Levitt-1 Exploration Drilling

Environment Plan Summary

REV	DATE	DESCRIPTION	BY	CHK	EM/PM
2	22/01/15	Revised and resubmitted to NOPSEMA	LMac	LM	HA
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1. INTRODUCTION

Apache Northwest Pty Ltd ('Apache') is the titleholder for petroleum activities covered under this EP within the permit area WA-482-P. In Australia, Apache Northwest Pty Ltd is a subsidiary of Apache Energy Ltd (AEL), an Australian operating subsidiary of Apache Corporation.

Apache proposes to drill the Levitt-1 hydrocarbon exploration well (the 'Activity'), located in Commonwealth waters approximately 250 km north of Karratha, Western Australia (WA), within permit area WA-482-P.

The Levitt-1 EP has been prepared in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (*OPGGS(E) Regulations*) for approval by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

1.1 Compliance

The overall purpose of the EP is to comply with statutory requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) regulations 2009 (OPGGS (E) Regulations) and to ensure that the Activity is planned and conducted in accordance with Apache environmental policies and standards, including the Corporate Environmental Policy. The EP was assessed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 10th of November 2014. This EP summary has been prepared in accordance with the requirements of regulation 11 (7) and (8) of the OPGGS (E) Regulations.

1.2 Schedule

Apache proposes to drill the Levitt-1 well in Q4 2014. The exact timing of the Activity is dependent upon asset availability, weather conditions and receiving the necessary statutory approvals. The Levitt-1 exploration well is expected to take approximately 45–60 days to complete.

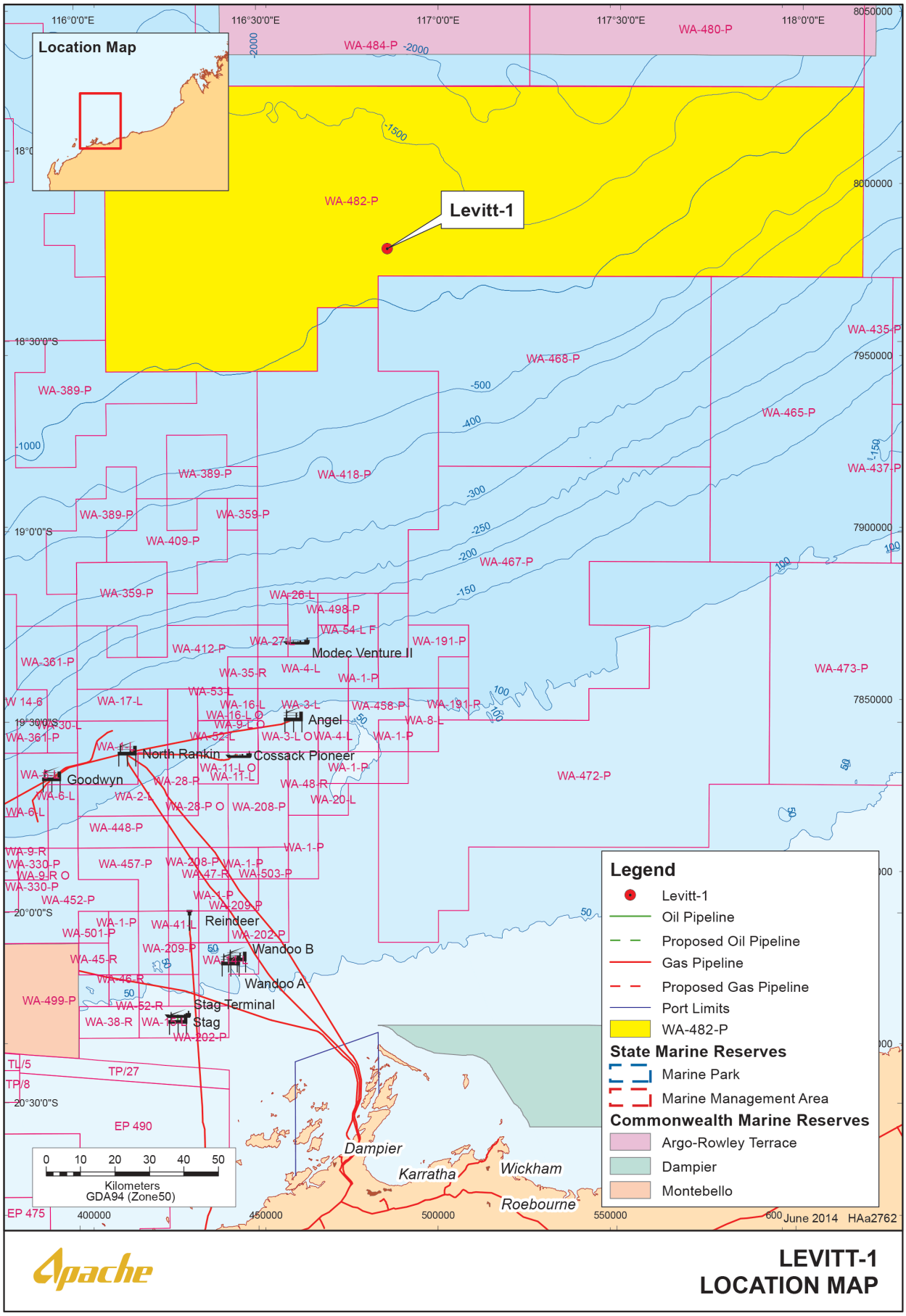

Figure 1-1: Location of the Levitt-1 drilling activity

2. ACTIVITY LOCATION

The proposed coordinates of the well are provided in **Table 2-1** and the location is displayed in **Figure 1-1.** The proposed well is located in a water depth of approximately 1,160 m and lies approximately 250 km north from the closest mainland coast (Karratha).

Table 2-1: Indicative location of the Levitt-1 exploration well

Parameter	Coordinates (Datum/Projection: GDA 94 Zone 50S)			
	Latitude	Longitude	Easting	Northing
Levitt-1	18°12’31”S	116°51’6”E	484329m	7986699m

3. DESCRIPTION OF THE ACTIVITY

Apache proposes to drill the Levitt-1 exploration well in this permit area using a mobile offshore drilling unit (MODU). The Levitt-1 exploration well, located in the Carnarvon Basin, will be drilled to assess the lithology and presence of hydrocarbons in the North Rankin and Legendre formations. The expected fluid is light oil.

The MODU used to drill the Levitt-1 well will be either a drillship or a semi-submersible drilling rig.

In the circumstance that the MODU is a drillship, the MODU will move into position under its own propulsion and will use dynamic positioning to keep station, whereby thrusters on the ship maintain its lateral position. Four to five positioning transponders ('beacons') will be deployed to seabed as part of the dynamic positioning system. Deployment of the transponders will be undertaken once the drillship is on location.

In the circumstance that the MODU is a semi-submersible rig, the MODU will be towed to location upon which anchor handling-vessels (AHVs) will deploy the anchors at the drilling location with up to an eight anchor array required; anchors will be laid on the seabed up to 2 km from the surface hole location and anchors will be retrieved upon completion of the Activity and departure of the MODU from the drilling location.

The well will be drilled in three sections: surface, intermediate, and production. The surface section will be drilled using seawater and bentonite sweeps and discharges will be returned to the seabed in this uncased section. The intermediate and production sections will be drilled with inhibited polymer water based mud (WBM). The extracted cutting and recoverable fluids (WBM) generated while drilling the lower two well intervals will be brought to the MODU through the riser, before being treated by solids control equipment to separate the drilling fluid from the cuttings before discharge of cuttings to the marine environment at sea surface.

The drilling activity will also include wireline logging and vertical seismic profiling of the well.

The support vessels for the Activity will supply food, bulk drilling materials and transport equipment to the MODU once it is in position. At least one support vessel will remain on location for the duration of the Activity to monitor the Operational Area (refer **Section 2**) around the MODU.

The Levitt-1 exploration well is expected to take approximately 45–60 days to complete. The timing of the drilling operation is dependent on MODU availability and weather conditions; therefore this EP covers drilling activities in all seasons.

4. RECEIVING ENVIRONMENT

4.1 Boundaries of the receiving environment for the Activity

4.1.1 Operational Area

The Operational Area defines the geographical boundary of the Activity. The Operational Area for the Levitt-1 drilling activity covers 3.14 km^2 extending 2 km radially from the surface hole location of the well (**Table 2-1**). The Operational Area is also the exclusion zone (500 m radius) for all vessels not employed in the Activity. The Operational Area sits entirely within permit area WA-482-P. The Operational Area occurs entirely within the Northwest transition bioregion.

4.1.2 Environment that may be affected

The environment that may be affected (EMBA) encompasses the environment that could be affected by unplanned as well as planned events. This area has been derived using modelling of credible worst case spill scenarios, including the loss of well control resulting in an oil spill at either sea surface or seabed (**Table 4-1**). The worst case credible spill scenario (a loss of well control) has been modelled to identify and define the worst case environmental extent that may be affected by this Activity. The extent of the EMBA is shown in **Figure 4-1**.

The EMBA shown in **Figure 4-1** does not represent the area that would be impacted following a single worst case credible oil spill. Rather it represents a cumulative area within which all potential oil spill impacts would be contained within. In the event of an oil spill accident the spill would move in the direction of the prevailing wind and currents, this area would be a smaller proportion of the area presented in **Figure 4-1.**

The EMBA for the activity due to planned activities and potential unplanned events extends across the following provinces:

- Northwest Transition;
- Northwest Shelf Transition;
- Timor Province;
- Northwest Province;
- Northwest Shelf Province;
- Central Western Transition;
- Central Western Shelf Transition;
- Central Western Shelf Province;
- Central Western Province; and
- International Waters.

Table 4-1: Summary of credible spill scenarios

No.	Scenario	Hydrocarbon Type	Maximum Credible Volume	Comment
1	Minor spills of hydrocarbons, environmentally hazardous chemicals or liquid-waste to the marine environment	Hydrocarbons/ Chemicals	2.5 m^3	Minor spills from routine operations (e.g. refuelling, chemical transfers)
2	Hydrocarbon spill from a ruptured vessel or MODU fuel tank	Diesel	1,156 m^3	Worst case credible volume based on largest MODU fuel tank
3	Loss of well control	Light crude oil	16,669 m^3	Worst case credible volume based on well blowout over 11 weeks before control established

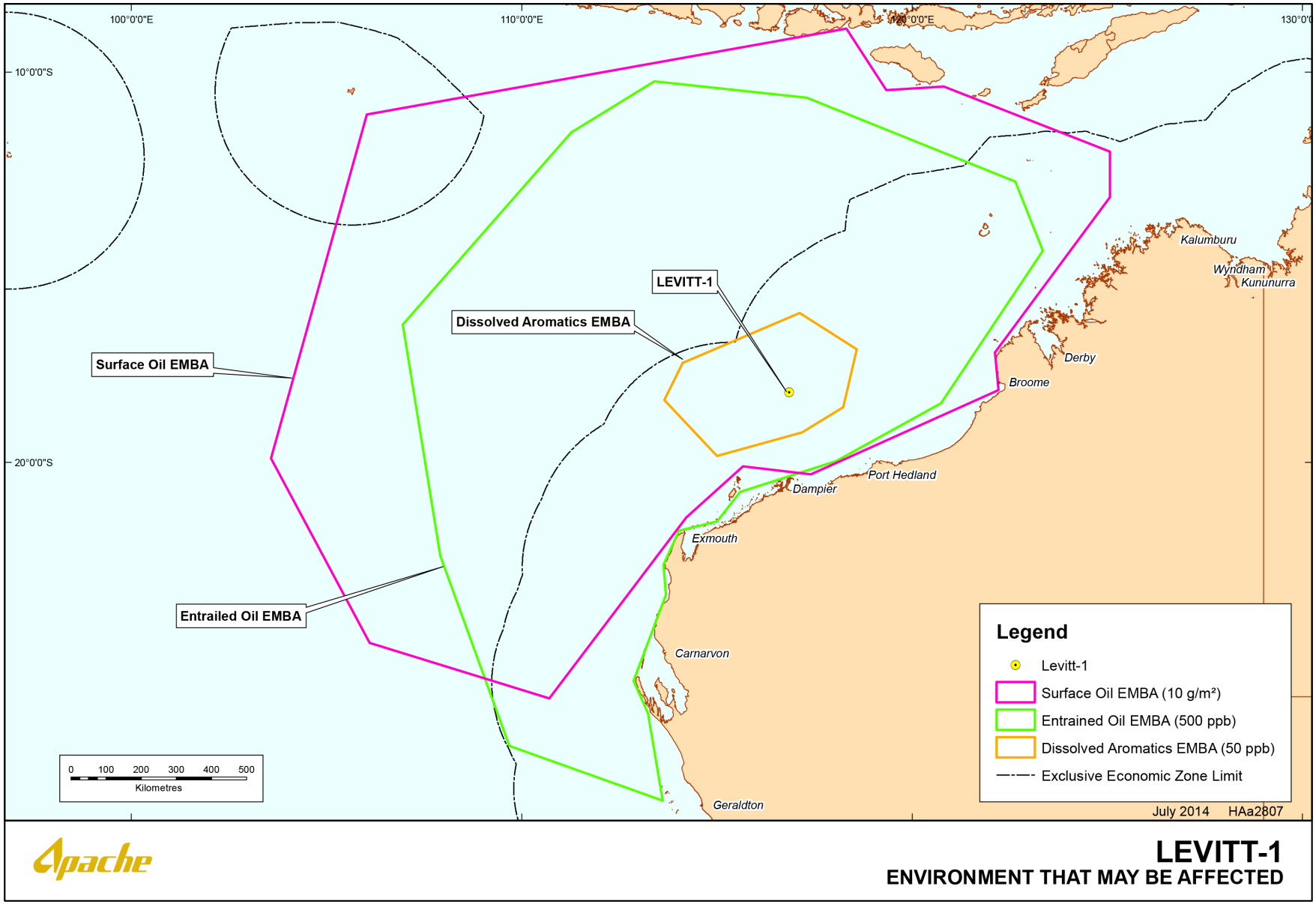

Figure 4-1: EMBA for the Activity

4.2 Description of the environment

4.2.1 Physical environment and habitats

Physical environment

North West Shelf (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˚C) and coolest in August (19˚C). 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. Non-storm winds prevail from the north-east through to south-east at average speeds of 5–6 knots, peak average speeds of 10–15 knots, and maximum speeds of 20 knots. The wave climate is generally composed of locally generated wind waves (seas) and swells that are propagated from distant area (WNI, 1995; 1996). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway and Nye, 1985).

Tidal and wind-forcing are the dominant contributions to local sea surface currents. The tides of the NWS have a strong semi-diurnal signal with four tide changes per day (Holloway and Nye, 1985) and a spring tidal range of 1.9 m and a highest astronomical tide of 2.9 m (Chevron Australia, 2010). 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 current is described as a sea surface current, extending in depth to 150 m (BHPB, 2005; Woodside, 2005). Closer to the coast, the Ningaloo Current flows in a northerly direction, in the opposite direction to the Leeuwin Current, along the outside of the Ningaloo Reef and across the inner shelf from September to mid-April (BHPB, 2005; Woodside, 2005). 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.

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, 2014).

Habitat

The Operational Area is situated within the Northwest transition bioregion. This bioregion lies mostly over the continental slope and the abyssal plain in deep waters that preclude photosynthetic coral growth (DEWHA, 2008). However, in contrast with the surrounding area, the Rowley Shoals are three distinct reef systems (Mermaid, Clerke and Imperieuse Reefs) ~30–40 km apart that rise vertically to the surface from depths of between 500 and 700 m. The marine reef fauna of the Rowley Shoals is considered to be exceptionally rich and diverse, including species typical of the oceanic coral reef communities of the Indo-West Pacific. As many of these species are not found in the inshore tropical waters of northern Australia, such populations are of regional significance (DEWHA, 2008).

Benthic habitat mapping surveys and epibenthic sampling conducted by CSIRO at the continental slope (approximately 400 m water depth) showed that all survey sites predominantly comprised soft muddy sediment, which was often riffled. Gravel, boulders and small outcrops were occasionally recorded. Epifaunal abundance was similar all sites, with epifauna limited to sparsely distributed isolated individuals. Epifauna included isolated scattered sessile crinoids, anemones, glass sponges and seapens. Occasional non-sessile fauna included urchins, prawns and other decapods, holothurians and sea stars. Modelling indicated a 1 km long beam trawl across the continental shelf (~400 m water depth) would be expected to yield sparse (<20 individuals) and low diversity (<10 species) of epibenthic fauna (≥1 cm body size) (Williams *et al*., 2010). Deeper on the continental slope at ~700 m and ~1,000 m, habitats were similar to those observed at 400 m (Williams *et al*., 2010).

Table 4-2 summarises the presence and absence of significant physical environment and habitats that have been identified within the Operational Area and EMBA for the Activity.

Table 4-2: Environmental values and sensitivities – physical environment and habitats

Category	Physical environment and habitats	Operational Area Presence	EMBA									
			Northwest Shelf Transition	Timor Province	Northwest Transition	Northwest Province	Northwest Shelf Province	Central Western Transition	Central Western Shelf Transition	Central Western Shelf Province	Central Western Province	International Waters
Benthic habitats	Coral Reefs		✓	✓	✓		✓		✓	✓		✓
	Seagrass		✓	✓	✓		✓		✓	✓		✓
	Macroalgae		✓	✓			✓		✓	✓		
	Non Coral Benthic Invertebrates	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shoreline habitats	Mangroves		✓				✓		✓	✓		
	Intertidal mud / sand flats		✓				✓			✓		
	Intertidal platforms		✓				✓		✓	✓		
	Sandy beaches		✓				✓					
	Rocky shorelines		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

State and Commonwealth marine reserves that occur within the Operational Area and EMBA are listed in **Table 4-3**. Commonwealth Marine Reserves, State Marine Parks, Marine Management Areas, World Heritage Areas, Wetlands of International Importance, Commonwealth or National Heritage Places and Key Ecological Features present within the EMBA are listed in **Table 4-3.** None of these areas were identified within, or nearby, the Operational Area for the Activity.

Additional information on KEFs and Commonwealth Protected Areas and Heritage places listed in **Table 4-3** is available at the following link:

http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west

Additional information on state Marine Parks listed in **Table 4-3** is available at the following link:

http://www.dpaw.wa.gov.au/management/marine/marine-parks-and-reserves

Table 4-3: Environmental values and sensitivities – protected/significant areas

Value/Sensitivity	Operational Area	EMBA
Commonwealth Marine Reserves	**N/A**	Abrolhos Commonwealth Marine Reserve
	N/A	Jurien Commonwealth Marine Reserve
	N/A	Carnarvon Canyon Commonwealth Marine Reserve
	N/A	Shark Bay Commonwealth Marine Reserve
	N/A	Gascoyne Commonwealth Marine Reserve
	N/A	Ningaloo Commonwealth Marine Reserve
	N/A	Montebello Commonwealth Marine Reserve
	N/A	Dampier Commonwealth Marine Reserve
	N/A	Eighty Mile Beach Commonwealth Marine Reserve
	N/A	Argo-Rowley Terrace Commonwealth Marine Reserve
	N/A	Mermaid Reef Commonwealth Marine Reserve
	N/A	Roebuck Commonwealth Marine Reserve
	N/A	Kimberley Commonwealth Marine Reserve
	N/A	Ashmore Reef Commonwealth Marine Reserve
	N/A	Cartier Island Commonwealth Marine Reserve
State Marine Parks (MP) and Marine Management Areas (MMA)	**N/A**	Shark Bay Marine Park
	N/A	Ningaloo Marine Park
	N/A	Muiron Islands Marine Management Area
	N/A	Barrow Island Marine Park
	N/A	Barrow Island Marine Management Area
	N/A	Montebello Islands Marine Park
	N/A	Rowley Shoals
	N/A	Lalang-garram / Camden Sound
World Heritage	**N/A**	Shark Bay
	N/A	The Ningaloo coast
Wetlands of International Importance (Ramsar)	**N/A**	Roebuck Bay
	N/A	Ashmore Reef National Nature Reserve
National Heritage Places	**N/A**	HMAS Sydney II and HSK Kormoran Shipwreck Sites
	N/A	Barrow Island and the Montebello – Barrow Islands Marine Reserve
	N/A	The West Kimberley
	N/A	The Ningaloo Coast
	N/A	Shark Bay
Commonwealth Heritage Places	**N/A**	Scott reef and Surrounds
	N/A	Seringapatam Reef and Surrounds
	N/A	Ashmore Reef National Nature Reserve
	N/A	Mermaid Reef - Rowley Shoals

Value/Sensitivity	Operational Area	EMBA
	N/A	Ningaloo Marine Area - Commonwealth Waters
Key ecological feature (KEF)	**N/A**	Ancient coastline at 125 m depth contour
	N/A	Ancient Coastline at 90m-120m depth
	N/A	Ashmore Reef and Cartier Island and surrounding Commonwealth waters
	N/A	Canyons linking the Argo Abyssal Plain with Scott Plateau
	N/A	Canyons linking the Cuvier Abyssal Plain with the Cape Range Peninsula
	N/A	Carbonate bank and terrace system of the Sahul Shelf
	N/A	Commonwealth marine environment surrounding the Houtman Abrolhos Islands (and adjacent shelf break)
	N/A	Commonwealth waters adjacent to Ningaloo Reef
	N/A	Continental slope demersal fish communities
	N/A	Exmouth Plateau
	N/A	Glomar Shoals
	N/A	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals
	N/A	Perth Canyon and adjacent shelf break, and other west-coast canyons
	N/A	Seringapatam Reef and Commonwealth waters in the Scott Reef complex
	N/A	Wallaby Saddle
	N/A	Western Demersal slope and associated fish communities (of the Central Western Province)
	N/A	Western rock lobster

4.2.2 Marine fauna

There is likely to be some marked differences in terms of ecological functioning and faunal composition between shelf and deep-sea areas, with the 200 m isobath widely believed to represent a key boundary (Wilson, 2013; Brewer *et al*., 2007; Gage and Tyler, 1992). Beyond the 200 m isobath, deep-sea benthic communities rely exclusively on the settling of organic detritus from the overlying water column as a food source. The spatial and temporal distribution of benthic fauna depends on factors such as sediment characteristics, depth and season (Wilson, 2013).

The offshore atolls and the continental shelf waters in the Northwest Shelf Transition are also geographically important for fish species. They support species of recreational and commercial interest, including saddle-tail snapper and red emperor, cods, coral and coronation trout, sharks, trevally, tuskfish, tunas, mackerels and billfish (DEC, 2009).

A search of the EPBC Act Protected Matters Database was conducted on 23rd of July 2014 using the coordinates of the Operational Area and EMBA (**Figure 1-1**). **Table 4-4** below provides a full list of all threatened and/or migratory species identified which may occur within the proposed Operational Area and EMBA.

Additional information on EPBC Act threatened and migratory fauna listed in Table 4-4 can be retrieved from the link below:

http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Table 4-4: EPBC Act threatened and migratory marine fauna species potentially occurring in the Operational Area and EMBA

Common Name	Scientific Name	EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area	EMBA
Protected Species and Communities: Fish and Sharks				
Great white shark	*Carcharodon carcharias*	V,M	✓	✓
Shortfin mako	*Isurus oxyrinchus*	M	✓	✓
Longfin mako	*Isurus paucus*	M	✓	✓
Giant manta ray	*Manta birostris*	M	✓	✓
Grey nurse shark	*Carcharias taurus*	V		✓
Dwarf sawfish	*Pristis clavata*	V		✓
Porbeagle Mackerel Shark	*Lamna nasus*	M		✓
Green sawfish	*Pristis zijsron*	V		✓
Whale shark	*Rhincodon typus*	V		✓
Blind gudgeon	*Milyeringa veritas*	V		✓
Protected Species and Communities: Marine Mammals				
Blue whale	*Balaenoptera musculus*	E,M	✓	✓
Humpback whale	*Megaptera novaeangliae*	V,M	✓	✓
Bryde's whale	*Balaenoptera edeni*	M	✓	✓
Killer whale	*Orcinus orca*	M	✓	✓
Antarctic minke whale	*Balaenoptera bonaerensis*	M	✓	✓
Sperm whale	*Physeter macrocephalus*	M	✓	✓
Sei whale	*Balaenoptera borealis*	V		✓
Fin whale	*Balaenoptera physalus*	V		✓
Southern right whale	*Eubalaena australis*	E		✓
Australia sea-lion	*Neophoca cinerea*	V		✓
Dugong	*Dugong dugong*	M		✓
Dusky Dolphin	*Lagenorhynchus obscurus*	M		✓
Irrawaddy Dolphin	*Orcaella brevirostris*	M		✓

Common Name	Scientific Name	EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area	EMBA
Indo-pacific humpback dolphin	*Sousa chinensis*	M		✓
Spotted bottlenose dolphin	*Turdiops aduncus*	M		✓
Australia sea-lion	*Neophoca cinerea*	V		✓
Protected Species and Communities: Marine Reptiles				
Loggerhead turtle	*Caretta caretta*	E,M	✓	✓
Green turtle	*Chelonia mydas*	V,M	✓	✓
Leatherback turtle	*Dermochelys coriacea*	E,M	✓	✓
Hawksbill turtle	*Eretmochelys imbricata*	V,M	✓	✓
Flatback turtle	*Natator depressus*	V,M	✓	✓
Short-nosed seasnake	*Aipysurus apraefrontalis*	CE		✓
Leaf-scaled seasnake	*Aipysurus foliosquama*	CE		✓
Olive ridley turtle	*Lepidochelys olivacea*	E, M		✓

4.2.3 Socio-economic environment

Socio-economic activities that may occur within the Operational Area and surrounds include commercial fishing and oil and gas exploration and production.

Offshore and coastal waters in the North-west Marine Region support a valuable and diverse commercial fishing industry, dominated by Pilbara fisheries. The major fisheries in the Pilbara region target tropical finfish, large pelagic fish, crustaceans (prawns and scampi) and pearl oysters. Six State/Commonwealth commercial fisheries have boundaries that overlie or are in close proximity to the Operational Area and EMBA. These are summarised in Table 4-5.

Table 4-5: Commonwealth and State managed fisheries zones overlapping the Operational Area or EMBA

Value/Sensitivity	Description	Operational Area	EMBA
Commonwealth Managed Fisheries			
North west slope trawl	Demersal trawl fishery for scampi (primarily) and finfish. Extends from 114° E to approximately 125° E off the WA coast between the 200 m isobath and the outer limit of the Australian Fishing Zone (AFZ).	✓	✓
Western tuna and billfish fishery	Primarily pelagic longline fishery. Extends westward from Cape York Peninsula (142°30' E) off Queensland to 34° S off the WA west coast. It also extends eastward from 34° S off the west coast of WA across the Great Australian Bight to 141° E at the South Australian–Victorian border. No current effort near Operational Area	✓ No current effort near Operational Area	✓
Western skipjack tuna fishery	Primarily purse seine fishery. No current effort in NW Australia	✓ No current effort in NW Australia	✓
Southern bluefin tuna	Purse seine or pelagic longline fishery. No current effort in NW Australia	✓ No current effort in NW Australia	✓
Western deepwater trawl fishery	Trawl fishery for demersal finfish. No effort NE of North West Cape (borders the North West Slope Fishery).		✓
State Managed Fisheries (Whole of State)			
West coast rock lobster managed fishery	Trap (pot) fishery for western rock lobster. The fishery is situated along the west coast of Australia between Latitudes 21°44´ to 34°24´ S. The fishery is managed in three zones: Zone A – Abrolhos Islands, north of latitude 30° S excluding the Abrolhos Islands (Zone B) and south of latitude 30° S (Zone C).		✓
West coast demersal scalefish interim managed fishery	The WCDSIMF encompasses the waters of the Indian Ocean just south of Shark Bay (at 26°30'S) to just east of Augusta (at 115°30'E) and extends seaward to the 200 nm boundary of the Australian Fishing Zone (AFZ). The commercial fishery is divided into five management areas comprising four inshore areas and one offshore area. The inshore areas, i.e. Kalbarri, Mid-West, Metropolitan and South-West, extend outwards to the 250 m depth contour, while the Offshore Area extends the entire length of the fishery from the 250 m depth contour to the boundary of the AFZ		✓
Abrolhos Islands and mid-West trawl limited entry fishery	All the waters of the Indian Ocean adjacent to Western Australia between 27°51´ south latitude and 29°03´ south latitude on the landward side of the 200 m isobath'.		✓
Shark Bay scallop Limited entry fishery Shark Bay prawn limited entry	The boundaries of the Shark Bay Prawn Managed Fishery and the Shark Bay Scallop managed Fishery are located in and near the waters of Shark Bay		✓

Value/Sensitivity	Description	Operational Area	EMBA
fishery			
Shark Bay crab interim managed fishery	Waters of Shark Bay north of Cape Inscription, to Bernier and Dorre Islands and Quobba Point. In addition, two fishers with long-standing histories of trapping crabs in Shark Bay are permitted to fish in the waters of Shark Bay south of Cape Inscription.		✓
Gascoyne Demersal Scalefish Managed Fishery	The GDSF operates in the waters of the Indian Ocean and Shark Bay between latitudes 23□07'30"S and 26°30'S. Vessels are not permitted to fish in inner Shark Bay		✓
Exmouth Gulf prawn managed fishery	Sheltered waters of Exmouth Gulf Essentially the western half of the Exmouth Gulf (eastern part is a nursery ground). The Muiron Islands and Point Murat provide the western boundary; Serrurier Island provides the northern limit.		✓
Pearl oyster managed fishery	Operational Area is within Pearl Oyster Zone 1: NW Cape (including Exmouth Gulf) to longitude 119°30'E. There are five licensees in this zone. No fishing in this zone since 2008	✓ No fishing effort in Zone 1 since 2008. No fishing at Operational Area depth	✓
Onslow prawn managed fishery	Operates along the western part of the North-West Shelf with most prawning activities concentrated in the shallower water off the main land. The boundaries of the OPMF are 'all the Western Australian waters between the Exmouth Prawn Fishery and the Nickol Bay prawn fishery east of 114º39.9' on the landward side of the 200 m depth isobath'.		✓
Kimberley prawn managed fishery	The KPMF operates off the north of the state between Koolan Island and Cape Londonderry. The boundaries of the KPMF are 'all Western Australian waters of the Indian Ocean lying east of 123°45´ east longitude and west of 126°58´ east longitude'. It abuts the western boundary of the Commonwealth Northern Prawn Fishery (NPF).		✓
Kimberley gillnet and barramundi managed fishery	Nearshore and estuarine zones of the North Coast Bioregion from the WA/NT border (129ºE) to the top end of Eighty Mile Beach, south of Broome (19ºS). The waters of the KGBF are defined as 'all Western Australian waters north of 19° south latitude and west of 129° east longitude and within three nautical miles of the high water mark of the mainland of Western Australia and the waters of King Sound south of 16°21.47´ south latitude'		✓
Northern demersal scalefish managed fishery	The Northern Demersal Scalefish Managed Fishery (NDSF) operates off the northwest coast of Western Australia in the waters east of 120° E longitude. These waters extend out to the edge of the Australian Fishing Zone (200 nautical miles). The fishery is further divided into two fishing areas; an inshore sector and an offshore sector The inshore waters in the vicinity of Broome are closed to commercial fishing.		✓
Broome prawn	The BPMF operates in a designated trawl zone off Broome		✓

Value/Sensitivity	Description	Operational Area	EMBA
managed fishery	The boundaries of the BPMF are 'all Western Australian waters of the Indian Ocean lying east of 120° east longitude and west of 123°45' east longitude on the landward side of the 200 m isobath'. The actual trawl area is contained within a delineated small area north west of Broome.		
Pilbara fish trawl managed fishery	The Pilbara Fish Trawl Interim Managed Fishery is situated in the Pilbara region in the north west of Australia. It occupies the waters north of latitude 21°35'S and between longitudes 114°9'36"E and 120°E. The Fishery is seaward of the 50 m isobath and landward of the 200 m isobath The Fishery consists of two zones; Zone 1 in the south west of the Fishery (which is closed to trawling) and Zone 2 in the North, which consists of six management areas.		✓
Nikol Bay prawn limited entry fishery	Operates along the western part of the North-West Shelf in coastal shallow waters The boundaries of the NBPMF are 'all the waters of the Indian Ocean and Nickol Bay between 116°45' east longitude and 120° east longitude on the landward side of the 200 m isobath'. The NBPMF incorporates the Nickol Bay, Extended Nickol Bay, Depuch and De Grey SMFGs.		✓
Pilbara trap managed fishery	The Pilbara Trap Managed Fishery lies north of latitude 21°44´ S and between longitudes 114°9´36´´ E and 120° E on the landward side of a boundary approximating the 200 m isobath and seaward of a line generally following the 30 m isobath.		✓

At a distance of approximately 200 km from Karratha the Operational Area is unlikely to be visited by recreational fishers especially given the water depths (~1,160 m).

There are few petroleum exploration and development activities in the vicinity of the Operational Area. Woodside operated oil and gas infrastructure (Goodwyn, Angel and North Rankin (A, B) platforms and associated pipelines) are located ~150 km to the southwest of the Operational Area.

While the Operational Area falls outside recognised commercial shipping routes, the Operational Area for the Activity is approximately 2 to 3 km from the boundary of the Shipping Fairway.

Given the considerable distance of the Operational Area from the nearest population centre at Karratha (approximately 200 km away) there is unlikely to be any tourism-based activities in the deep waters of the Operational Area.

No known Aboriginal heritage sites are located within the Operational Area.

5. STAKEHOLDER CONSULTATION

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

Apache's operating presence off the North West Shelf (e.g. gas processing facilities at Devil Creek and Varanus Island) 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 Activity based on the defined Operational Area are summarised in **Table 5-1**.

Table 5-1: Summary of stakeholders consulted

Group	Stakeholder
Commercial fisheries	• A Raptis and Sons. • Austral Fisheries • Australian Fisheries Management Authority (AFMA) • Commonwealth Fisheries Association (CFA) • Department of Fisheries (DoF) • MG Kailis • Pearl Producers Association • Shark Bay Seafoods • Western Australian Fishing Industry Council (WAFIC) • WestMore Seafoods
Recreational fisheries	• Marine Tourism WA • Recfishwest
Conservation	• Department of Parks and Wildlife (DPaW)
Marine activities, spill response and safety	• Australian Marine Oil Spill Centre (AMOSC) • Australian Maritime Safety Authority (AMSA) • Department of Defence (State) • Department of Environment (Federal) • Department of Mines and Petroleum (State) • Department of Transport (State) • Telstra – International Cables and Capacity
Karratha/ Dampier Stakeholder Reference Group	• Shire of Roebourne • Dampier Port Authority

On 1 July 2014, Apache Energy distributed to all identified stakeholders advanced notification of the Levitt-1 drilling activity proposed to commence between October and December 2014. Apache consults with stakeholders regularly in the course of its NWS operations, and will notify or consult with stakeholders should there be any changes to the Activity, either through the regular consultation process, or through a specific notification, whichever is deemed more appropriate. Apache is confident that stakeholders are adequately informed, and is able to feed back or request further information if required.

No major concerns were raised by stakeholders between distribution of the Levitt-1 drilling consultation package and the submission of this EP Summary. The most extensive consultation included detailed advice provided by AMSA and DoF which was incorporated into the development of the EP.

Apache has extended its consultation program to include provision of Quarterly Updates to all individual commercial fishing licensees operating off the North West Shelf – now some 600 individual contacts.

The Apache Energy Quarterly Project Update has been developed in consultation with informed stakeholders and includes a summary of Apache's activities for the next six to nine months (in both Commonwealth and state waters). The quarterly updates (which include this survey) are intended to trigger feedback, comments and requests for additional information or consultation opportunities for the future activities, and provide updates of the activities that are underway, or have previously been consulted on. Stakeholders are urged to contact Apache should they require more information or have concerns with any activities showcased.

Apache believes that consultation undertaken for the Activity has consulted with stakeholders and matters raised during consultation have been suitably addressed, and the ongoing Apache consultation program allows for future updates to be provided to stakeholders.

6. ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

The impact and risk assessment approach is consistent with the requirements of AS/NZS ISO 31000:2009 Risk Management – Principles and guidelines and ISO/IEC 31010 Risk management – Risk management techniques.

The key steps are:

1. Define the activity and subsequent planned and unplanned events.
2. Determine the nature and scale of the risks and impacts; and identify receptors in the environment that will or may be impacted.
3. Determine impact mechanisms and evaluate the impact and risk rankings (on the basis that all reasonable controls / environmental performance standards have been implemented)
4. Describe the Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria
5. Undertake an ALARP (as low as reasonably practicable) evaluation on impacts (planned events) and risks (unplanned events).
6. Evaluate acceptability of impacts and risks.

A summary of these steps is included below. Additional information on the impact and risk assessment approach is given in Apache's *Environmental Risk Identification and Analysis Procedure (EA-91-IG-004)*.

6.1 Define the activity and subsequent planned and unplanned events.

Hazards arising from the activity and associated planned and unplanned events were determined for the activity. These are summarised in **Sections 2** and **7**.

6.2 Determine the nature and scale of impacts (extent and duration) and identify receptors within the environment that will or may be impacted

The extent of each hazard is defined in the relevant section using modelling and scientific studies where available. The duration of the hazard/ event is also described including the potential duration of any impacts (or recovery times) should they occur. Receptors identified as potentially occurring within the extent of each hazard/aspect are then listed. Receptors within the environment that may be affected (EMBA) are summarized in **Section 4**.

6.3 Determine impact mechanisms and evaluate impact and risk rankings

Mechanisms and thresholds for impact using scientific studies and modelling are determined and described. This step looks at the causal effect between the aspect/hazard and the identified receptor. Impact thresholds for different critical life stages are also identified where relevant.

The impact or risk, for planned and unplanned events, is then evaluated on the basis that control measures and associated performance standards as identified are implemented. For all planned and unplanned events an environmental consequence level for the expected or potential impact is determined based on set criteria for each of the following receptor categories:

- Threatened/Migratory Fauna;
- Physical Environment/Habitat;
- Threatened Ecological Communities;
- Protected Areas; and
- Socio-economic receptors.

The environmental consequence level for an impact takes into consideration the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem or industry level. Consequence levels are ranked as follows: A (Negligible), B (Minor), C (Moderate), D (Major) and E (Critical).

For unplanned events, a risk ranking is also determined using a risk matrix which pairs the likelihood (likelihood ranking) of the event (from Very Rare to Expected) as well as the consequence level of the potential impact should that event occur. Risk rankings range from Low to High, with a High level of residual risk meaning the activity is unacceptable without further risk reduction.

The process and definitions supporting the consequence, likelihood and risk ranking determination are included within the *Environmental Risk Identification and Analysis Procedure (EA-91-IG-004)*.

6.4 Describe the Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria

A set of environmental performance outcome(s), environmental performance standards and measurement criteria are then identified for each planned or unplanned event which are used to assess environmental performance during the activity. Each control measure has an associated environmental performance standard(s). The definitions of the performance outcomes, standards and measurement criteria are outlined within the OPGGS (E) Regulations.

6.5 Undertake an ALARP evaluation on impacts (planned events) and risks (unplanned events)

For planned and unplanned events, an ALARP assessment is undertaken to demonstrate that control measures adopted reduce the impact or risk to as low as reasonably practicable (ALARP). This process relies on demonstrating that further potential control measures would require a disproportionate level of cost/effort for the level of impact or risk reduction they would provide. If this cannot be demonstrated then the further controls are implemented. The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact and risks. .

For an impact or risk to be ALARP it must be possible to demonstrate that the cost involved in reducing the impact or risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent on the attempt of reducing a risk to zero. It should not be understood as simply a quantitative measure of benefit against detriment. It is more a best common practice of judgement of the balance of impact or risk and societal benefit.

6.6 Evaluate acceptability of impacts and risks.

Apache considers the impacts or risks associated with the activity to be acceptable if they meet the following criteria:

1. An environmental consequence level from a planned event is ranked as A (Negligible) or B (Minor); or risk of impact from an unplanned event is not ranked ‘High’.
2. Performance standards are consistent with legal and regulatory requirements.
3. Performance standards are consistent with Apache Environmental Management Policy.
4. Performance standards are consistent with stakeholder expectations.
5. Performance standards are consistent with reducing the impacts and risks to ALARP.

7. ENVIRONMENTAL HAZARDS AND CONTROLS

The following tables (refer to **Table 7-1** and **Table 7-2** below) provide a summary of environmental hazards that could be expected from the Activity for routine and contingency activities. The tables list the controls to either prevent or mitigate impacts such that impact and risks are reduced to ALARP and are at acceptable levels.

Table 7-1: Environmental impact summary for operational activities

Aspect	Impact	Extent and duration	Consequence level	Avoidance, Mitigation & Management Controls
Light emissions	Limited behavioural impacts to fish and seabirds.	Artificial lighting will be required on a 24-hours basis for the duration of the Activity (45-60 days). Light spill will occur on surface waters in the area directly adjacent to MODU/ support vessels. No light spill to coastal areas.	Negligible	• No management controls specific to lighting were identified.
Noise	Impacts to fauna are expected to be limited to temporary behavioural impacts to migrating cetaceans.	General vessel and rig noise will be localised around the drilling location within the Operational Area. Noise will occur 24 hrs a day for duration of activity (45-60 days). Noise from VSP may extend up to 3 km from the well location Vertical Seismic Profiling (VSP) noise may occur for up to 12 hours	Minor	• MODU and helicopters comply with Part 8 of EPBC Regulations for interacting with cetaceans • MODU and support vessels submit marine fauna sighting datasheets • Vertical seismic profile (VSP) or check-shot survey implemented in accordance with Apache's Vertical Seismic Profile Marine Fauna Interaction Checklist
Air emissions	Air emissions through the release of ODS, and use of fuel may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point.	Air emissions from MODU and vessel engines/equipment will be generated for the duration of the drilling activities (45-60 days). Gaseous emissions will quickly dissipate into the surrounding atmosphere	Negligible	• No incineration within the 500 m exclusion zone • Sulphur content of fuel oil will not exceed 3.5% m/m • As required under MARPOL Annex VI, MODU and support vessels will maintain a current International Air Pollution Prevention (IAPP) certificate • Ozone-depleting substances managed in accordance with MARPOL Annex VI

Physical presence	The presence of the MODU, support vessels in the Operational Area could interfere with commercial shipping and fishing activities. Disturbance of seabed will also occur through positioning of the MODU on station.	Physical presence will include the MODU footprint and the movements of MODU and support vessels within the Operational Area.
		Disturbance to seabed from MODU anchors expected to be localised with recovery in weeks to months.
			Negligible	• Information provided to Australian Maritime Safety Authority (AMSA RCC), Department of Defence Australian Hydrographic Service (AHO) and nearest port authority prior to the following planned events:
				  ○ MODU arrival and departure; and
				  ○ Deployment of temporary surface navigational obstructions, such as mooring buoys, if required.
				• NOPSEMA and DMP notified that the activity is to commence at least 10 days before the activity commences
				• No support vessel anchoring during the activity
				• A MODU or vessel mobilising from outside Australia's maritime zone to an Apache permit area will complete a biofouling vessel risk assessment (VRASS). Through completion of a VRASS and any associated mitigating actions the risk of introducing marine pests to Australian waters shall be 'low'
				• As required by AMSA, the MODU will have RACON (radar transponder) or Automatic Identification System (AIS)
				• At least one support vessel monitoring the MODU 500 m exclusion at all times to identify possible vessel collision threats
				• MODU station keeping system maintains the MODU at the desired location
				• MODU dynamic positioning (DP) beacons deployed to sea are recovered prior to MODU departure
				• MODU anchors positioned at locations defined in the rig mooring analysis
				• Parts of the MODU mooring system deployed to sea are recovered within 3 months of MODU departure

Operational discharges	Operational discharges will be small and continuous and dependent on rainfall, the number of persons onboard and the machinery activity. Operational discharges have the potential to impact on environmental receptors through nutrient enrichment, toxicity, turbidity, increased temperature/ salinity and potential for Introduced marine species	Operational discharges will occur continuously or intermittently over the activity period (45-60 days). Operational discharges result in localised and short-lived reductions in water quality given the dispersive nature of the open oceanic environment.	Negligible	• Pursuant to the International Convention for the Control and Management of Ships' Ballast Water and Sediment 2004, MODU and support vessels carrying ballast water and engaged in international voyages shall manage ballast water in accordance with a Ballast Water Management Plan so that marine pest species are not introduced • Sewage discharged in accordance with MARPOL Annex IV • Sewage system equipment maintained in accordance with a preventive maintenance schedule • No waste shall be discharged to sea, unless the garbage is food waste disposed in accordance with MARPOL Annex V • In accordance with MARPOL Annex V, placards will be displayed to notify personnel of garbage disposal restrictions • Deck cleaning products released to sea are of low toxicity, readily biodegradable and non-bio-accumulative • Pursuant to the International Convention for the Control and Management of Ships' Ballast Water and Sediment 2004, MODU and support vessels carrying ballast water and engaged in international voyages shall manage ballast water in accordance with a Ballast Water Management Plan so that marine pest species are not introduced • Oily mixtures only discharged to sea in accordance with MARPOL Annex 1 • Oil filtering equipment maintained in accordance with a preventive maintenance schedule

Aspect	Impact	Extent and duration	Consequence level	Avoidance, Mitigation & Management Controls
Drilling discharges	Environmental receptors have the potential to be impacted through smothering (sediment deposition and toxicological effects) and through reduction to water quality (turbidity and toxicological effects).	Drilling discharges within the activity period (45-60 days). Seabed cuttings disposal may result in presence mainly within 50 m with minor traces out to 1 km. Discharges at sea surface are expected to disperse and dilute over wide area given the water depth (~1,100 m) and open ocean environment. Recovery of benthic habitats expected in weeks to months. Water quality recovery expected within hours of discharges ceasing.	Negligible	• The drilling and cementing chemicals selected are either Gold/Silver/D or E rated through OCNS or Apache's risk assessment procedure as per Apache's *Drilling Fluid and Chemical Selection* (EA-91-II-007) to ensure product is environmentally acceptable • Drilling and cementing 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 • Only water based mud (WBM) will be used during the Activity • Cuttings returned to the MODU are treated through the onboard cuttings management system to maximise reconditioning and re-use of WBM and reduce the concentration of WBM on cuttings prior to discharge • Shaker screens are selected and inspected daily during drilling operations once BOP and riser in place to ensure shaker screens are operating effectively • Only WBM, brine and drilling water within MODU mud pits will be diverted overboard. Drilling fluids, solids, brine and water stored on the MODU in bulk storage tanks will not be released to sea • Only wet and dry cement flushed during tank and pipe cleaning throughout the activity shall be diverted overboard • Only wet cement will be diverted overboard at the end of the activity for the purpose of consuming unusable inventories of dry cement in bulk storage tanks
Spill response operations	The application of subsurface dispersant has the potential to impact the environment through two key mechanisms; 1. Enhancing the volume of entrained hydrocarbons (through limiting surface exposures), and 2. Toxicity associated with the dispersed hydrocarbon. Shoreline cleanup has potential to lead to secondary contamination and disturbance to sensitive habitat (e.g. mangroves) Oiled wildlife response activities has the potential to increases stress and disrupt fauna behaviour	Spill response operations will be focused within the EMBA area dependent upon the volume of oil spilled and the direction/ area of an oil spill. Duration of response activities is variable and may continue for years in the case of remediation and monitoring of shorelines. If used, dispersant application will be localised at the well-head and will continue for a short period to assist in well intervention activities.	Minor	• Existing chemical dispersant stocks sourced and mobilised within four hours after loss of well control has been confirmed and safety issues addressed • Subsurface chemical dispersants only to be used at the wellhead location where the damage has occurred • Production of preferred chemical dispersant mobilised to meet demand until Week 7 of the spill • An initial mixing ratio of 80:1 (water: dispersant) will be applied and adjusted to achieve the optimal mixing ratio according to observations of effectiveness at the time of dispersant injection • Application of dispersant to be continued until the Capping Stack has been installed or installation is deemed unfeasible • Equipment selected to undertake clean-up activities targeted to avoid secondary contamination. • Early mobilisation of the OSRT to provide the ICT with initial assessment of shorelines. • Clean-up teams and equipment will be deployed and positioned as per observations by the OSRT in consultation with the DoT. • Oil wildlife response strategies will be implemented in accordance with the WA Oiled Wildlife Response Plan (WAOWRP). • A Net Environmental Benefit Analysis (NEBA) will be undertaken every operational period to determine if response strategies are having a net environmental benefit.

Table 7-2: Environmental risk assessment summary for unplanned events

Hazard	Potential impact	Extent and duration	Risk	Avoidance, Mitigation & Management Controls
Death of fauna – Vessel collision	During the Activity, use of a MODU and support vessels have the potential to result in direct impacts to fauna through collisions with larger marine fauna (cetaceans).	The risk of MODU/vessel collision with marine fauna extends for 45-60 days within the Operational Area.	Low	• MODU complies with Part 8 of EPBC Regulations for interacting with cetaceans • MODU and support vessels submit marine fauna sighting datasheets

Non-hydrocarbon release (surface) – liquid	An accidental release of chemicals and other non-hydrocarbon liquids into the marine environment may result in a reduction of water quality and potential toxicity impacts to local marine fauna.	Given the low volumes potentially accidentally discharged (<1 m^3), the extent of the discharge is expected to be localised within the Operational Area. The risk of discharge extends for the period of 45-60 days. Any accidental discharges are expected to disperse within minutes to hours.	Low	• MODU safety case control measures implemented to prevent dropped objects and subsequent release of non-hydrocarbon liquids to sea
				• Objects dropped overboard shall be recovered
				• Liquid waste managed in accordance with the MODU and vessel support waste (garbage) management procedures
				• Liquid chemicals managed in accordance with the MODU and support vessel operating procedures.
				• For environmentally hazardous substances, the following precautions shall apply to prevent an accidental release to sea:
				  ○ Storage containers shall be closed when the product is not being used
				  ○ Storage containers shall be managed in a manner that provides for secondary containment in the event of a spill or leak
				  ○ Storage containers shall be labelled with the technical product name (as per the safety data sheet)
				  ○ Spills and leaks to deck (excluding storage bunds and drip trays) shall be immediately cleaned up
				  ○ Storage bunds and dip trays shall not contain free flowing volumes of liquid
				  ○ Spill response equipment shall be readily available
				• MODU and support vessel chemical spill prevention and response managed in accordance with safety data sheet (SDS)
				• Dangerous goods managed in accordance with International Maritime Dangerous Goods Code (IMDG Code)
				• Non-hydrocarbon drilling fluids transferred and stored in accordance with the MODU bulk transfer and storage procedures
				• MODU and support vessel shall ensure crew are prepared for an on-board spill by conducting spill response exercises during the activity

Non-hydrocarbon release (surface) – solid	Non-hydrocarbon solids such as bulk materials may be lost during the Activity through accidental events leading to a reduction in water quality and potential for marine fauna entanglement	Solid accidental discharges that sink are expected to be localised to the Operational Area with buoyant discharges potentially moving further afield. Those wastes that are not readily biodegradable (e.g. plastics) may persist within the environment for years. The risk of discharge extends for the period of 45-60 days.	Low	• MODU safety case control measures implemented to prevent dropped objects and subsequent release of non-hydrocarbon solids to sea
				• Objects dropped overboard shall be recovered
				• Solid waste managed in accordance with the MODU and support vessel waste (garbage) management procedures
				• Solid chemicals managed in accordance with the MODU and support vessel standard operating procedures
				• For environmentally hazardous substances, the following precautions apply to prevent an accidental release to sea:
				  ○ Storage containers shall be closed when the product is not being used
				  ○ Storage containers shall be managed in a manner that provides for secondary containment in the event of a spill or leak
				  ○ Storage containers shall be labelled with the technical product name (as per the safety data sheet)
				  ○ Spills and leaks to deck shall be immediately cleaned up
				  ○ Spill response equipment shall be readily available
				• MODU and support vessel chemical spill prevention and response managed in accordance with safety data sheet (SDS)
				• Dangerous managed in accordance with International Maritime Dangerous Goods Code (IMDG Code)
				• Drilling and cement solids transferred and stored in accordance with the MODU bulk transfer and storage procedures
				• MODU and support vessel shall ensure crew are prepared for an on-board spill by conducting spill response exercises during the activity

Hydrocarbon spill - minor	Accidental loss of fuel and other hydrocarbons, used or stored onboard the MODU and support vessels, during the Activity to the marine environment resulting in a reduction of water quality and potential impacts to local marine fauna.	Given the low volumes potentially accidentally discharged (<2.5 m^3), the extent of the discharge is expected to be localised within the Operational Area. The risk of discharge extends for the period of 45-60 days. Any accidental discharges are expected to disperse within minutes to hours.	Low	• MODU safety case control measures implemented to prevent dropped objects and subsequent release of hydrocarbons to sea
				• Objects dropped overboard shall be recovered
				• Transfer of fuel to and from the MODU in compliance with the MODU's bulk fuel transfer procedure
				• Hydrocarbons managed in accordance with the MODU and support vessel standard operating procedures
				• The following hydrocarbon management precautions apply to prevent an accidental release to sea:
				  ○ Storage containers shall be closed when the product is not being used
				  ○ Storage containers or shall be managed in a manner that provides for secondary containment in the event of a spill or

Hazard	Potential impact	Extent and duration	Risk	Avoidance, Mitigation & Management Controls
				leak ○ Storage containers shall be labelled with the technical product name (as per the safety data sheet); with the expectation being that certain containers will be clearly labelled as containing waste hydrocarbon ○ Storage bunds and dip trays shall not contain free flowing volumes of hydrocarbon ○ Spills and leaks to deck shall be immediately cleaned up ○ Spill response equipment shall be readily available • Dangerous goods managed in accordance with International Maritime Dangerous Goods Code (IMDG Code) • Hydrocarbon spills shall be managed in accordance with MODU and support vessel spill procedures • MODU and support vessel shall ensure crew are prepared for an onboard spill by conducting spill response exercises during the activity • ROV inspected and maintained in accordance with ROV company procedures to prevent hydraulic fluid releases to sea
Hydrocarbon release – vessel collision	The worst-case environmental incident resulting from a vessel collision is the rupturing of a MODU fuel tank resulting in the release of marine diesel to the environment and subsequent impacts to water quality and marine fauna.	A worst case spill of 1, 156 m^3 could extend for up to 90 km from the release point within open waters. Dispersion of the slick may take up to 54 hours with the risk of discharge extending for a period of 45-60 days.	Low	• Information provided to Australian Maritime Safety Authority (AMSA), Department of Defence Australian Hydrographic Service (AHO) and nearest port authority prior to MODU arrival and departure • MODU Safety Case controls relating to collision prevention are implemented • At least one support vessel monitoring the MODU 500 m exclusion at all times to identify possible vessel collision threats • Vessel collision response executed in accordance with MODU or support vessel emergency response plans • Oil spill response executed in accordance with *Levitt-1 OPEP (EA-00-RI-10059.2)*
Hydrocarbon release – loss of well control	In the event a loss of well control occurred light crude oil may be released to the marine environment, with the release points at either the MODU floor (surface) or seabed. The worst-case duration of a loss of well control is predicted as 11 weeks, due to the length of time required to gain control of the well. The environmental consequences of a loss of well control are highly variable, dependant on the characteristics of the hydrocarbon released, the dynamics of the receiving environment and the proximity of the release point to sensitive environmental receptors. Physical (coating) and chemical (toxicological) impacts could occur to habitats and marine fauna. Disruption and financial impacts could occur to socio-economic sensitivities from disruption to activities or flow on effects from impacts to habitats and marine fauna.	A worst case loss of well control of 16.669 m^3 which may lead to floating oil, entrained oil and dissolved aromatic fraction (at environmental impact concentrations) extending over the areas displayed in **Figure 4-1**. A loss of well control may extend for up to 11 weeks before control. Residual hydrocarbons following weathering and impacts to receptors (habitats, marine fauna) may extend for periods of months to years depending upon the severity of the spill and the receptors contacted by oil.	Medium	• Well integrity managed in accordance with the NOPSEMA-accepted WOMP for the Activity • Well blowout risks managed in accordance with the NOPSEMA-accepted MODU Safety Case • Well drilled in accordance with Apache Drilling Program for the Activity • Well blowout response executed in accordance with MODU emergency response plans • Oil spill response executed in accordance with Apache *Levitt-1 OPEP (EA-00-RI-10059.2)*

8. MANAGEMENT APPROACH

The Levitt-1 drilling activity will be managed in compliance with all measures and controls detailed within the EP accepted by NOPSEMA under the OPGGS (E) Regulations, other environmental legislation and Apache's Management System (e.g. Apache Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts associated with routine operational events and unplanned events associated with the 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 outcomes, standards and procedures, and identifies the range of controls to be implemented (consistent with the standards) to achieve the performance outcomes. The controls for the Activity are summarised in **Section 7**. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance outcomes.

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 ongoing awareness.
4. Monitoring, auditing, management of non-conformance and review.
5. Incident investigation, reporting and follow up.
6. Records Management.
7. Incident response including an Oil Spill Contingency Plan (OSCP), and
8. Reporting.

During the period that activities described in the EP are undertaken, Apache will ensure environmental performance is managed through an inspection and monitoring regime undertaken by Apache representatives or rig OIM and vessel masters based on the rig and vessels, respectively. This will include daily, weekly and monthly monitoring and is recorded via a number of checklist and inspection documents that are sent to the Apache HSE Manager or delegate. Feedback from the ongoing monitoring also informs the environment plans developed for other Apache oil and gas activities, through the risk assessment stage, and the internal review of these documents prior to submission, providing opportunity for continuous improvement.

Non-conformances (non-conformances relate to not complying with the environmental performance outcomes and/or performance standards) from audits are formally documented in an audit report and distributed to the Apache Drilling Manager, Apache HSE Manager, Client Site (Apache) Representative and Offshore Contractor Representative. An end-of-activity environmental performance report will be produced which will include a 'lessons learnt' section to help facilitate continuous improvement for future projects.

All personnel are informed of the need to report HSE incident and hazards through inductions and regular operations meetings. HSE incidents and hazards will be documented in Apache's incident management system (Enablon) and significant incidents will be investigated through a roots cause analysis. Incident notification and reporting to NOPSEMA and other regulators will be conducted as per the OPGGS (E) Regulations, as detailed within the EP. Reported HSE incidents and hazards will be communicated to personnel during daily operational meetings

9. HYDROCARBON SPILL RESPONSE ARRANGEMENTS

Credible hydrocarbon spill scenarios are identified in **Table 4-1**. In the event of a spill, initial actions will be undertaken by the Rig OIM/Vessel Master in line with the MODU/ vessel Shipboard Oil Pollution Emergency Plan (SOPEP). Should the spill require further action, such responsibilities will be taken over by the Combat Agency, in this instance Apache Energy in accordance with the Levitt-1 Drilling Oil Pollution Emergency Plan (OPEP) (EA-00-RI-10059.2).

The following response strategies may be applied to credible spill scenarios:

- Monitor and evaluate: surveillance and spill fate modelling;
- Source control: relief well and well intervention including the use of a capping stack. Subsurface dispersant operations will be required in association with the source control strategy of capping stack;
- Containment and recovery of oil;
- Mechanical dispersion of floating oil: mechanical dispersion through use of vessels;
- Wildlife operations: including hazing and capture/treatment;
- Shoreline operations for protection/deflection and clean-up; and
- Operational and scientific monitoring: to determine extent of spill and impact and recovery assessment of sensitive marine receptors exposed to oil – tier 3 spills.

A justification and description of the strategies is provided in **Table 9-1**.

Table 9-1: Applicable oil spill response strategies for the Activity

Strategy	Applicability		Justification and Description
	Crude	Diesel	
Source control	Yes	Yes	Source control is one of the first response strategies implemented when mounting a spill response. Source control minimises the volume of hydrocarbons lost to the environment by securing the source of the spill. For diesel refuelling spills and diesel tank rupture (collision scenarios source control options include ESD of pumps, closing drainage system, implementing shipboard spill clean-up equipment, redistributing stored hydrocarbons into slack tanks or into other vessels, vessel trimming and plugging and repairing of leaks. For a loss of well control scenario, source control options include MODU ESD systems and BOP, implementing subsea response tool kit and capping stack and drilling for a relief well.
Source control (subsurface chemical dispersion)	Yes (only as part of source control)	No	In the event of a loss of well control (at the seabed), dispersants can be used to clear the water around the wellhead to maintain safe operating conditions and assist in well intervention activities. Supply of dispersant is not required until the subsurface dispersant system can be deployed and installed. Subsurface chemical dispersants will only to be used at the wellhead location where the release has occurred.
Monitor and evaluate	Yes	Yes	Monitor and Evaluate activities include vessel and aerial surveillance, spill fate modelling and use of tracking buoys. Surveillance activities are used to monitor and evaluate the dispersion of the released hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. Surveillance results are used to assist in escalating or de-escalating response strategies as required.
Mechanical	Yes	No	The crude is a very light oil that can be easily dispersed in the water column by running vessels through the plume and using the turbulence developed by the

Strategy	Applicability		Justification and Description
	Crude	Diesel	
dispersion			propellers to break up the slick. Once dispersed in the water column the smaller droplet sizes enhance the biodegradation process. Mechanical dispersion will not be applied to a diesel spill because of the nature of the product—preferentially relying on evaporation rather than dispersing toxic components of the fuel into the water column.
Surface chemical dispersion	No	No	The light crude is expected to have a high component of volatiles, losing 80% by volume to atmosphere within the first 32 hours. To obtain the best net environmental benefit, it is preferred that the oil is allowed to remain on the surface of the water to facilitate the transfer of light-end components to atmosphere, rather than mixing the oil into the water column. The application of chemical dispersants would transfer the oil into the water column and remove the volatilisation opportunity. Once weathered, the residual oil (~20%) is predicted to form non-emulsified waxy cakes that will float at sea surface and will not be amenable to dispersants. In the event that chemical dispersants were applied to the fresh and un-weathered oil it is expected the dispersants will preferentially target the light-end hydrocarbon fractions, and not fully disperse the waxy residue. The waxy residues will re-coalesce and float back to surface. Surface chemical dispersant application is not recommended as a beneficial option for these hydrocarbons from an environmental point of view as it has a low probability of increasing the dispersal rate of the spill whilst introducing more chemicals to the marine environment. Chemical dispersants will only be used to assist with well intervention activities. In addition, this strategy is not effective on diesel as the dispersant tends to 'punch through' the thin diesel film into the underlying water without dispersing the diesel spill. Consequently, the dispersant contaminates the water column without the benefit of dispersing the diesel spill, thus providing no environmental benefit. Allowing diesel to naturally weather from the sea surface rather than introduce it into the water column by adding dispersants, reduces the interaction of toxic compounds with aquatic biota.
Protection and deflection	Yes	No	Booms can be used to create physical barriers on the water surface to protect sensitive receptors in nearshore environments in close proximity to the area requiring protection and/or in deeper water further from the protection priority with the intent of taking the oil plume off its trajectory path to the sensitive receptors. Booms can also deflect the oil spill to easier locations for other response strategies. Given that the light crude is expected to have a persistent waxy residue, booming is expected to be more effective in preventing any significant environmental impact to shorelines. Protection and deflection activities would be focused on areas of high protection value based upon real time aerial surveillance and spill modelling trajectories. The diesel spill is not predicted to impact shorelines.
Containment and recovery	Yes	No	The light crude is anticipated to be highly evaporative and fast spreading, with a waxy persistent residue which is predicted to form waxy cakes. Given this, containment and recovery activities would focus on collecting the light crude with booms, and either pushing into skimmers or using trawler and scoop nets to remove the residue. Containment and recovery activities would be focused on areas of high protection value based upon real time aerial surveillance and spill modelling. Due to the rapid evaporation rate and tendency of diesel to disperse naturally, in conjunction with the ineffectiveness of containment and recovery methods on

Strategy	Applicability		Justification and Description
	Crude	Diesel	
			thin surface diesel films, the use of containment and recovery as a response strategy for a diesel spill is not applicable.
Shoreline clean-up	Yes	No	This response has potential to cause more harm due to secondary disturbance associated with the clean-up than light oiling of shorelines, so applicability is based on using aerial surveillance reconnaissance, the Oiled Shoreline Response Team (OSRT) and Net Environmental Benefit Analysis (NEBA) in the shoreline clean-up assessment. Shoreline clean-up activities, dependent on the outcome of a shoreline cleanup assessment, may include the use of water flushing, sorbent pads and booms and the use of manual hand tools to remove oil residues and oiled sediment. High volume, low pressure flushing may be considered if the oil enters high priority/ slow recovery habitats such as mangroves or wetlands. The diesel spill is not predicted to impact shorelines.
Oiled wildlife response	Yes	Yes	Applicable for marine fauna that come close to the spill when on the water and shorelines and those affected by hydrocarbons. Response will be in accordance with best practice procedures as outlined within the WA Oiled Wildlife Response Plan. Hazing only is to be considered for the diesel spill due to the highly evaporative and non-persistent nature of the diesel, and the distance offshore of the drill location.
Operational and Scientific Monitoring	Yes	Yes	Operational monitoring activities include initial surveillance monitoring, hydrocarbon characterisation and weathering, shoreline and coastal habitat assessment and megafauna assessment. Scientific monitoring activities may include water and sediment quality monitoring, shoreline and coastal habitat monitoring (including sandy/rocky shores, intertidal zones and mangroves), benthic habitat monitoring and monitoring of seabird/shorebirds, marine mammals and turtles. In addition fish, fisheries and aquaculture and seafood monitoring may be initiated. Extent/impact of spill to determine the extent of operational and scientific monitoring. Resources are available to implement operational and scientific monitoring as required.
In situ burning	No	No	In-situ burning is not an applicable response strategy given several limiting factors that are likely to prevent implementation. For in-situ burning to be undertaken oil has to be thicker than 1-2 mm and as diesel and 'light oil' spills (non-persistent oil - Group II) tend to have high evaporation rates and spread into very thin films this strategy is not applicable for this activity. In-situ burning cannot be undertaken in rough conditions as containment is likely to be interrupted by winds greater than approximately 20 knots and waves are higher than 3 feet. As such, this response strategy is not applicable for this crude.

9.1 Net Environmental Benefit Analysis

During any response incident, there is a documented decision making process to ensure that response strategies are identified and evaluated prior to implementation via the Incident Action Plan (IAP). The Incident Control Team use a Net Environmental Benefit Analysis (NEBA) process to inform the development and refinement of the IAPs, to ensure the most effective response strategies with the least detrimental environmental impacts are identified, documented and executed. The Environmental Team Lead is responsible for reviewing the priority receptors identified within the EP and the OPEP, and with real time knowledge of the fate and transport of the spill, apply the NEBA.

The application of the NEBA is to:

- Identify sensitivities within the area potentially affected by a spill at that time of the year;
- Assist in prioritising and allocating resources to sensitivities with a higher ranking; and
- Assist in determining appropriate response strategies.

9.2 Oil Spill Response Resources

Oil spill response equipment and resources are a combination of Apache, AMOSC, AMSA, DoT, National Plan (NatPlan), OSRL, and other operator resources available through the AMOSPlan mutual aid arrangements. Under the MOU between AMSA and Apache, AMSA will provide all resources available through NatPlan to support an Apache spill response. The DoT coordinates the State Response Team (SRT) oil spill response personnel and equipment resources. The DoT will work with Apache in an oil spill response and will define termination criteria for the shoreline operations designed to reduce the environmental impacts and risk to as low as reasonably practicable (ALARP) in State waters. Where oil contacts shorelines in Commonwealth waters, Apache will work with the Department of the Environment to establish shoreline clean-up priorities, activities and termination criteria.

In the event of an oiled wildlife response, Apache will activate the West Australian Oiled Wildlife Response Plan (WAOWRP) and work with DPaW in determining resources and capability requirements. DPaW and Industry (AMOSC) Oiled Wildlife Advisors (OWAs) ensure minimum standards for oiled wildlife response, as outlined within the WAOWRP, are met and ensure timely mobilisation of appropriate resources (equipment and personnel) through communication with the wildlife logistics team. Apache are able to access:

- AMOSC core group responders;
- DPaW staff and approved volunteers/SMEs;
- Additional local resources under current contracts and suppliers; and
- Access international support through Wildlife Response Services.

During and post-spill scientific response monitoring activities require resources external to Apache and include specialist technical capabilities. Astron Environmental Services Pty Ltd (Astron) is contracted as Apache's primary control support agency for scientific response monitoring activities. If additional support is required, Apache has Master Service Agreements with other service providers to support scientific response monitoring activities.

10. CONTACT DETAILS

Further information about the Levitt-1 drilling activity can be obtained from:

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