Julimar Development Project Installation Pre-works Environment Plan Summary

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1. INTRODUCTION

The Julimar Development Project (JDP) is a subsea development that will supply raw gas from the Julimar and Brunello gas fields to the Chevron-operated Wheatstone Development. The JDP intersects petroleum production licences WA-49-L and WA-48-L **(Figure 1-1**). First gas to the Wheatstone platform is expected in mid-2015 and first LNG shipment is expected in late 2016. Apache is the operator of the JDP.

The JDP will be developed over a number of phases commencing with the Brunello reservoir complex, which is closest to the Wheatstone platform. Subsequent phases will be developed over the next 20 years. The phases of the JDP include, but are not limited to (refer to **Figure 1-2**):

- Drilling of five production wells clustered around the Brunello A subsea production manifold;
- Installation of the Brunello cross over manifold that provides a tie-in point for the Brunello A production fluids and would facilitate future expansion to Julimar A fields;
- Installation of two 22.5 km corrosion resistant alloy (CRA) 18-inch production flowlines from the Brunello cross over manifold to the Wheatstone platform; and
- Installation of the A 4-inch mono-ethylene glycol (MEG) pipeline and 5.5-inch electric-hydraulic control umbilical.

The JDP production flowlines, MEG pipeline and control umbilical cross the existing Woodside Energy Limit (Woodside) Pluto subsea production pipelines, MEG pipeline and control.

This environment plan (EP) summary relates to the JDP installation pre-works activities including pre-installation surveys and installation of displacement initiators and concrete mattresses, and associated marine operations to assist with undertaking the above.

1.1 Schedule

Activities will be 24 hours per day, seven days per week. It is envisaged that the total duration of all activities covered by this environment plan will take approximately three months to complete.

Activities are scheduled to occur in a window between September and January, subject to contractor availability from existing commitments and receipt of all government approvals, although in the event of a delay the environment plan considers activities until the end of April.

1.2 Compliance

The proposed Julimar Development Project was referred under the Environment Protection and Biodiversity Conservation (EPBC) Act to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) at the time on the 21st of April 2011 (Ref 2011: 5936). A decision on this action was subsequently provided on the 26th of August 2011, approving the development on the basis that it is 'Not a controlled action if undertaken in a particular manner'.

The Julimar Development Project Installation Pre-works Activities EP (EA-72-RI-101.01) was prepared to comply with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E)) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) (Cmlth). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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

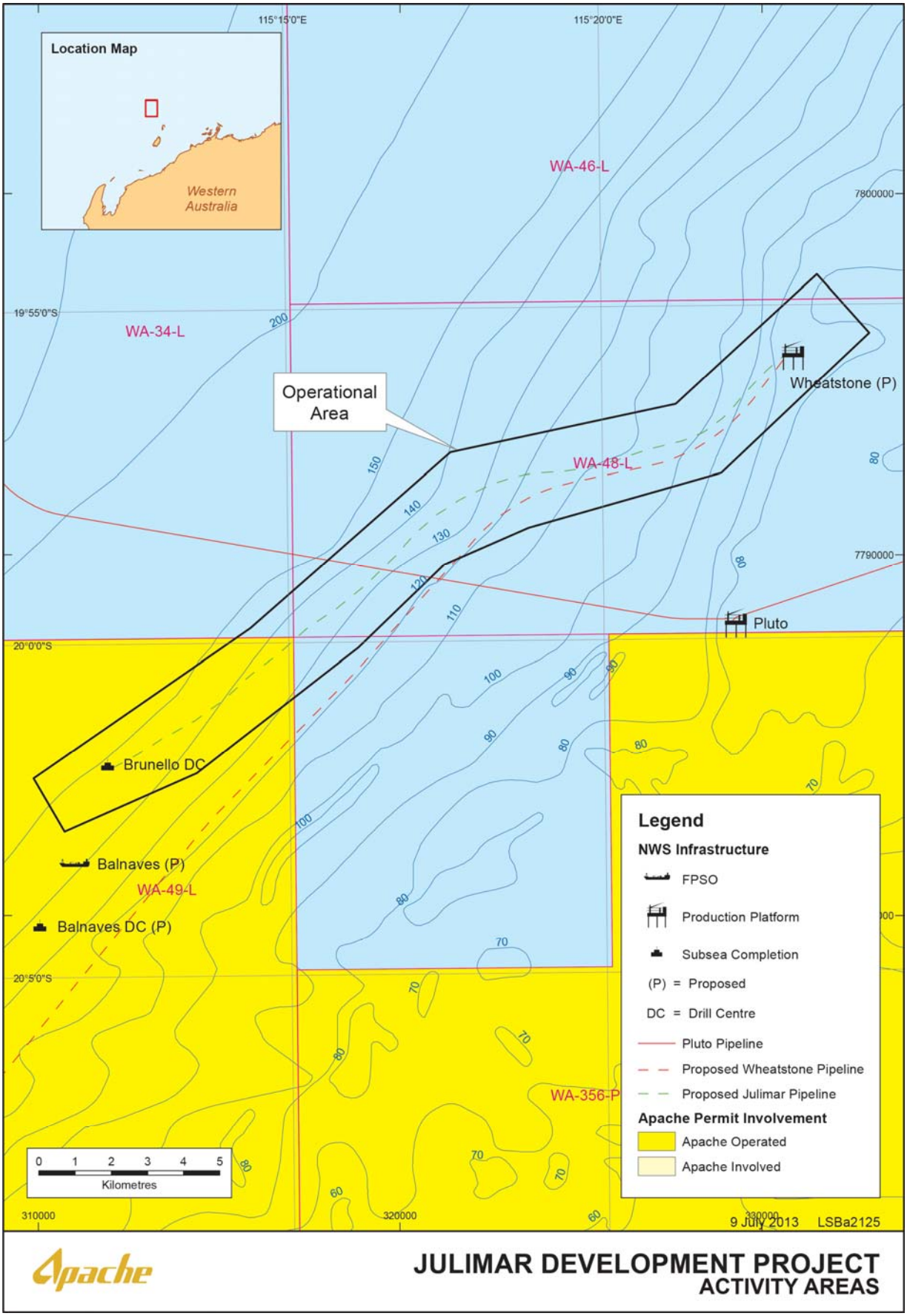

Figure 1-1: Julimar Development Project location and operational area for the activity

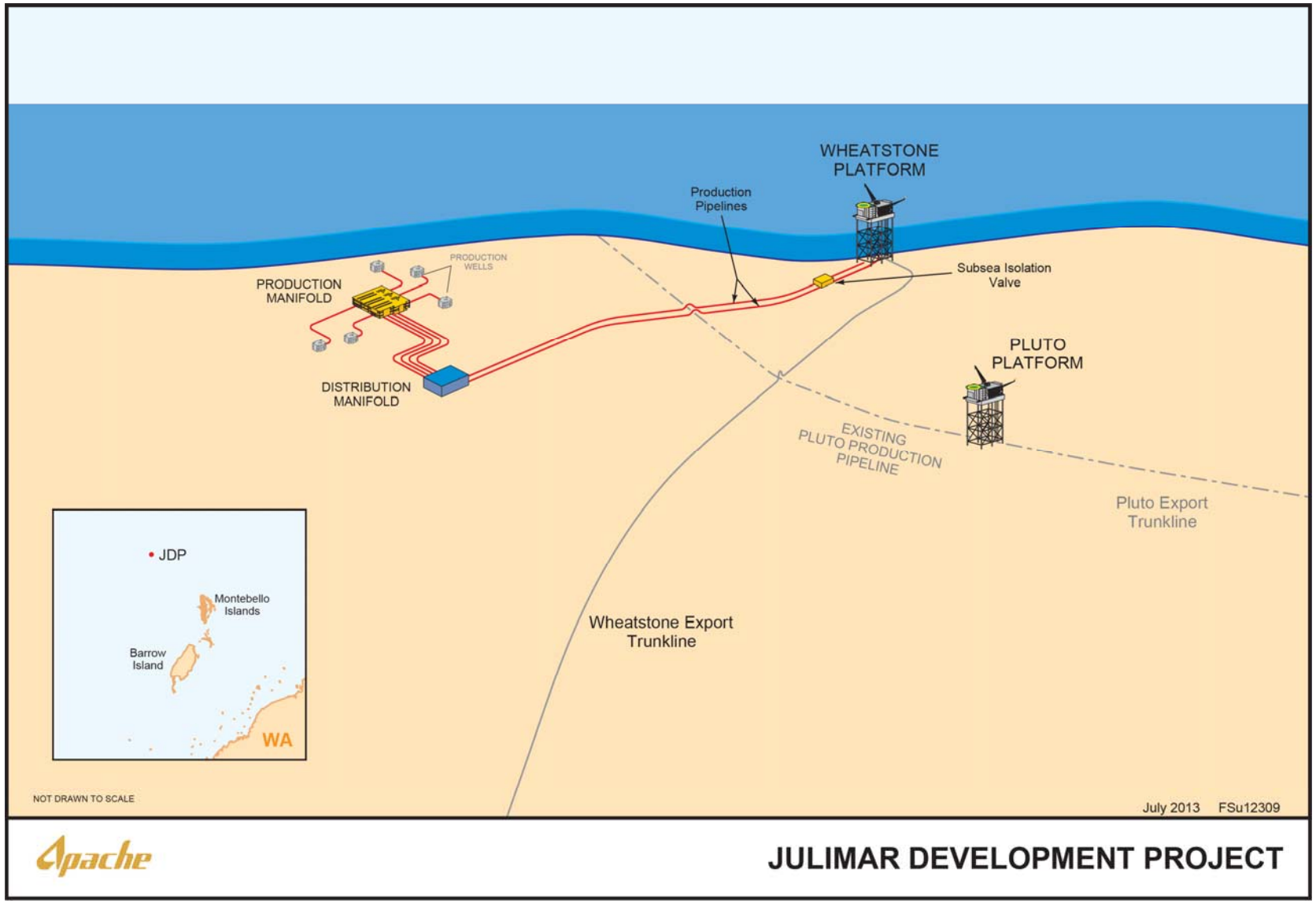

Figure 1-2: Julimar Development Project (Phase I) location and schematic

2. ACTIVITY LOCATION

Subsea infrastructure during the activity will be installed in Petroleum Pipeline Licence WA-48-L. The pipeline licence area is contained within a larger 'operational area' defined in **Table 2-1.** The 'operational area' defines the boundary within which activities described in the environment plan will occur. The operational area is approximately 47 km from the territorial sea baseline (nearest land).

Table 2-1: Coordinates of the operational area

Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
115.1822	-20.0334
115.2399	-19.9963
115.2932	-19.9528
115.3529	-19.9413
115.3904	-19.9091
115.4041	-19.9239
115.3647	-19.9587
115.3137	-19.9718
115.2913	-19.9808
115.2684	-20.0013
115.2254	-20.0325
115.1903	-20.0469

The operational area is approximately 26 km long and 2 km wide. The water depth within the operational area ranges between approximately 70 m and 150 m. There are no grounding hazards within the operational area. The operational area is approximately 168 km west-northwest from the town of Dampier, and 77 km and 48 km northwest from Barrow Island and Montebello Islands, respectively. The JDP operational area overlaps a small portion in the northwest corner of the Montebello Commonwealth Marine Reserve.

Existing facilities within the operational area include sections of the Woodside Pluto 20-inch production flowlines (A and B), 4-inch MEG pipeline and 5.5-inch control umbilical. Apache's Brunello-A drill centre is also located within the southern extent of the operational area. Five wells have been drilled limited to intermediate hole sections.

The proposed Wheatstone platform and sections of the subsea pipeline system (production lines and trunkline) also occur within the operational area. Chevron-managed construction and installation activities for these facilities could occur simultaneously with petroleum activities managed under this environment plan.

3. DESCRIPTION OF THE ACTIVITY

In addition to the specific activities covered by the EP and summarised below (i.e. pre-installation survey works, and the installation of displacement initiation and concrete mattresses), supply vessels will transit through the operational area to deliver supplies and equipment, offload waste, transfer crew and fulfil ancillary support.

3.1 Surveys

A pre-installation survey of the displacement initiator locations and a pre-pipelay survey will be undertaken to identify any debris within the operational area and suitability of seabed conditions at the location. The survey involves a dynamically positioned support vessel with a remote operated vehicle (ROV). The pre-pipelay survey may occur before, during or after the displacement initiator (DI) or pre-pipelay mattress installations. Additional ROV surveys may also occur before, during and after the displacement initiator and pre-pipelay mattress installations (e.g. as-built surveys).

3.2 Displacement Initiator Installation

Displacement initiators will be installed along the JDP pipeline route. An estimated 44 displacement initiators will be crane lifted from a dynamically positioned construction vessel and placed on the seabed. Displacement initiators will be placed at designed intervals along the pipeline route. Each displacement initiator weighs approximately 86 t and has a surface area of approximately 125 m^2. The construction vessel will arrive at the operational area on multiple occasions loaded with displacement initiators.

3.3 Pre-pipelay Mattress Installation

A number of mattresses will be installed at the Woodside Pluto crossing location to support JDP pipelines and to separate JDP pipelines from Pluto pipelines. An estimated 52 mattresses will be crane lifted from an appropriate dynamically positioned vessel and placed on the sea bed/Pluto pipeline. Each mattress weighs approximately 8 t and has a surface area of approximately 20 m^2. The vessel will arrive at the operational area on multiple occasions loaded with mattresses.

4. DESCRIPTION OF ENVIRONMENT

4.1 Physical environment

The JDP lies in the arid tropics experiencing high summer temperatures and periodic cyclones. Rainfall in the region is low with evaporation generally exceeding rainfall throughout the year, although intense rainfall may occur during the passage of summer tropical cyclones and thunderstorms (Condie *et al*., 2006).

Salinity is relatively uniform at 34–35 ppt throughout the water column and across the North West Shelf (NWS). Due to the low average rainfall in the region there is little freshwater run-off from the adjacent mainland (Blaber *et al*., 1985). 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). Vertical gradients are correlated to sea surface temperatures and are greatest during the warm-water season (SSE, 1991).

Wind shear on surface waters generates local-scale drift currents that can persist for extended periods (hours to days). During September–March, the prevailing non-storm winds are from the southwest ranging up to a maximum speed of ~30 knots. Winds from the southwest direction are generally strongest between September and January with wind speed frequently reaching 24 knots and weaker between February–March with wind speed generally less than 16 knots (APASA, 2013a). During April–August, winds are generally lighter and more variable in direction. Non-storm winds prevail from the east-south quadrant and can attain a maximum speed of up to 30 knots, but are generally less than 16 knots, particularly during April and May (APASA, 2013a). Extreme wind conditions in the area may be generated by tropical cyclones, strong easterly pressure gradients, squalls, tornados and water spouts.

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

The dominant offshore sea surface 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 (CMAR, 2007; Condie *et al*., 2006). The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer NWS (Woodside, 2005; CMAR 2007). Modelling indicates that significant east–west flows occur across the NWS to the north of the North West Cape, possibly linking water masses in the area (Woodside, 2005; Condie *et al*., 2006). Due to the complex oceanography of the NWS offshore drift currents comprise 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).

4.2 Biological environment

The JDP operational area is situated within Commonwealth waters of the North-west Marine Region (DSEWPaC, 2008). 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.

The JDP operational area overlaps a small portion in the northwest corner of the Montebello Commonwealth Marine Reserve.

Key ecological features (KEFs) are components of the marine ecosystem that are considered to be important for biodiversity or ecosystem function (DSEWPaC, 2012a). In a search of EPBC Act Protected Matters Database, three KEFs were identified that may be impacted by the activity:

- The Ancient Coastline at 125 m Contour,
- The Continental Slope Demersal Fish Communities; and
- The Exmouth Plateau.

The Ancient Coastline at 125 m Contour is a submerged coastline which provides areas of hard substrate and may contribute to higher diversity and enhanced species richness relative to soft sediment habitat (DSEWPaC, 2012k). *The Continental Slope Demersal Fish Communities* has a high level of endemism of demersal fish species compared to anywhere else along the Australian continental slope (DEWHA, 2012k). *The Exmouth Plateau* is a regionally and nationally unique tropical deep sea plateau at depths of 800–4,000 m that may serve an important ecological role by acting as a very large topographic obstacle that modifies the flow of deep waters that generate internal tides.

The expected benthic habitats within the area are soft sediments and outcropping cemented sediments (hard substratum). Benthic primary producer habitat (e.g. areas of hard corals, seagrass, macroalgae or mangroves) is unlikely to be present. The minimum depth of the water is approximately 50 m; at this depth benthic primary production, which relies on photosynthesis for energy production is limited due to insufficient light availability. Soft sediment benthic fauna comprises predominantly mobile burrowing species including molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals. Cemented sediments provide hard substrate which can be used as attachment points for sessile filter feeding invertebrates such as soft corals, gorgonians and sponges. These areas are also likely to be used by mobile invertebrates such as molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars) and echinoids (sea urchins).

The EPBC Act Protected Matters Database identified ten species of marine fauna found in the area which are listed as threatened species (endangered or vulnerable) under the EPBC Act, most of which are also migratory. A further nine species listed as migratory were also identified in the search. The list included nine marine mammals, five turtles, one seasnake and one seabird and three fish.

Some installation pre-works activities may partially overlap the March–June period when whale sharks are likely to be most abundant on the NWS; however, given the distance to the Ningaloo Marine Park where they aggregate (approximately 200 km southwest), large numbers are not expected to be encountered.

The Department of Fisheries has indicated (through stakeholder consultation) that Rankin cod, pink snapper (*Pagrus auratus*) and Spanish mackerel may be present and spawning in the area at times between May to November. The activity timing may also coincide with humpback whale (north and south) migration, although based on the shallower depth range of the southern migration (30–100 m), whales are more likely to be encountered at the operational area (approximately 130–140 m) during the northern migration peaking in July. There are no resting areas that have been identified nearby, with the closest sensitive area likely to be Exmouth Gulf. There is the potential for pygmy blue whales to migrate through the operational area during their northern migration period (April–August).

However, the width of the blue whale migration corridor in the region (greater than 200 km) suggests that it is highly unlikely that there will be significant interactions with pygmy blue whales. The nearest turtle nesting sites are the Montebello Islands, Lowendal Islands and Barrow Island (greater than 48 km southeast). Most specimens of the short-nosed seasnake (*Aipysurus apraefrontalis*) have been collected from Ashmore and Hibernia reefs (Minton and Heatwole, 1975), which are not within the area. The Southern giant petrel (*Macronectes giganteus*) may occasionally over-fly the operational area or greater potential spill trajectory area when in transit or during foraging, but are not expected to be encountered in significant numbers.

4.3 Socio-economic environment

The operational area is located approximately 168 km offshore from the Port of Dampier. Smaller regional settlements are further away at Onslow, Point Samson and Exmouth. Socio-economic activities that may occur within the area include commercial fishing and oil and gas exploration and production; and to a lesser extent, recreational fishing and tourism.

Offshore and coastal waters in the North-west Marine Region support a valuable and diverse commercial fishing industry, dominated by Pilbara fisheries. Of the state commercial fishing boundaries, the Pilbara Trap Managed Fishery and Pilbara Line Fishery were identified as potentially interacting with the installation activities. The Pilbara Trap Managed Fishery is seaward of the 30 m isobath and landward of the 200 m isobath. The Pilbara Line Fishery licensees are permitted to operate 'anywhere' in Pilbara waters. The North West Slope Trawl Fishery (NWSTF) is the only Commonwealth fishery with historical effort within the area, targeting scampi and prawns. The NWSTF is restricted to depths of greater than 200 m.

Water-based tourism activities undertaken across the NWS include whale watching, recreational boating and fishing, charter boat fishing, snorkelling and diving, and surfing. Given the considerable distance of the operational area from the nearest population centre at Dampier (approximately 168 km away) and the nearest shoreline at Montebello Islands (approximately 48 km away) there is unlikely to be any tourism based activities in the area.

The JDP is in close proximity to the proposed Chevron Wheatstone Development and existing Woodside Pluto Development. During the Wheatstone construction phase, the area surrounding the operational area will experience increased traffic from construction and support vessels.

There are no recognised shipping routes in or near the operational area with the nearest recognised shipping routes located 43 km northwest and 56 km east.

There are no World Heritage properties, National Heritage places, wetlands of international importance or Aboriginal heritage sites located within the area. The closest known historic shipwreck location is at Trial Rocks (approximately 35 km south-southeast of the operational area) where the wreck of the vessels *Trial* and *Tanami* are believed to occur.

5. STAKEHOLDER CONSULTATION

Apache maintains a comprehensive stakeholder database containing fishing interest groups, government and non-government authorities and other stakeholder parties including the community. This database was used to identify stakeholders located, or operating, in the proximity of the activity. Apache has maintained relationships to assist information sharing with key stakeholders for many years and regularly communicates with stakeholders on a variety of activities, always seeking comment and fielding enquiries.

Relevant interested parties for consultation directly relating to the installation activities were identified on the basis of the operational area. Stakeholders identified are listed in **Table 5-1**.

Table 5-1: Summary of stakeholders consulted

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA)[2] • Department of Fisheries (DoF) • Western Australian Fishing Industry Council (WAFIC) • Commonwealth Fisheries Association (CFA) • A Raptis and Sons. • WestMore Seafoods • Shark Bay Seafoods • Austral Fisheries • Jamaclan Marine • MG Kalis • Pearl Producers Association • State commercial fishing licence holders
Recreational fisheries	• Recfishwest • Marine Tourism WA
Marine conservation	• Department of the Environment (DoE) - formerly DSEWPaC[1]
Tourism	• Marine Tourism WA (formerly Charter Boat Owners and Operators Association)
Shipping safety and security	• Australian Maritime Safety Authority (AMSA) • Department of Defence
Hydrocarbon spill response	• Department of Transport (DoT)[2] • Australian Marine Oil Spill Centre (AMOSC)[2]

1. Department consulted with as part of the EPBC Act referral and assessment.
2. Apache consults with these authorities on regular basis and is only required to submit an electronic copy of the approved OSCP for their records.

5.1 Consultation Summary

On 28 April 2011, Apache referred the Julimar Development Project to the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for public comment and assessment in accordance with the *Environment Protection and Biodiversity Conservation Act 1999*. The project was deemed by DSEWPaC to be 'not a controlled action if undertaken in a particular manner'.

In the past year, Apache has consulted with stakeholders on its Brunello and Harmony exploration activities, and Julimar and Balnaves development activities. Given the close proximity of these activities to the operational area, the consultation outcomes from these activities have been considered in the development of this environment plan.

In addition to the above stakeholder consultation efforts, the majority of stakeholders identified in **Table 5-1** were forwarded a specific information package detailing the proposed JDP activities. In accordance with Regulation 11A (2) of the OPGGSE Regulations, the pack contained sufficient information to allow the relevant stakeholders to make an informed assessment of the possible consequences of the activity; and invited stakeholders to contact Apache to discuss any matter.

Apache also released the Apache Energy Stakeholder Consultation Quarterly Project Update for March 2013 to all stakeholders listed in its comprehensive stakeholder database. The quarterly update has been progressively developed in consultation with interested stakeholders, and includes a summary of Apache's activities for the next six to nine months. The quarterly update is intended to trigger feedback, comments and requests for additional information or consultation opportunities for future activities, and provides an update of the activities that are underway or have previously been consulted on. All feedback and enquiries received regarding the above information have been responded to, addressed and closed off with the stakeholder in question. Apache will remain available before, during and after completion of the activity to listen to the concerns of stakeholders, as contact details of the relevant project personnel are provided in consultation material.

6. ENVIRONMENTAL HAZARDS AND CONTROLS

Identification of hazards and assessment of risks was determined using a qualitative assessment process defined by the *Apache Environmental Risk Identification Procedure (EA-91-IG-004)*. The Environmental Risk Assessment (ERA) identifies potential and expected hazards and environmental impacts and determines the risk of the impact occurring. For each impact the risk is determined prior to implementation of proposed management controls (inherent risk), and again after management controls have been implemented (residual risk). The control measures adopted are designed to eliminate the risk, or reduce the risk to a level that is tolerable or as low as reasonably practicable (ALARP). This assessment process was undertaken at a risk assessment workshop held on 23 and 24 May 2013. This workshop was facilitated by the risk specialist consulting firm Oracle Risk Consultants.

The environmental risk assessment identified eight planned environmental risks and five unplanned environmental risks. The key environmental hazards and control measures to be applied are provided in **Section 9**. These are consistent with Apache corporate and project specific performance objectives, standards and criteria. All commitments associated with these will be used to reduce environmental risk to ALARP and will be of an acceptable level.

7. MANAGEMENT APPROACH

The JDP installation pre-works activity will be managed in compliance with the *Julimar Development Project Preworks Installation Environment Plan (EA-72-RI-010.01)* accepted by NOPSEMA under the OPGGS(E) Regulations, other environmental legislation and Apache's Management System (e.g. Apache Environmental Management Policy).

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

The EP details, for each environmental impact identified (and assessed in the Environmental Risk Assessment) specific performance objectives, standards and procedures and identifies the range of controls to be implemented (consistent with the standards) to achieve the performance objectives. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

The goals of the environmental implementation strategy as detailed in the EP are to direct, review and manage activities so that environmental impacts and risks are continually being reduced to ALARP, and performance objectives and standards are met. The implementation strategy includes the following elements:

1. Systems, practices and procedures;
2. Key roles and responsibilities;
3. Training, competencies and ongoing awareness;
4. Monitoring, auditing, management of non-conformance and review;
5. Records management;
6. Incident response and preparedness including oil spill contingency planning; and
7. Reporting.

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

8. CONTACT DETAILS

Further information about the Julimar Development Project Installation pre-works activity can be obtained from:

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9. ENVIRONMENTAL IMPACTS AND CONTROLS

The following tables (refer to **Table 9-1** and **Table 9-2** below) provide a summary of potential environmental impacts that could be expected from the JDP pre-works installation activity for planned activities and unplanned events. It lists the activities which might give rise to environmental impacts and the subsequent controls and measures which eliminate or ensure the environmental risk is reduced to ALARP.

Table 9-1: Environmental risk summary for planned activities

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
Introduction of Invasive Marine Species (Ballast Water and Biofouling)	Bringing project vessels into operational area (from international waters).	Establishment of invasive marine species	• International Maritime Organisation (IMO)-compliant antifouling paint valid as prescribed by the manufacturer. • Vessel bio-fouling risk assessment conducted in accordance with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth Government, 2009) and actions implemented as required to achieve a risk score of 'low' prior to entering the operational area. • Vessel shall exchange 'high-risk' ballast water, as defined in Australian Ballast Water Management Requirements (DAFF, 2009), outside Australian territorial seas and in water at least 200 m deep. • Onboard ballast water log completed.
Vessel Movements	The physical presence of project vessels within the operational area.	Behavioural and physiological effects on marine fauna; Interference with other marine users	• Binoculars and fauna observation recording sheets available on the vessel. • Apache Marine Fauna Sighting Datasheets are completed and submitted to DSEWPaC. • In accordance with *Part 8 of the EPBC Regulations 2000,* the vessel 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. - Change course or speed if a dolphin approaches the vessel or comes within 100 m. • Any vessel collision with an EPBC-listed marine fauna reported to DoE. • All crew must attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna. • Australian Hydrographic Office (AHO) notified of operational area, activities and durations prior to the activity, which triggers AHO to issue a Notice to Mariners. • Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) notified of operational area, activities and durations two weeks prior to the activities, which triggered RCC to issue an AusCoast Warning.
Installation of subsea infrastructure	Pipelay preworks installation activities. (e.g. DI and concrete mattresses)	Damage / loss to benthic habitat and associated biota; Sedimentation; Reduction in water quality from	• Use of vessels with DP, and no project vessel anchoring within operational area. • As-built drawings of the activity prepared within 10 weeks of completion of installation and supplied to AHO for marine chart update. • Pre- installation and pre-pipelay sea bed surveys: - The surveys identify any debris within operational area which may need to be removed - Placement of displacement initiators will be made within design tolerances at the target locations so

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
		turbidity.	that the least impacts to hard substrates supporting epifauna, and benthic primary producers on soft or hard substrates, occur. - Post-installation site survey verifies mattress and displacement initiators constructed and installed to design. • All facilities installed in accordance with the Installation Procedure endorsed by the Apache Project Manager or their delegate. • Competent crew to conduct rigging and lifting operations. • Lifting equipment certified. • Dropped objects recovered as far as reasonably practicable. • Equipment and structures securely sea fastened prior to deployment.
Artificial light	Deck and navigational lighting on vessels	Disorientation or mis-orientation caused by direct attraction to the light; Increased vessel interactions with animals attracted to the light; and Altered feeding behaviours, including increased predation risks.	• Deck lighting configuration reviewed prior to mobilisation and practicable opportunities to reduce direct light spill to marine waters implemented. • Night-time in-sea equipment inspections avoided if practicable to reduce direct lighting onto marine waters.
Noise emissions	Vessel equipment and machinery; Helicopter (crew transfers)	Physiological or behavioural effects to fauna.	• Noise emissions minimised by maintaining vessel machinery in line with vessel's planned maintenance schedule. • Avoid and/or mange vessel interactions with cetaceans, in accordance with EPBC Regulations Part 8; for instance, the vessel will not: - Travel at greater than 6 knots within 300 m (caution zone) of a cetacean known to be in the operational area. - Approach closer than 100 m of a cetacean known to be in the operational area. - Change course or speed if a dolphin approaches the vessel or comes within 100 m in the operational area.

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			• For aerial (i.e. helicopter for crew transfers) - Helicopters not landing, taking off or involved in emergency must not fly lower than 500 m radius of a cetacean, or hover over the no-fly zone.
Oily water discharges	Vessel drainage (e.g. bilge water, machinery space)	Temporary reduction of water quality in the vicinity of the release point; Potential for toxicological impacts to marine flora and fauna.	• Oily water discharged to marine waters through filtering equipment in accordance with Regulation 15 of MARPOL Annex I: - Oily water discharged to sea after passing through filtering equipment has an oil content not exceeding 15 parts per million (ppm). - On detection of OIW content greater than 15 ppm, the discharge stream shall automatically shut-in or be directed in-board for further treatment or storage. - Oily water discharged while proceeding *en route*. • Vessel fitted with oil filtering equipment in accordance with Regulation 14 of MARPOL Annex I. • Oil filtering equipment maintained and calibrated in accordance with vessel's planned maintenance schedule to ensure oil content is not exceeding 15 parts per million (ppm). • All transfer and movement of oil is recorded in the vessel's oil record book.
Liquid Discharges	Putrescible food waste; Sewage; Brine from the potable water supply system; Deck drainage from rainfall or wash-down operations.	Temporary and localised water column turbidity, localised nutrient enrichment and toxicity of water, potential negative physiological or behavioural effects to some threatened marine fauna and humans.	• Sewage discharge procedures compliant with Regulation 11 of MARPOL Annex IV. • Sewage treatment system compliant with Regulation 9 of MARPOL Annex IV. • Sewage treatment system maintained in accordance with vessel's planned maintenance schedule. • Untreated sewage is discharged at a distance of more than 12 nautical miles from the nearest land in accordance with Regulation 11 of MARPOL Annex IV. • Maximum carrying capacity of the sewage system is not exceeded. • Food waste collected, stored, processed and disposed of in accordance with a Garbage Management Plan as required under Regulation 9 of MARPOL. • Food waste disposal procedures compliant with Regulation 3 of MARPOL Annex V. • Macerator capable of reducing food to 25 mm or less is installed and maintained in accordance with vessel's planned maintenance schedule • Cleaning agents or additives that will be released to the sea are not 'harmful substances' as defined by MARPOL Annex III. • Water treatment system maintained in accordance with vessel's planned maintenance schedule. • Machinery maintained in accordance with vessel's planned maintenance schedule
Air Emissions	Operation of machinery and	Temporary and localised decrease in	• Incinerator meets the requirements of Regulation 16 of MARPOL Annex VI.

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
	vessels by combustion engines; Incinerator; Refrigeration equipment (Ozone Depleting Substances, ODS)	air quality, contribution to greenhouse gas loadings.	• Incinerator operated in accordance with Regulation 16 of MARPOL Annex VI. • Sulphur content of fuel oil complies with Regulation 14 of MARPOL Annex VI. • Vessel engines meet NOx emission levels as required by Regulation 13 of MARPOL Annex VI. • Ozone-depleting substances managed in accordance with Regulation 13 of MARPOL Annex VI. • Ozone-depleting substances only handled by a qualified or experienced tradesperson.

Table 9-2: Environmental risk assessment summary for unplanned events

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
Hydrocarbon Spill from Vessel Collision	Significant vessel collision capable of rupturing fuel tanks.	Chemical and physical impacts to marine species.	• Navigational equipment and vessel operations compliant to AMSA, including but not limited to: Marine Orders Part 21 (Safety of Navigation and Emergency Procedures), Marine Order Part 27 (Radio Equipment), Marine Order Part 30 (Prevention of Collisions), and Marine Orders Parts 3 and 6 – Seagoing Qualifications and Marine Radio Qualifications • An International Marine Contractors Association (IMCA) Common Marine Inspection Document (CMID) (or equivalent vessel audit covering navigation equipment and procedures) completed or updated prior to mobilisation. • Vessels equipped with an automatic radar plotting aid (ARPA) system. • Visual vessel bridge-watch 24 hours per day by crew qualified by an accredited trainer. • Australian Hydrographic Office (AHO) notified of operational areas, activities and durations prior to the activity, which triggers AHO to issue a Notice to Mariners. • Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) notified of operational areas, activities and durations prior to commencement of activity, which triggers RCC to issue an AusCoast Warning. • Shipboard Oil Pollution Emergency Plan (SOPEP or SMPEP) spill response exercise conducted prior to the commencement of the activity. • Oil spill response executed in accordance with Apache *Julimar Development Project Pipeline Installation Pre-works*

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			OSCP Oil Spill Contingency Plan (OSCP) (EA-72-RI-010.02)
Hazardous Chemical and Hydrocarbon Release from Woodside Pluto Line Rupture	Pluto pipeline rupture, from a dropped or snagged object.	Reduction in water and sediment quality; Lethal or sub-lethal chemical or physical effects on marine fauna; Asphyxiation of marine fauna exposed to concentrated natural gas; Reduction in local air quality caused by greenhouse gas emissions.	• Vessel maintained in accordance with the vessel's planned maintenance schedule. • Dynamic positioning trials. • ROV survey to establish the as-found and as-built condition of the Woodside Pluto lines. • An ROV deployed within the operational area shall not a) Approach within 2 m of a Woodside Pluto facility (i.e. pipeline), and/or b) Exceed 8 knots. • Overboard No Loading Exclusion Zone: Facilities and equipment deployed and retrieved outside of an engineered vessel overboard 'no loading exclusion zone', including mattresses lifted overboard outside the 'no loading zone' over the Woodside Pluto lines, and lowered to within 5 m of the seabed. The zone will be endorsed by the Apache Project Manager and Woodside representative. • At least one Woodside representative on the project vessel • Adherence to the vessel emergency response plan, which addresses a Woodside Pluto line rupture. The plan endorsed by the Apache Project Manager and Woodside representative. • Communication protocols of the vessel emergency response plan tested prior to DPFPV entering the operational area. Woodside representative to be present during the test. • Oil spill response executed in accordance with Apache *Julimar Development Project Pipeline Installation Pre-works OSCP Oil Spill Contingency Plan (OSCP) (EA-72-RI-010.02)*
Hazardous chemical and hydrocarbon spill from marine operations	Chemicals and hydrocarbons could be spilt or leak on-board or during activity, and potentially enter the marine environment.	Chemical and physical impacts to marine species. Reduction in water quality	• Environmentally hazardous chemicals and hydrocarbons in packaged form carried in accordance with MARPOL Annex III. • Vessel shall maintain a manifest setting forth the environmentally hazardous chemicals and hydrocarbons on board and the location thereof. • Material Safety Data Sheet (MSDS) available for environmentally hazardous chemicals and hydrocarbons onboard. • Environmentally hazardous chemicals and hydrocarbons stored in bunded areas, and storage areas are inspected weekly. • Areas with machinery or equipment with potential to leak or spill oil are in enclosed/bunded areas and checked as part of the weekly environmental inspections; and maintained in accordance with vessel's planned maintenance schedule. • Header tank limit switches maintained and tested in accordance with the manufacturer's specifications and the vessels planned maintenance system.

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			• ROV hydraulic hoses and fittings checked prior to deployment; with ROV's maintenance undertaken in accordance with vessel planned maintenance schedule. . • Clean-up equipment located where environmental hazardous chemicals and hydrocarbons are stored and frequently handled. • Scupper plugs or equivalent deck drainage control measures available where environmentally hazardous chemicals and hydrocarbons are stored and frequently handled on deck. • Environmentally hazardous chemical and hydrocarbon leaks and spills on the vessel immediately cleaned up (including in deck bunds), and contaminated material contained securely onboard. • Shipboard spills and leaks managed in accordance with a SOPEP or SMPEP. • SOPEP or SMPEP spill response exercise conducted prior to the commencement of the activity.
Non-hazardous and Hazardous Solid Waste	Solid waste may unintentionally enter the marine environment if not appropriately secured onboard.	Marine pollution; Injury or death of marine fauna through ingestion or entanglement	• Waste managed in accordance with a Garbage Management Plan required under MARPOL Annex V. • Hazardous wastes documented, tracked, segregated, labelled and stored onboard with secondary containment. • Incinerator meets the requirements of Regulation 16 of MARPOL Annex VI. • Incinerator operated in accordance with Regulation 16 of MARPOL Annex VI. • All crew must attend an environmental induction containing basic information on waste management. • Hazardous wastes documented, tracked, segregated, labelled and stored onboard with secondary containment.
Hydrocarbon Spill Response	Implementation of hydrocarbon spill response strategies.	Hydrocarbon spill, response activities can exacerbate or cause further environmental harm.	The three credible hydrocarbon spill scenarios identified in this environment plan requiring a spill response include: • Hydrocarbon spill from vessel collision • Chemical and Hydrocarbon release from Woodside Pipeline Rupture and • Chemical and hydrocarbon spills from marine operations Based on the pre-planning net environmental benefit assessment (NEBA), the preferred response strategies for identified spill scenarios, include: Source control; Monitor and Evaluation - including aerial and vessel surveillance, tracking buoys, and spill fate modelling; Mechanical Dispersion Oiled wildlife response (OWR) activities; and Scientific (Type II) monitoring. The aim of the NEBA is to inform response strategies that have the greatest net benefit to the overall environment

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			and reduce impacts associated with the response strategies to ALARP. Chemical dispersants do not form part of the response strategy. The environmental impact associated with the general use of vessels and helicopters have been covered in the planned activities of the EP (for instance: noise, light and atmospheric emissions)

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