Julimar Seabed Remediation Environment Plan Summary

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1. INTRODUCTION

Apache Energy Limited is the registered Operator on behalf of Apache Julimar Pty Ltd and Kufpec Australia (Julimar) Pty Ltd who are the titleholders for petroleum activities within WA-49-L.

Apache proposes to undertake a seabed cuttings remediation activity at the Brunello drill centre (**Figure 2-1**). The drill cuttings discharged during the Brunello drilling campaign have dispersed and consolidated around the drill centre location resulting in a potentially uneven surface. Prior to installation of the production crossover manifolds at the drill centre, remediation of the seabed is required. The drill cuttings will be removed from around the subsea infrastructure and relocated subsea to an area away from the Brunello drill centre.

1.1 Compliance

The overall purpose of the Environment Plan (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 line 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 23rd of December 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

The activity will be carried out 24 hours per day, seven days per week for a period of approximately 30 days. The latest date for completion of this remediation activity is December 2015.

2. ACTIVITY LOCATION

The seabed cuttings remediation will be conducted in petroleum permit WA-49-L. The operational area is defined as the area within which the remediation activity will take place and is centred around the Brunello drill centre. The operational area boundary is a 500 m radius around the drill centre and encompasses all drill cuttings to be remediated including the discharge location (see **Table 2-1** and **Figure 2-1**). The Brunello drill centre is located approximately 35 km northwest of the Montebello Islands and 77 km northwest from Varanus Island in approximately 148 m of water depth. There are no grounding hazards within the seabed remediation area.

Table 2-1: Coordinates of the Brunello drill centre

Parameter	Coordinates (Datum/Projection: GDA 94 Zone 50S)			
	Latitude	Longitude	Easting	Northing
Brunello DC	-20°01'49.08"	115°12'06.87"	311,922.40	7,784,154.70

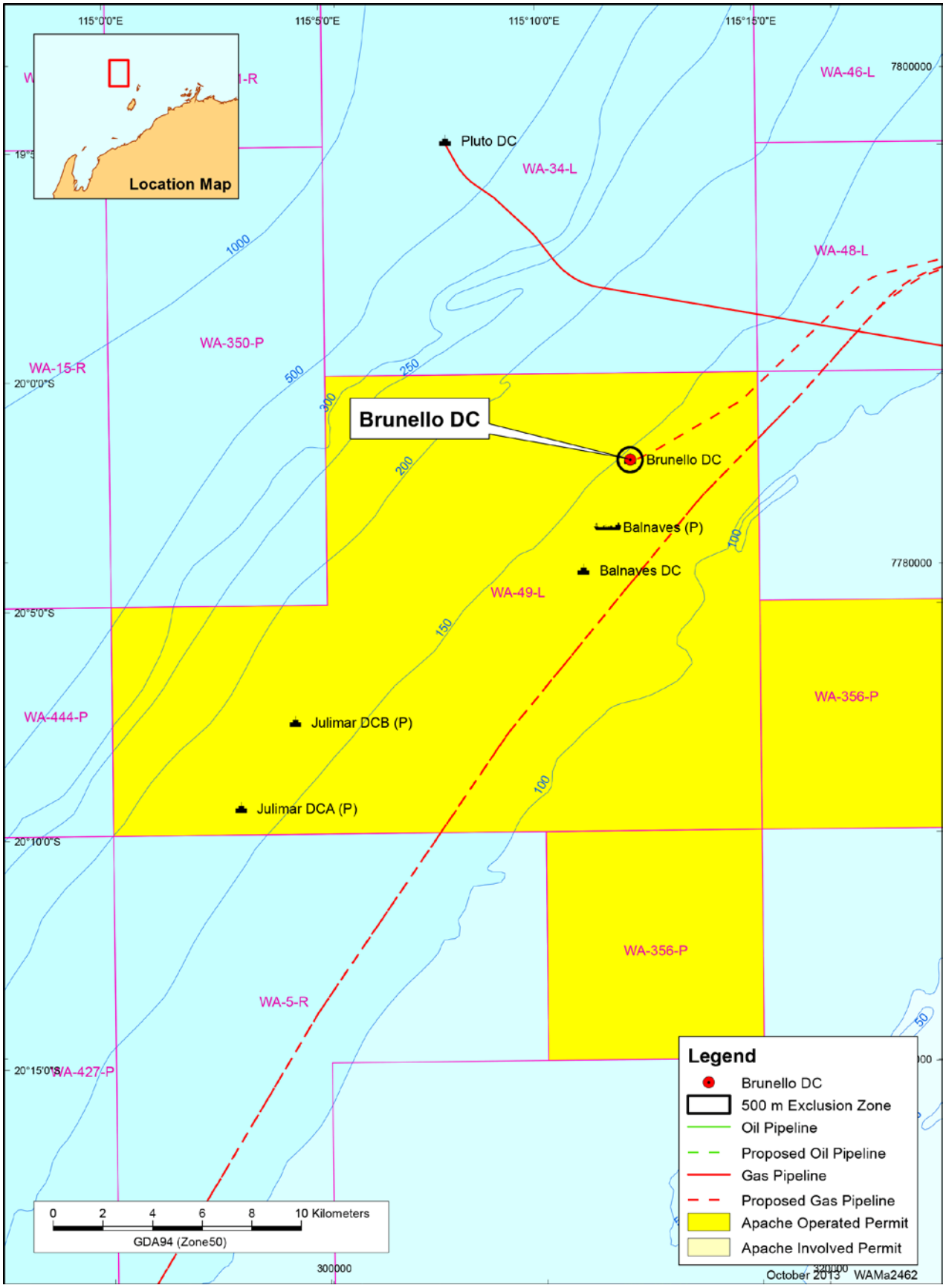

Figure 2-1: Location of Brunello drill centre with 500 m exclusion zone (operational area)

3. ACTIVITY DESCRIPTION

3.1 Activity Overview

The remediation activity will be conducted using a standalone pumping system in conjunction with an ROV supported by either a vessel or a MODU. The cuttings at each tree location will be removed via suction and pumped to another location away from the drill centre, within the operational area, where the cuttings will not be re-suspended and potentially re-settle back onto the Christmas trees.

Surveys completed to date show that the drill cuttings are dispersed and consolidated around the drill centre, proposed production manifold location and proposed crossover manifold location. Samples of the cuttings piles have been taken to inform dispersion modelling prior to undertaking the remediation activities to understand how the cuttings will behave once re-deposited. Through the surveys undertaken, it has been calculated that a total of 6,325m^3 of cuttings will be remediated and moved.

3.2 Activity Equipment

A standalone seabed dredging and excavation system (ROV dredge) will be launched from the vessel/MODU deck and controlled and monitored by an ROV. Tools on the machine include a suction ejection system, pump and various nozzles to suit the operations. The ROV dredge ejector system is fitted onto work-class ROVs and powered by the ROV hydraulic circuits. A suction nozzle is fitted to the ROV manipulator arm and the suction head aids in fluidising the seabed debris and sediment, a hose then connects to a suction pump. The ROV monitors the activity through video facilities installed on the ROV as standard.

The suction pump will be placed at a certain distance from the remediation area. The discharge hose can be connected to the module and spoils can be displaced at a certain location depending upon the capacity of the discharge pump. During the remediation activity and following completion of remediation, surveys of the seabed will be conducted using an ROV.

3.3 Vessels

If vessels are used to do the remediation activity, the primary vessels nominated to perform the remediation activity would be dive support vessels with dynamic positioning (DP) capabilities for launch and recovery of the ROV dredging system and suction pump.

Other support vessels will transit through the operational area to deliver supplies and equipment, offload waste, transfer crew and fulfil ancillary support. Marine Gas Oil (MGO) only will be utilised on these vessels.

The maximum number of people that could be accommodated on any vessel would be less than 330. At sea, crew changes could occur within the operational area via helicopter transfer if required.

3.4 MODU activities

If a drilling rig is to be used, the activity will be undertaken using a semi-submersible MODU utilised for the Brunello appraisal and production drilling campaign, such as the Ocean Monarch. The MODU will already be on location prior to commencing the Activity described in this EP, the drilling activity and associated workscope including anchoring of the MODU are described in the NOPSEMA accepted *Brunello Appraisal and Production Drilling EP* (EA-72-RI-10004.01). Simultaneous operations (SIMOPs) are likely to occur during the remediation activity as drilling may be underway. Project specific procedures will be in place to manage SIMOPs activities.

4. ENVIRONMENT DESCRIPTION

4.1 Operational Area

The Julimar operational area is situated within Commonwealth waters of the North-west Marine Region. The North-west Marine Region is further divided into eight provincial bioregions. The operational area is located within the Northwest Shelf (NWS) Province. Water depths within the bioregion range from 0-200 m, with more than 45% of the bioregion having a depth of 50-100 m; water depth in the operational area is approximately 148 m.

4.2 Environment that may be affected (EMBA)

The environment that may be affected (EMBA) encompasses the environment that could be affected by unplanned as well as planned events. The area has been derived using modelling of credible worst case spill scenarios. The EMBA does not represent the area that would be impacted following a single worst case scenario, but a cumulative area within which all potential MGO spill impacts would be contained.

The Julimar EMBA which has been defined based on a MGO spill from a ruptured vessel fuel tank has been used to inform the spatial extent of all relevant environmental values and sensitivities for the activity since it is considered to incorporate all of the events and impacts highlighted and further discussed in **Section 7**. The Julimar EMBA has the potential to reach other bioregions, if for example a fuel tank rupture were to occur, the bioregions that could be contacted by the spill include the Northwest Transition and Northwest Province in addition to the NWS Province.

4.3 Physical Environment

Waters from Kalbarri to the Northern Territory border predominantly lie in the arid tropics experiencing high summer temperatures and periodic tropical cyclones in summer. Rainfall in the region is low, although intense rainfall may occur during the passage of summer tropical cyclones and thunderstorms (Condie *et al*. 2006).

Major drivers of marine ecosystems include ocean currents, tides, waves, temperature and salinity. The dominant offshore sea surface current is the Leeuwin Current, which carries warm tropical water south along the edge of Western Australia's continental shelf, reaching its peak strength in winter and becoming weaker and more variable in summer (Condie *et al*. 2006). The nearshore Ningaloo Current flows northwards opposite to the Leeuwin Current, along the outside of the Ningaloo Reef and across the inner shelf from September to mid-April, (Woodside 2005). The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer North West Shelf (Woodside 2005). This current brings warm and relatively fresh water to the region from the western Pacific via the Indonesian Archipelago.

Tides in the area are generally semi-diurnal (i.e. two high tides and two low tides per day) with a spring/neap cycle. The wave climate in the area is composed of locally-generated wind waves (seas) and swells that are propagated from distant areas (WNI 1995). In summer the seas typically approach from the west and south-west, while in winter the seas typically approach from the south and east. Mean sea wave heights are typically less than 1 m and peak heights of less than 2 m are experienced in all months of the year (WNI 1995).

Average swell heights are low, around 0.4–0.6 m in all months. The greatest exposure to swells is from the west. 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 1996). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway & Nye 1985).

Waters on the continental shelf are usually thermally-stratified, with a marked change in water density at approximately 20 m. Surface temperatures vary annually, being warmest in March (32°C) and coolest in August (19°C). Vertical gradients are related to the seasonality of sea surface temperatures, and are greatest during the warm-water season. Near-bottom water temperature on the North West Shelf is approximately 23°C, with no discernible seasonal variation.

Salinity is relatively uniform at 34–35 parts per thousand (ppt) throughout the water column and across the North West Shelf. Due to the low rainfall there is little freshwater run-off from the adjacent mainland. Pronounced shifts in water column characteristics can occur following the passage of tropical cyclones (McKinnon *et al.*, 2003).

4.4 Biological Environment

4.4.1 Operational Area – NWS Province Bioregion

The operational area is situated in the NWS Province which is almost entirely on the continental shelf, except for a small area to the north of Cape Leveque that extends onto the continental slope. The shelf gradually slopes from the coast to the shelf break, but displays a number of seafloor features such as banks/shoals and holes/valleys. The dynamic oceanic environment influences sediment distribution throughout the bioregion. The seafloor of this bioregion is particularly strongly affected by cyclonic storms, long-period swells and large internal tides, which can resuspend sediments within the water column as well as move sediment across the shelf.

Low density benthic communities of bryozoans, molluscs and echinoids are supported within the bioregion. Sponge communities are also sparsely distributed on the shelf and are found only in areas of hard substrate. Benthic and pelagic fish communities are also highly diverse and strongly depth-related with a number of hotspots identified between Port Hedland and North West Cape. Numerous migratory species including humpback whales and whale sharks travel through the bioregion. The bioregion also supports bottlenose and indo-pacific humpback dolphins, turtle nesting sites, and several seabird breeding populations.

Extensive seabed surveys of the Julimar operational area found the benthic habitat present is primarily (>98%) soft sediments with sparse (5–25% density) epifauna and little evidence of bioturbation. Cemented sediment habitat within the operational area was found to support a mixed benthic invertebrate community including large sea fans, sponges, soft corals, sea whips and ascidians (RPS, 2010; 2011).

4.4.2 EMBA values and sensitivities

Table 4-1 to **Table 4-3** present the environmental values and sensitivities (natural, cultural and socio-economic) within the EMBA.

4.4.2.1 Habitats and protected/significant areas

An EPBC search was conducted on the EMBA to indicate the potential protected and significant areas within the EMBA, these are summarised in **Table 4-1**.

Table 4-1: Environmental values and sensitivities – habitats and protected/significant areas in the Julimar EMBA

Value/Sensitivity	Receptor within EMBA	Overview of Receptor within EMBA
Benthic habitats	Soft sediments and associated epifauna.	*NWS Province* – see 4.4.1 above *Northwest Transition* 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. 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). 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. Due to contrasting depths, the Rowley Shoals supports a diverse marine invertebrate community including a number of endemic species. Invertebrate species (excluding corals) at the Rowley Shoals include sponges, cnidarians (jellyfish, anemones), worms, bryozoans (sea mosses), crustaceans (crabs, lobsters, etc.), molluscs (cuttlefish, baler shells, giant clams, etc.), echinoderms (starfish, sea urchins) and sea squirts (DEC & MPRA 2007b) *Northwest Province* The Northwest Province is located entirely on the continental slope in water depths of predominantly between 1,000–3,000 m and is comprised of muddy sediments. Despite the present poor knowledge of the benthic communities on the Exmouth Plateau, information on sediments in the bioregion indicates that benthic communities are likely to include filter feeders and epifauna. Soft-bottom environments are likely to support patchy distributions of mobile epibenthos, such as sea cucumbers, ophiuroids, echinoderms, polychaetes and sea pens
World Heritage Areas	Not present within the Julimar EMBA.	N/A
National Heritage Places	Not present within the Julimar EMBA.	N/A
Commonwealth Heritage Places For additional and specific	Montebello Commonwealth Marine Reserve	The Montebello Commonwealth Marine Reserve (Multiple Use Zone - IUCN Category VI), important area for: foraging areas for migratory seabirds that are adjacent to important breeding areas; areas used by vulnerable and migratory whale sharks for

Value/Sensitivity	Receptor within EMBA	Overview of Receptor within EMBA
information on Commonwealth Heritage places please access the following link provided below; http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west		foraging; foraging areas marine turtles which are adjacent to important nesting sites; and seafloor habitats
Ramsar wetlands	Not present within the Julimar EMBA.	N/a
Threatened ecological shoreline habitats	Not present within the Julimar EMBA.	N/a
Key Ecological Features For additional and specific information on KEFs please access the following link provided below; http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west	Ancient coastline at 125 m depth contour - North-west.	The ancient submerged coastline provides areas of hard substrate which may contribute to higher biological diversity. Little detailed knowledge is available, but the hard substrate of the escarpment is likely to support sponges, corals, crinoids, molluscs, echinoderms
	Continental Slope Demersal Fish Communities - North-west.	The Australian continental slope provides important habitat for demersal fish communities, characterised by high endemism and species diversity. Specifically, the continental slope between North West Cape and the Montebello Trough is the most diverse slope bioregion in Australia with more than 500 fish species, 76 of which are endemic

4.4.3 Marine fauna

An EPBC search was conducted on the EMBA to indicate the potential receptors that may transit through or reside within the EMBA. Species listed as threatened (endangered or vulnerable) and migratory are provided in **Table 4-2**. Additional information on EPBC Act threatened and migratory fauna listed can be retrieved from the link below:

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

Table 4-2: Environmental values and sensitivities – marine fauna in the Julimar EMBA

Category	Receptor	EPBC Protection Status
Marine mammals	Blue whale (*Balaenoptera musculus*)	Endangered; migratory
	Humpback whale (*Megaptera novaeangliae*)	Vulnerable; migratory
	Antarctic minke whale (*Balaenoptera bonaerensis*)	Migratory

Category	Receptor	EPBC Protection Status
	Bryde's whale (*Balaenoptera edeni*)	Migratory
	Killer whale (*Orcinus orca*)	Migratory
	Sperm whale (*Physeter macrocephalus*)	Migratory
	Spotted bottlenose dolphin (Arafura/Timor Sea populations) (*Tursiops aduncus*)	Migratory
Marine reptiles	Loggerhead turtle (*Caretta caretta*)	Endangered; migratory
	Green turtle (*Chelonia mydas*)	Vulnerable; migratory
	Leatherback turtle (*Dermochelys coriacea*)	Endangered; migratory
	Hawksbill turtle (*Eretmochelys imbricata*)	Vulnerable; migratory
	Flatback turtle (*Natator depressus*)	Vulnerable; migratory
	Short-nosed seasnake (*Aipysurus apraefrontalis*)	Critically endangered
Seabirds	Southern giant-petrel (*Macronectes giganteus*)	Endangered; migratory
	Osprey (*Pandion haliaetus*)	Listed marine
Sharks & Fish	Great white shark (*Carcharodon carcharias*)	Vulnerable; migratory
	Whale shark (*Rhincodon typus*)	Vulnerable; migratory
	Shortfin mako (*Isurus oxyrinchus*)	Migratory
	Longfin mako (*Isurus paucus*)	Migratory
	Giant manta ray (*Manta birostris*)	Migratory

4.4.4 Socioeconomic

Socio-economic activities that may occur within the Julimar EMBA include commercial fishing, shipping and oil and gas exploration and production (**Table 4-3**).

Table 4-3: Environmental values and sensitivities – socioeconomic in the Julimar EMBA

Category	Receptor	Activity within EMBA
Commercial fishing (Commonwealth waters)	North West Slope Trawl Fishery	**Potentially** - 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	**No** - No current effort on NWS
	Skipjack Tuna (Western) Fishery	**No** - No current effort on NWS
	Southern Bluefin Tuna Fishery	**No** - No current effort on NWS
Commercial fishing (State waters)	Pearl Oyster Managed Fishery	**No -** No fishing in area since 2008
	Pilbara Trap Managed Fishery	**Potentially** - The Pilbara Trap Managed Fishery lies north of latitude 21°44´ S and between longitudes

Category	Receptor	Activity within EMBA
		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.
	Onslow Prawn Managed Fishery	**Potentially** - Operates along the western part of the North-West Shelf with most prawning activities concentrated in the shallower water off the main land.
	Pilbara Fish Trawl Managed Fishery (Zone 1)	**Potentially** - 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.
	Mackerel Managed Fishery	**Potentially** - The Fishery extends from the West Coast Bioregion to the WA/NT border, to the 200 nautical mile AFZ with most effort and catches recorded north of Geraldton, especially from the Kimberley and Pilbara coasts of the Northern Bioregion. Restricted to coastal and shallower waters.
Recreational fishing	Not present within the Julimar EMBA.	None
Oil and Gas	• Apache Brunello • Chevron • Woodside	**Potentially** - The EMBA overlaps the proposed Chevron-operated Wheatstone Development and is in close proximity to the existing Woodside Pluto Development and Apache's Brunello development
Shipping	Shipping traffic in the region in relation to commercial fishing and other oil and gas operations	**Potentially** - The nearest designated shipping routes located 43 km northwest and 56 km east of the operational area and therefore within the EMBA
Tourism	Not present within the Julimar EMBA.	None
Cultural Heritage	Not present within the Julimar EMBA.	None

5. STAKEHOLDER CONSULTATION

Apache Energy recognises that its development activities have the potential to impact the community and the environment, particularly in locations which feature or are near sensitive receptors, or that overlap with other economic, cultural or community uses.

To facilitate informed assessment by stakeholders of the likely potential impact of Apache activities, Apache seeks to establish long-term and meaningful dialogue with those stakeholders who have an interest in its present and planned future activities in Australia.

Apache clearly articulates engagement and consultation standards, goals, and mechanisms, seeks to effectively manage change during the life of its projects and activities, and strives to continuously improve all aspects of its stakeholder engagement processes. The key stakeholders identified for the Julimar Development Project are based on the operational area and provided in Table 5-1.

Table 5-1: Summary of key stakeholders consulted for the Julimar Development Project

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA). • Department of Fisheries (DoF). • Western Australian Fishing Industry Council (WAFIC). • Commonwealth Fisheries Association (CFA). • A Raptis and Sons. • Austral Fisheries. • WestMore Seafoods. • Shark Bay Seafoods. • MG Kailis. • Pearl Producers Association. • State commercial fishing licence holders.
Recreational fisheries	• Recfishwest. • Marine Tourism WA.
Marine conservation	• Department of Parks and Wildlife (DPaW).
Tourism	• Marine Tourism WA (formerly Charter Boat Association).
Shipping safety and security	• Australian Maritime Safety Authority (AMSA). • Department of Defence
Hydrocarbon spill response	• Australian Marine Oil Spill Centre (AMOSC) • Department of Transport (DoT).
Adjacent Regulator	• Commonwealth Department of the Environment (DoE). • Department of Mines and Petroleum (DMP).

Apache employs a dedicated Stakeholder Coordinator to manage a database of all key stakeholders in Apache's projects and operations. The purpose of the database is allow the identification, initial and ongoing contact with an appropriate stakeholder set for any given project, and to facilitate the building of long-term and meaningful dialogue with those stakeholders with whom Apache has regular contact.

Given seabed cuttings remediation will be conducted in petroleum pipeline licence WA-49-L, well within the operational area as defined in the *Brunello Appraisal and Production Drilling EP* and the *Julimar Subsea Installation EP,* stakeholders are considered to be aware of activities in the area and are not expected to have any concerns regarding the activity defined in this EP.

Apache has previously consulted on three phases of the Julimar Development Project: for the *Julimar Development Project Rock Berm Supports Installation Environment Plan (EA-14-EI-01)* (consultation distributed in February 2013), the *Julimar Development Project Pipeline Installation Environment Plan* (EA-72-RI-008.01) (consultation distributed September 2013) and the *Julimar Subsea Installation Environment Plan (EA-72-RI-10010.001)* (consultation distributed June 2014). All consultation was closed out and full text responses were presented in *Julimar Development Project Rock Berm Supports Installation Environment Plan (EA-14-EI-01)* Appendix E1, Appendix E2 and Appendix E3, the *Julimar Development Project Pipeline Installation Environment Plan* (EA-72-RI-008.01) Appendix G and the *Julimar Subsea Installation Environment Plan (EA-72-RI-10010.001)* Appendix 5 and are not repeated in this EP.

Apache considers feedback collected regarding the potential impacts of these prior activities completed in near proximity is relevant to this activity and was taken into account when preparing consultation material for this EP. A notification to stakeholders was not issued for this activity given the nature and scale of the activity. Stakeholders are informed through the quarterly update and no issues have been raised during consultation on the Julimar Development Project.

Additionally Apache's Brunello and Balnaves activities in permit WA-49-L have been extensively consulted on with this stakeholder group, including the recent *Brunello Appraisal and Production Drilling EP* (EA-72-RI-10004.01).

Apache has detailed communications procedures for the life of the project and will maintain two-way communications with stakeholders regarding the Julimar Development Project and all current or proposed activities undertaken on the NWS. Many stakeholders have stated that they will contact Apache by exception, that is, if upon receiving the Stakeholder Information Package they feel the activity poses a risk to them, they will contact Apache.

6. ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

Environmental impact and risk assessment refers to a process whereby planned and unplanned events that may or will occur during an activity are quantitatively and/or qualitatively assessed for their impacts on the environment (physical, biological, and socio-economic) at a defined location and specified period of time. In addition, unplanned events are assessed on the basis of their likelihood of occurrence which contributes to their level of risk.

AEL has undertaken environmental impact and risk assessments for the Julimar seabed remediation planned activity in accordance with the OPGGS (E) Regulations.

The full description of the process applied in identifying, analysing and evaluating the impacts and risks relating to the planned activity, is contained in Apache's *Environmental Impact and Risk Identification and Assessment Procedure (EA-91-IG-004)*. The results of the assessment underpin the aspect and hazard assessments summarised in **Table 7-1** and **Table 7-2.**

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 approach can be mapped to the requirements of the OPGGS (E) Regs for an EP, as described by NOPSEMA (*N4700-GN1074 Rev 1 2013*).

The key steps are:

1. Define the activity and hazards (planned and unplanned events) arising from the activity;
2. Identify receptors in the environment for the activity that will or may be impacted and determine the nature and scale of impacts;
3. Determine impact and risk ranking and identify standard controls;
4. Make ALARP evaluation on impacts (planned events) and risks (unplanned events) based on standard controls and implement further controls as needed to reduce to ALARP;
5. Determine residual consequence or risk ranking; and
6. Evaluate acceptability of impacts and risks.

6.1 Environmental impact assessment and evaluation of planned events

In assessing impacts associated with planned events, the likelihood of an event occurring is assumed to be 'expected' as the event is planned. As such, an evaluation of management controls that can be used to reduce the likelihood of the event (i.e. preventative controls) is not necessary.

Assessing the level of impact arising from a planned event is based on the severity or consequence level of the environmental impact. Consequence levels used by Apache are: Negligible (A), Minor (B), Moderate (C), Major (D) and Critical (E).

Identification of management controls during the assessment process is therefore made to reduce the environmental severity of the event. These controls can be termed mitigation controls. Identification of management controls for planned events has two outcomes: to demonstrate environmental impacts will be managed to a level where the severity of impact is considered acceptable (as determined by a consequence level ranking of A-Negligible or B-Minor), and demonstrating impacts have been reduced to as low as reasonably practicable (ALARP). Both aspects need to be considered when demonstrating the acceptability of impacts from planned events. A further evaluation of acceptability of the planned event is made based on whether its impacts and/or management controls:

- Are consistent with all applicable legislation;
- Are consistent with Apache Environmental Policy; and

- Have considered relevant stakeholder consultation.

6.2 Environmental risk and impact assessment of unplanned events

In assessing unplanned events, both the likelihood of the event occurring and the severity of the impact that might arise from that unplanned event are evaluated. It is the consideration of both likelihood of the event (ranging from Very Rare to Expected) and the severity of the potential impact (consequence level) that informs the level of environmental risk (risk ranking) for an unplanned event. Risk rankings range from Low to High. The criteria and ranking system detailed within Apache's *Environmental Impact and Risk Identification and Assessment Procedure (EA-91-IG-004).* The risk of an unplanned event occurring is at an acceptable level if the risk ranking is not ranked as High and the risk has been reduced to ALARP. Acceptability of environmental risks associated with unplanned events will also be evaluated against:

- Applicable legislation;
- Apache Environmental Management Policy; and
- Stakeholder consultation.

6.3 The ALARP Principle

The ALARP principle is that the residual impacts and risk shall be 'as low as reasonably practicable'. For an environmental 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 environmental 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 environmental benefit.

7. ENVIRONMENTAL HAZARDS AND CONTROLS

An assessment against the Activity was undertaken and the environmental hazards or aspects were then identified. The risk assessment identified 6 potential unplanned events and 7 planned events. A set of environmental performance outcome(s), environmental performance standards and measurement criteria are then identified for each aspect/ hazard. The definitions of the performance outcomes, standards and measurement criteria are consistent with the OPGGS (E) Regulations.

Table 7-1 and **Table 7-2** summarise the identified hazards and potential impacts associated with the activity. The table also lists the controls to prevent or mitigate impacts such that impacts and risks are reduced to ALARP and are at acceptable levels. The residual risk (unplanned events) and consequence (planned events) are also provided in accordance with Apache's *Environmental Risk Identification and Analysis Procedure (EA-91-IG-004)* and summarised in **Section 6**.

Table 7-1: Environmental risk treatment summary for unplanned events

Event	Potential Impacts	Severity, extent or duration	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Hydrocarbon release (MGO spill of ≤15 m^3 at surface) – Tier 1	Accidental loss of fuel during fuel transfer would result in localised reductions in water quality that may be harmful to marine fauna in surface waters and upper layers (~1 m) of the water column	The EMBA as a result of a tier 1 event is less than for a Tier 2 (see below). Duration expected to be 12 hours for >95% of the lost volume to disperse or evaporate	Low	• Fuel and oil transfers undertaken in accordance with contractor's permit to work and safe work procedure and include dry break connections and break-away couplings. • Sulphur content of MGO complies with Regulation 14 of MARPOL Annex VI in order to control SOX and particulate matter emissions . • Fuel transfer connections are bunded to contain minor spills and leaks. • Vessel and/or MODU Safety Case accepted by NOPSEMA includes control measures to reduce risk of hydrocarbons being lost to the marine environment • Drainage and bunding systems are subject to ongoing monitoring and maintenance to ensure integrity and capacity. • Project vessel and/or MODU have oily water filtering systems that are compliant, and surveyed, as per MARPOL Annex I/ Marine Order 91. • Hydrocarbon containing equipment maintenance undertaken in accordance with the Planned Maintenance System (PMS). • MODU/project vessel has and implements a Shipboard Oil Pollution Emergency Plan (SOPEP), or Shipboard Marine Pollution Emergency Plan (SMPEP), as required under MARPOL Annex I. • Oil spill exercise conducted prior to the commencement of the activity.
Hydrocarbon release (MGO spill of ≤329 m^3 at surface) – Tier 2	The worst-case environmental incident resulting from a vessel collision is the rupturing of a vessel fuel tank resulting in the release of MGO to the environment and subsequent impacts to water quality, marine fauna	The extent of the spill area could be up to 70 km from the release site (surface oils) and up to 85 km for entrained hydrocarbons For a modelled MGO spill of 337.4 m^3, it is estimated that dispersion of >65%	Low	• 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. • Vessel and/or MODU Safety Case accepted by NOPSEMA includes control measures to prevent vessel collision (such as navigational lighting) • Dynamic positioning systems on vessels are maintained and tested as per the PMS • Implementation of the simultaneous operations (SIMOPS) plan to manage interactions between two or more vessels

Event	Potential Impacts	Severity, extent or duration	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
	and other sea users	of the lost volume would occur within approximately 15 hours		• Navigation equipment and vessel / MODU 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). • Oil spill response executed in accordance with *Julimar Seabed Remediation Oil Pollution Emergency Plan* (EA-72-RI- 10020.002) • Oil spill response executed in accordance with the vessel / MODU Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL. • Oil spill exercises conducted as per the OPEP and SOPEP.
Non-hydrocarbon release (≤1 m^3 at surface) – Liquid	Hazardous liquids (including wastes) are used or stored on board the project vessels during the activity. Accidental loss of liquid wastes to the marine environment could occur via tank pipework failure or rupture, inadequate bunding and/or storage, insufficient fastening or inadequate handling and subsea ROV operations. This may result in impacts to water quality and hence sensitive environmental receptors	In the event that the spill is not contained on deck, there would be a release to the marine environment, which would be likely to rapidly disperse and evaporate within the operational area. Risk occurs for duration of the activity	Low	• Chemicals (environmentally hazardous) and hydrocarbons stored in bunded areas. • MSDS available where the chemical is stored. • Chemicals stored in accordance with relevant MSDS. • All hazardous wastes stored in a bunded area. • Chemical and hydrocarbon storage areas inspected weekly. • Vessel and/or MODU Safety Case accepted by NOPSEMA manages prevention of loss of containment of chemicals and non- hydrocarbon liquids to ALARP • Contaminated material contained onboard for onshore disposal in accordance with *Environmental Protection (controlled waste) Regulations (2004).* • All shipboard chemical spills managed in accordance with SOPEP/SMPEP. • Spill clean-up equipment located where chemicals and hydrocarbons are stored and frequently handled. • Scupper plugs or equivalent deck drainage control measures available where chemicals are stored and frequently handled. • Only non-hazardous, biodegradable detergents used for deck washing. • Secondary containment shall be available for all machinery or equipment with potential to leak chemicals to the marine environment

Event	Potential Impacts	Severity, extent or duration	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Non-hydrocarbon release (surface) - Solid	Non-hydrocarbon solid wastes such as plastics have the potential to smother benthic environments and harm marine fauna through entanglement or ingestion. Release of hazardous solids (e.g. wastes) may result in the pollution of the immediate receiving environment, potential injury to marine fauna and interference with other sea users (buoyant objects)	The hazard originates within the operational area and all non-buoyant waste material is expected to remain within the operational area. Buoyant waste material would potentially move beyond the operational area. An unplanned release of waste or other solids may occur throughout the activity and impacts may occur until the solid degrades	Low	• Non-hazardous and hazardous wastes collected, stored, processed and disposed of in accordance with the vessel and/or MODU's Garbage Management Plan, as required under Regulation 9 of MARPOL Annex V. • All shipboard objects lost overboard managed in accordance with Emergency response Procedures. • Vessel and/or MODU Safety Case accepted by NOPSEMA manages prevention of loss of containment of non-hydrocarbon solid waste • Chemicals stored in accordance with relevant MSDS. • Material handling and lifting equipment and remediation equipment maintained in accordance the PMS. • Lifting equipment certified. • Compliance with equipment handling and lifting procedures demonstrated by mitigation measures being included in JSA. • Lifting JSA to include communications during lifts to prevent loss of objects overboard • The suction pump will be overboarded away from subsea infrastructure and brought in slowly to an area at least 30 m away from the subsea wellheads • If the suction pump needs to be relocated, the 30 m minimum distance from subsea infrastructure will be maintained at all times • The ROV operator's competency will be assessed prior to contractor commencing work to ensure they are suitable for undertaking activity in close proximity to wellheads • ROV procedures followed during activity to ensure full control throughout, this may include testing of equipment at the surface • MODU/vessel safety case includes control measures for dropped objects that reduce the risk of objects entering the marine environment. • MODU/vessel dropped objects overboard are recovered (if possible) to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences are negligible or safety risks are disproportionate to the environmental consequences.

Event	Potential Impacts	Severity, extent or duration	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Marine fauna collision	The main collision risk associated with the activity is through project vessel collision with large, slow moving cetaceans or whale sharks; potentially resulting in severe injury or mortality	Restricted to immediate area around the project vessel/remediation equipment/MODU and aircraft whilst underway within the operational area for the duration of the activity	Low	• Marine fauna identification posters and Marine Fauna Sighting Datasheets to be made available on board all project vessels and/or MODU. • In accordance with Part 8 of 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.
Introduction of Invasive Marine Species	Introduced invasive marine species (IMS) can be introduced into the operational area and surrounds by project vessels and/or MODU which can have impacts on native flora and fauna including over-predation, out-competing, aquaculture stock and viable fishing area depletion, reduction of coastal aesthetics and damage to infrastructure	Localised (seabed and water column near the project area) to widespread if successfully translocated to new areas via ocean currents or project equipment transit. Temporary (duration of the activity) to long-term (in the event of successful translocation)	Minor	• Anti-foulant systems are maintained in compliance with *International Convention on the Control of Harmful Anti-fouling Systems on Ships*. • AQIS clearance to be in Australian waters • A biofouling vessel and/or MODU 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 risk”. • 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. • Ballast water shall be managed in accordance with Ballast Water Management Plan

Table 7-2: Environmental risk treatment summary for planned events

Event	Potential Impacts	Severity, Duration or Extent	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Interactions with other marine users	The presence of project vessels and/or MODU in the operational area could potentially inhibit commercial shipping, fishing and other oil and gas activities and the presence of vessels and infrastructure could pose a collision risk and inconvenience to fishing practices during these operations.	Occurs within operational area for duration of the activity – a 500m exclusion zone around the vessel/MODU.	Minor	• Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of operational area, activity and duration prior to mobilisation to the operational area, which may 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.
Light Emissions	During the activity, safety and navigational lighting on the project vessel and/or MODU will generate light emissions that may potentially affect marine fauna behaviour.	Direct light spill on surface waters will be limited to the operational area. Required on a 24-hours basis for the duration of the activity	Negligible	• No standard controls are in place other than those required for navigational and safety requirements which are detailed in each vessel/MODU safety case
Noise Emissions	Noise generated during the activity may result in	Localised around the Julimar project area for the duration of the activity	Negligible	• Compliance with Part 8 of EPBC Regulations (Vessels). • 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

Event	Potential Impacts	Severity, Duration or Extent	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
	physiological or behavioural impacts to marine fauna, especially to cetacean species who use sound for navigation and communication.			EPBC Regulations (Aircraft). • In accordance with Part 8 of the EPBC Regulations 2000 the vessels must not: • Travel at greater than 6 knots within 300 m (caution zone) of a cetacean or whale shark known to be in the area. • Approach closer than 100 m of a cetacean or whale shark known to be in the area. • If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly. • Binoculars and Marine Fauna Sighting Datasheet available on all vessels • Apache Marine Fauna Sighting Datasheets submitted to DSEWPaC
Planned Operational Discharges (Surface)	The discharge of non-hazardous wastes (sewage, food waste, brine, cooling water, anti-scalant, deck drainage and oily water) to the marine environment may result in a localised reduction in water quality.	Localised impacts primarily in surface (<5 m) waters. During the activity localised impacts will occur; however water quality conditions will return to normal within minutes to hours of cessation of discharges	Negligible	• Vessels to have current and valid class survey certificate indicating the vessel meets standards for operating in Australia • Vessels and/or MODU to have MARPOL certification for applicable equipment including sewage system and garbage management. • Standard Operating Procedures (SOPs) are in place to manage discharges. • Treated sewage will be discharged in compliance with Regulation 11 of MARPOL Annex IV. • Sewage system compliant with Regulation 9 of MARPOL Annex IV. • Sewage system maintained in accordance with PMS. • Food waste processed and disposed of in accordance with the project vessel': o Garbage Management Plan as required under Regulation 9 of MARPOL; and/or o 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 project vessel and/or MODU to provide guidance on garbage disposal requirements. • In accordance with Regulation 3 of MARPOL Annex V food waste:

Event	Potential Impacts	Severity, Duration or Extent	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
				o Discharged at least 12 nautical miles from nearest territorial baseline. o Discharged at least 3 nautical miles from the nearest territorial baseline if macerated to 25 m or less. • Only non-hazardous, biodegradable detergents used for deck washing as per MARPOL. • As required by MARPOL Annex I Regulations, while in the operational area, project vessel may discharge oily water after treatment to 15 ppm in a MARPOL compliant oily water filter system. • If a MARPOL approved OWS is not present/functioning, or oily filtration residue (sludge) requires disposal, the project vessel and/or MODU will store oily water/sludge which will be shipped to shore for appropriate disposal at a reception facility or to a carrier licensed to receive the waste. • Oily water treatment system maintained in accordance with PMS.
Atmospheric Emissions	Hydrocarbon combustion may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point during the activity.	Gaseous emissions generated during the activity will under normal circumstances, quickly dissipate into the surrounding atmosphere.	Negligible	• Sulphur content of fuel oil complies with Regulation 14 of MARPOL Annex VI. • Ozone-depleting substances managed in accordance with Regulation 13 of MARPOL Annex VI. • Vessels and/or MODU to have MARPOL certification for applicable equipment including incinerator (vessels) and engines • Machinery maintained in accordance the PMS. • Incinerator operated in accordance with Regulation 16 of MARPOL Annex VI
Seabed Disturbance	Disturbance of the seabed as a result of routine activities, leading to disturbance of benthic habitat and associated organisms.	The extent of cuttings discharges and seabed disturbance will be within the operational area for the duration of the activity. Any seabed depressions resulting from equipment placement will gradually infill	Minor	• No vessel anchoring within the operational area. • Project vessel will utilize dynamic positioning only in the operational area. • Post-remediation site survey verifies seabed disturbance and cuttings deposition is as per procedures • Remediation work conducted in accordance with the Remediation Procedure endorsed by the Apache Project Manager, which includes a work/job risk assessment, consideration of cuttings modelling to determine area for cuttings

Event	Potential Impacts	Severity, Duration or Extent	Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
		over time through the deposition of suspended material in the area		dispersion • Survey of the cuttings completed to determine the fines and potential volumes to be removed prior to finalising methodology • Cuttings modelling completed prior to activity commencement to determine the most suitable location for disposal of drill cuttings
Spill Response Operations	Poorly planned and coordinated response activities can result in a lack of, or inadequate, information being available upon which poor decisions can be made, exacerbating or causing further environmental harm.	Impacts within area of extent of spill until the activities cease	Minor	• Oiled wildlife response strategies will be implemented in accordance with the WA Oiled Wildlife Response Plan (WAOWRP). • Apache maintains Master Service Agreements for Oiled Wildlife Response contractors. • NEBA undertaken every operational period to determine if response strategy is having a net environmental benefit. • Oiled wildlife response ceased when termination criteria are met, as outlined within the Julimar Seabed Remediation OPEP (EA-00-RI-10020.2). • Apache understands and maintains the AMSA/APACHE MOU • Apache understand the resources and requirements of the National Plan

8. MANAGEMENT APPROACH

The Julimar seabed remediation 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 unplanned events and planned events associated with the survey, 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 survey activities are summarised in **Section 6**. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance outcome.

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. Management of change.
6. Records Management.
7. Incident response including an Oil Spill Contingency Plan (OSCP).
8. Reporting.

During the period that activities described in this EP are undertaken, Apache will ensure environmental performance is managed through an inspection and monitoring programme undertaken by Apache representatives or delegates based on the vessel and/or MODU. This will include weekly and monthly monitoring and is recorded via a number of checklists and inspection documents that are sent to the Apache Environment Manager or delegate (HSE Coordinator). Feedback from the ongoing monitoring also informs the development of future EPs developed for oil and gas activities, through the risk assessment stage and the internal review of these documents prior to submission; this provides the opportunity for continuous improvement.

Apache has a scheduled audit program and undertakes regular audits of contracted project vessels and/or MODU which are used for an ongoing programme, each approved under the OPGGS Act. Project vessels and/or MODU are inspected/ audited approximately every twelve months while on contract to Apache. Audit findings, opportunities for improvement and/or non-conformances (non-conformances relate to not complying with the intent of environmental performance outcomes and/or performance standards), from the audit are formally documented and tracked through to close-out by members of the Apache Environment team.

Training and competency requirements are reinforced by Apache management staff to all personnel working offshore on a regular basis, such as through the environmental induction and general information sessions. Contractor personnel also participate and assist in information dissemination where appropriate, and will be involved in activity-specific inductions, toolbox talks and at safety meetings. The environmental induction is mandatory for all project vessel and/or MODU personnel, and is delivered either on the project vessel and/or MODU or onshore prior to mobilisation.

9. HYDROCARBON SPILL RESPONSE ARRANGEMENTS

Apache uses the tier structure outlined in **Table 9-1** below to categorise a spill's volume and complexity, which in turn assists in informing the appropriate level of response. Tier 1 and 2 spill scenarios were identified as credible during the Activity.

Table 9-1: Tier structure utilised by Apache

Tier	Definition	Example	Maximum credible volume
1	An incident which will not have an adverse effect on the public or the environment which can be controlled by the use of resources normally available at the facility or vessel concerned without the need to mobilise the Apache Incident Command Team or other external assistance	Spill of hydrocarbons, environmentally hazardous chemicals or liquid-waste to the marine environment	$1m^3$
		Small spill from vessel such as during refuelling	$15\ m^3$
2	An incident that cannot be controlled by the use of facility resources alone and requires external support and resources to combat the situation; or An incident that can be controlled by the facility but which may have an adverse effect on the public or the environment	Vessel collision resulting in a ruptured fuel tank	$329\ m^3$
3	An incident which has a wide ranging impact on Apache and may require the mobilisation of external state, national or international resources to bring the situation under control	Loss of well control	None – not credible

In the event of a hydrocarbon spill, there will be both a Statutory Agency and a Control Agency assigned to the spill at all spill tier levels. Apache intends to remain the Control Agency for any vessel spills it is responsible for until such a time as AMSA or the DoT identifies the need to assume control. This will be based on Apache's ability to respond effectively.

In the event of a tier 2 spill event, the first step in response is forming an Incident Command Team (ICT), whose role it is to directly manage the response process from Apache's headquarters in Perth. The ICT management structure reflects the Australian Interagency Incident Management System (AIIMS) and consists of key management roles required to effectively coordinate and execute a response under emergency conditions, including logistics, environmental and human resourcing roles.

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 ICT use the 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/operationalise 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.

Through the application of a preliminary NEBA for the EP, an assessment of the expected hydrocarbon behaviour(s), modelling results of credible worst-case spill scenario, and identified environmental priorities within the predicted spill impact areas was undertaken. This resulted in a set of functional, achievable oil spill response strategies being selected to respond to a tier 2 MGO incident. Initial response strategies that may be considered are summarised in **Table 9-2**.

Table 9-2: Oil Spill Response Strategies

Response Strategy	Description	Response activities
Source Control	The initial and highest priority response to an oil spill incident is to prevent or limit further oil loss into the marine environment; however this will only be attempted if safe to do so. In most circumstances, the net benefit of source control outweighs impacts of further oil being released into the marine environment.	Activities may include • Cease pumping operations, • Drainage network closed, • Transfer of inventory to another tank, • Trimming or lightening of vessel, • Mobilise ROV for site survey and debris removal (if subsea)
Monitor and Evaluate	Understanding the behaviour and likely trajectory of an oil spill is critical to evaluate the appropriate response strategy, and to identify and report on any potential contact to flora and fauna that may occur while the spill disperses. Information collected is used to inform response decisions	Monitoring activities may include: • Vessel surveillance; • Aerial surveillance; • Tracking buoys; • Surveillance for entrained oil; and • Spill fate modelling.
Oiled wildlife response	Oiled wildlife response operations may be required to deter fauna from an area that has been or is likely to be oiled and if fauna is oiled. Potential impacts to fauna from capturing and cleaning can range from disruption to natural activities, injury or death. This describes how, in the event of a spill that will or could potentially oil wildlife, the ICT will activate DPaW and Industry (AMOSC) Oiled Wildlife Advisors (OWAs) as stipulated in the States WA Oiled Wildlife Response Plan (WAOWRP) and the Pilbara Region Oiled Wildlife Response Plan (PROWRP)	As determined by the WAOWRP and PROWRP
Operational and scientific monitoring	Environmental monitoring may be operational (Type I) or scientific (Type II). Operational and scientific monitoring activities constitute an operational and scientific monitoring plan (OSMP) and are the principle tool for determining the extent, severity and persistence of environmental impacts from an oil spill. This allows operators and regulators to determine whether agreed environmental protection goals have been met during a response (via scientific monitoring	Operational monitoring conducted may include: OMP1 Initial Surveillance Monitoring OMP2 Hydrocarbon Characterisation and Weathering OMP3 Assessment of Shorelines and Coastal Habitats

Response Strategy	Description	Response activities
	activities).	OMP4 Megafauna Assessments Scientific monitoring may include; SMP1 Water Quality SMP2 Sediment Quality SMP3 Shorelines and Coastal Habitats – Sandy Beaches, Tidal Zones and Rocky Shores SMP4 Shorelines and Coastal Habitats – Mangroves SMP5 Benthic Habitats SMP6 Seabirds and Shorebirds SMP7 Marine Mammals and Marine Turtles SMP8 Seafood Quality SMP9 Fish, Fisheries and Aquaculture

Resources available

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. 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.

Resources and personnel are sourced from personnel on site and contractors identified within the OPEP.

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 Julimar Subsea Installation Activity can be obtained from:

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