fuel oil complies with Regulation 14 of MARPOL Annex VI in order to control SOx and particulate matter emissions.
	• Adequate bunding beneath in fuel transfer areas as per MARPOL Annex IV.
	• Drainage and bunding systems are subject to ongoing monitoring and maintenance to ensure integrity and capacity;
	• Support vessels have oily water filtering systems that are compliant (i.e. discharge oily water only when oil in water <15 ppm), and surveyed, as per MARPOL Annex I/ Marine Order 91.
	• Diesel storage tanks and fluid transfer hose maintenance (including replacement of refuelling hoses every six months and base oil transfer lines at least every 12 months) undertaken in accordance with the PMS.
	• Mud pits to have at least two isolation valves in place, locked shut with the installation management keeping the keys, and only operated under the permit to work system
	• Mudlogging volume sensors calibrated
	• Oil spill response executed in accordance with the Apache *Balnaves-1 Exploration Drilling OSCP (EA-72-RI-10003.02)*.
	• Oil spill response executed in accordance with the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP) /SMPEP as required under MARPOL.
	• Oil spill exercise will be conducted prior to the commencement of the Activity and then every three months thereafter.
	• In line with MARPOL Annex I, all vessels involved in the Activity over 400 gross tonnage will have a current SOPEP in lance and a valid IOPP.

Hydrocarbon spill due to ruptured vessel tanks due to vessel collision	• Notification provided to key stakeholders including relevant Australian Government agencies. • Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of operational area, activity and duration prior to mobilisation, which triggers AHO to issue 'Notice to Mariners'. • AMSA RCC notified of operational area, activity and duration prior to mobilisation, which triggers RCC to issue an AusCoast Warning. • Australian Fisheries Management Authority (AMFA), Department of Fisheries and commercial fishing stakeholders notified prior to mobilisation. • Navigation equipment and vessel procedures will be compliant with all marine navigation and vessel safety requirements under the *International Convention of the SOLAS 1974* and *Navigation Act 1912* (or equivalent). • Support vessels will be equipped with an automatic identification system (AIS) and an ARPA system for the detection of approaching vessels.

Hazard	Management Control Measures and Performance Standards
	• Bridge-watch on all support vessels will be maintained 24 hours per day. • At least one support vessel will be employed to monitor the MODU 500 m exclusion zone at all times to aid in the detection of other vessels and provide additional communication with other vessels where necessary. • Sulphur content of fuel oil complies with Regulation 14 of MARPOL Annex VI in order to control SOx and particulate matter emissions. • Oil spill response executed in accordance with the Apache *Balnaves-1 Exploration Drilling OSCP (EA-72-RI-10003.02)*. • Oil spill response executed in accordance with the MODU and support vessel's SOPEP/ SMPEP as required under MARPOL. • Oil spill exercise will be conducted prior to the commencement of the Activity and then every three months thereafter.
Hydrocarbon spill due to loss of well control	• Well designed to meet technical specifications to ensure a margin of safety. • During preparation of the MODU safety case, all risk associated with well blowout are assessed and reduced to ALARP. • After BOP's are installed, the well will have two barriers maintained during drilling, suspension and abandonment activities in accordance with Apache's *Drilling and Completions Standards Manual (AE-91-004, Section 11)*. • The well will be drilled in accordance with Apache's Well Management Drilling System (WMDS) to ensure blowout prevention and well control. • WOMP details specific well control standard for this Activity and will be approved prior to the commencement of the Activity. • Apache's Fluid Selection Process will be followed in order to select the most appropriate drilling mud following offset well data reviews and analysis. • Well control equipment (e.g. BOP) included on the PMS as per Apache's *Drilling and Completions Standards Manual (AE-91-004, Section 11)*. • All well control equipment, casings and well head equipment will be tested to MASP in accordance with the Apache *Drilling and Completions Barrier Standard (AE-91-ID-004*). • Oil spill response executed in accordance with the Apache *Balnaves-1 Exploration Drilling OSCP (EA-72-RI-10003.02)*. • Oil spill response executed in accordance with the vessel's SOPEP as required under MARPOL. • Oil spill exercises will be conducted as per the Apache *Balnaves-1 Exploration Drilling OSCP (EA-72-RI-10003.02)*.and SOPEP.
Hydrocarbon spill response	Management controls for activities and associated hazards relating to the following are described above: • Disturbance to marine habitat and seabed; • Artificial light; • Noise; • Drilling and Cementing liquid discharges; • Oily water discharges; • Liquid non-hazardous and potentially hazardous materials; • Discharge of sewage and sullage; • Discharge of cooling water; • Desalination brine discharge;

Hazard	Management Control Measures and Performance Standards
	• Atmospheric emissions; • Interaction with commercial and recreational fishing; • Interaction with shipping; • Disruption to tourism and/or visual amenity; • Marine pest introduction; • Non-hazardous and hazardous solid waste; • Disturbance to marine fauna; and • Surface release of diesel. Performance standards applicable to all response strategies include: <u>Planning and design</u> • Response priorities and activities to be documented in IAPs (including NEBA of response options for the receptor(s) of concern) • Operational and scientific monitoring of operations to ensure net environmental benefit achieved from response strategy and environmental harm does not occur • Approvals for access, disposal, restrictions, prioritisation and relocation considerations required from DER, DoT and/ or DPaW received prior to implementation of response plans, for instance during a shoreline clean-up response • Shoreline protection and deflection to be managed in accordance with the Protection and Deflection Plan • Shoreline clean-up to be managed in accordance with the Shoreline Clean-up Plan, for instance no machinery to be used in mangroves or on turtle nesting beaches • OWR to be managed in accordance with the Oiled Wildlife Response Plan, for instance prioritisation of conservation status fauna in all OWR activities and dead wildlife recovery • Waste generated to be managed in accordance with the Waste Management Plan, for instance temporary bunding will be installed around the IBCs (Intermediate Bulk Containers) and Isocontainers <u>Personnel and equipment</u> • Lead response personnel are trained and experienced for the activities assigned and/ or sensitive receptors targeted • The ICT is to mobilise all people and equipment required to achieve the IAP performance objective(s) • Provision of timely and adequate resources to ensure collected fauna begin transport to intended destination within two hours of capture • Confirmation that the OWR facility able to accommodate washing and rehabilitation of intakes received prior to collection of fauna <u>Monitoring and maintenance</u> • Surveillance data and spill trajectory modelling predictions incorporated into daily IAP preparation process for response strategies • Treated animals being transported are kept in a well-ventilated, shaded area and checked hourly In addition, hydrocarbon spill response activities may require the following management controls:

Hazard	Management Control Measures and Performance Standards
	Protection and Deflection Response Strategy: • Pre-planning of protection and deflection booming to be installed in nearshore and shoreline areas will evaluate ambient environmental conditions known and predicted and will outline the necessary equipment to ensure fail-safe ballasting of surface boom. Nearshore/ shoreline boom will not be installed if environmental conditions cannot be accommodated. • Daily checks of boom integrity will be undertaken to ensure equipment is holding and functioning as intended; • Shoreline surveys completed prior to installation of booming along shorelines will demarcate no-go areas; • Marine fauna observation will be undertaken during offshore and nearshore booming operations. Shoreline Clean-up Response Strategy: • Shoreline assessments used to plan clean-up operations. Pre-planning of operations to include access requirements, no-go zones, and hot/warm/cold zones; • Flushing and washing to only use seawater; • Shoreline access permissions and restrictions to be provided by Department of Parks and Wildlife (DPaW) and Department of Transport (DoT) prior to implementation of cleanup operations; • In the case of natural recovery, scientific monitoring of shoreline habitats to inform on recovery; • Pre-cleaning of shorelines predicted for contact will reduce the volume of oily waste and reduce the required clean-up resources; • No machinery to be used in mangroves or on turtle nesting beaches; • Waste generated to be managed in accordance with the Waste Management Plan. Oiled Wildlife Response (OWR) Strategy: • Lead response personnel trained and experienced in OWR activities and field teams to be accompanied by wildlife experts experienced with identification and behaviour of wildlife at risk; • Planning of capture and relocation activities to be approved by DPaW prior to implementation; • Effective provision of operational monitoring data to OWR planning teams to identify and prioritise oiled habitats and areas predicted for contact; • Use of capture and collection equipment appropriate for the fauna being targeted; • Provision of timely and adequate resources to ensure collected fauna begin transport to intended destination within two hours of capture; • Confirmation that the OWR facility able to accommodate washing and rehabilitation of intakes received prior to collection of fauna; • Prioritisation of conservation status fauna in all OWR activities. • Pre-planning to include delineation of hot, warm and cold zones. All oiled equipment and waste will be managed within the warm zone and will not pass to the cold zone during clean-up activities; • Recovered oily water and solid wastes from oiled PPE, equipment and stranded oil will be returned to shore and disposed of at facilities licensed to take the controlled waste; • Permits for the placement and design of waste disposal pits will be acquired from DER and/ or DPaW prior to their construction and use.

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