Reindeer Wellhead Platform and Offshore Gas Supply Pipeline Operations Environment Plan Summary

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1. INTRODUCTION

Apache Energy Limited (AEL), through its subsidiary Apache Northwest Pty Ltd and on behalf of its joint venture partners, operates the Reindeer wellhead platform (WHP) and the associated offshore gas supply pipeline located approximately 80 km offshore north-west of Dampier.

The operation of the Reindeer WHP (including associated subsea infrastructure, collectively referred to as the 'Reindeer WHP') and the offshore gas supply pipeline has been managed under the Devil Creek Gas Plant (DCGP) Operations Environment Plan (EP) accepted by the Department of Mines and Petroleum (DMP) in 2011. In February 2013, the National Offshore Petroleum Safety and Environment Authority (NOPSEMA) requested AEL submit an amended revision of the EP to meet the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (OPGGS (E) Regulations) for petroleum activities located in Commonwealth waters.

1.1 Compliance

The *Reindeer Wellhead Platform and Offshore Gas Supply Pipeline Operations Environment Plan* (EA-14-RI-10002.1) was prepared in accordance with the OPGGS (E) Regulations pre 28 February 2014 requirements; and requirements of the amended OPGGS (E) Regulations (post 28 February 2014) for revisions, incident reporting, record keeping and other miscellaneous requirements. The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on 31st July 2014.

This EP summary has been prepared as per Regulation 11 (7) and (8) of OPGGS (E) Regulations (pre 28 February 2014 requirements).

2. ACTIVITY LOCATION

This EP covers the Reindeer WHP and offshore gas supply pipeline, with a 5 km buffer to cover all operational activities, termed the Defined Area (**Figure 2-1**). The Defined Area incorporates the physical footprint of the operational activities, including the WHP, subsea infrastructure around the WHP, and the offshore gas supply pipeline in Commonwealth waters. The coordinates for the Reindeer WHP and key locations shown in **Figure 2-1** are provided in **Table 2-1** below.

Table 2-1: Coordinates for the Reindeer WHP

Infrastructure Locations	Coordinates (Datum/Projection: GDA 94 Zone 50)		Water depth (m)[1]
	Latitude (South)	Longitude (East)	
Reindeer WHP	20°01'26.85"	116°18'34.90"	58.7
Pluto pipeline crossing	20°13'1"	116°19'20"	50.5
State/Commonwealth boundary interception	20°24'40"	116°20'9"	38.0

[1] Water depths are referenced to Lowest Astronomical Tide (LAT).

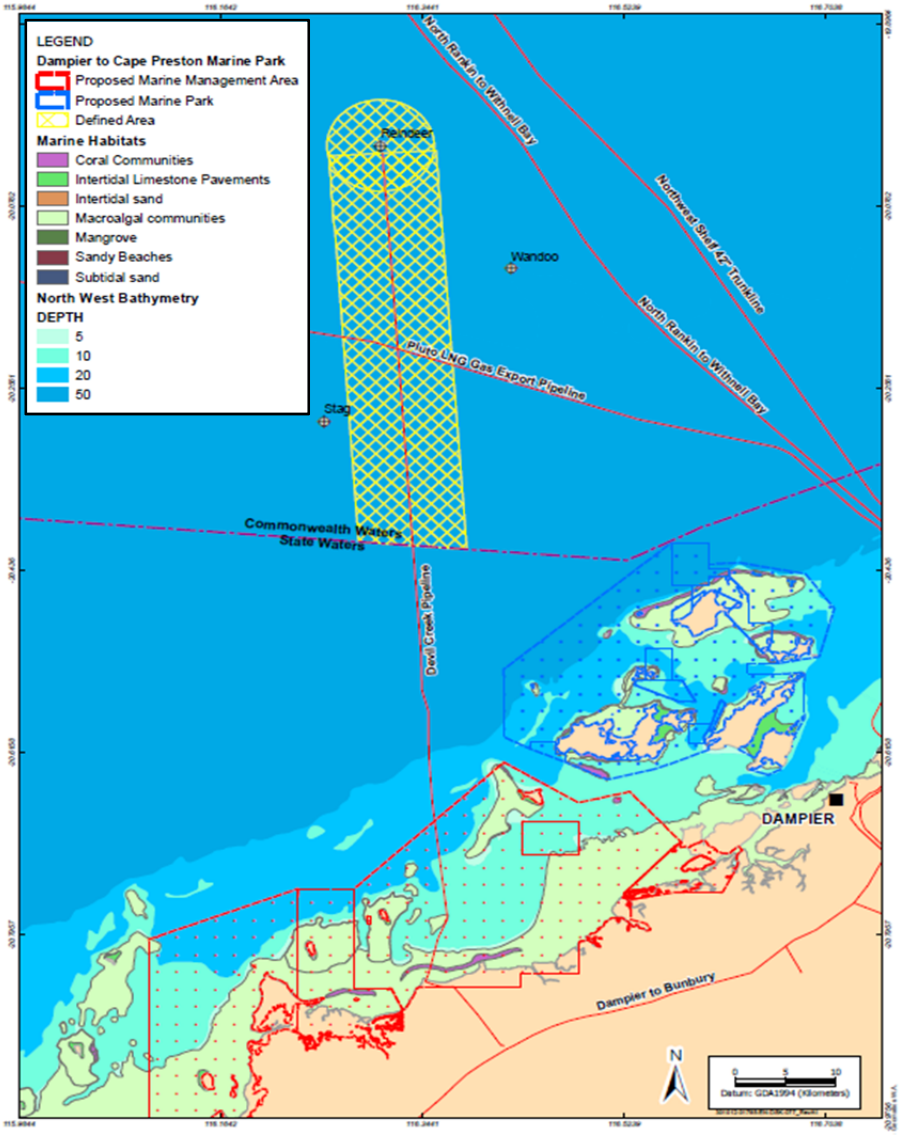

Figure 2-1: Reindeer WHP and offshore gas supply pipeline Defined Area

3. DESCRIPTION OF THE ACTIVITY

The EP covers offshore unmanned, minimum facilities including a wellhead platform (Reindeer WHP) with three conventional production wells remotely controlled from the onshore Devil Creek Gas Plant. The substructure of the WHP is a four leg jacket with one skirt pile per leg and four level topsides with an integrated helideck location on the upper deck. A single 406 mm (16”) subsea and offshore gas pipeline links the WHP to an onshore gas treatment plant (the Devil Creek Gas Plant).

The EP covers operational activities for the Reindeer WHP and the offshore gas supply pipeline in Commonwealth waters. This includes the following:

- General WHP visits;
- Subsea and pipeline integrity and corrosion management;
- Subsea, pipeline and seafloor imaging surveys including:
    - Single-beam echo sounder and multi-beam echo sounder surveys;
    - Side scan sonar surveys; and
    - Autonomous Underwater Vehicle (AUV) surveys.
- Subsea, pipeline and seafloor visual surveys including:
    - Remotely Operated Vehicle (ROV) surveys;
    - Diver surveys; and
    - Cathodic protection surveys.
- Maintenance activities, including:
    - Plant modifications;
    - Marine growth removal and corrosion control;
    - Pipeline span/burial rectification;
    - Pigging activities;
    - Well intervention; and
    - Well abandonment/suspension.
- Vessel operations.

Decommissioning is not covered in the EP, nor are any activities involving the use of a Mobile Offshore Drilling Unit (MODU), such as the drilling of new wells or permanent abandonment of wells.

4. DESCRIPTION OF ENVIRONMENT

4.1 Physical environment

In addition to the Defined Area (**Section 2**), the Regional Area has been defined based on the area that could be impacted through an unplanned event occurring, based on the worst-maximum credible hydrocarbon spill scenario. This encompasses the North West Shelf (NWS) from the North West Cape to offshore of Port Hedland.

The climate of the Regional Area resides in the arid tropics, which experiences high summer temperatures and periodic cyclones. Rainfall on the NWS 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). Mean air temperatures over the ocean range from a minimum of 11°C in winter to a maximum of 37°C in summer.

Winds at the WHP in winter tend to be predominantly from the east to south-east and can be very strong, up to 60 knots offshore (DEC 2007). Summer winds are mainly from the west or south-west, while the seasonal changeovers in April and September have the most variable and weakest winds (DEC 2007, AEL 2011b).

Extreme wind conditions in the area may be generated by tropical cyclones, strong easterly pressure gradients, squalls, tornados and water spouts. The coastline between Broome and Exmouth is the most cyclone prone region in Australia with an average of five tropical cyclones per season (BoM 2013).

Currents on the inner continental shelf are driven by the tide and prevailing winds, with increasing influence by the prevailing ocean currents towards the outer shelf and slope (SEWPaC 2012). The bathymetry of the continental shelf slope also influences the oceanography of the area.

The tides of the NWS have a strong semi-diurnal signal with four tide changes per day (Holloway and Nye 1985). Peak tidal flows are to the east on the flood, and to the west on the ebb (Holloway and Nye 1985; Chevron Australia 2010). The net current direction in the Defined Area is largely influenced by the prevailing winds and the resultant direction is to the north north-east in summer and south south-west in winter (Chevron Australia 2010).

Surface temperatures vary seasonally, being warmest in the Regional Area in March (>30°C) and coolest in August (<20°C). Vertical temperature gradients are correlated to sea surface temperatures, and are greatest during the warm-water season (SSE 1991). Near bottom water temperature is approximately 23°C, with no discernible seasonal variation.

4.2 Biological environment

The marine habitats that could be impacted from routine activities associated with the Reindeer WHP and offshore gas supply pipeline operations include hard substrates and supported assemblages, and soft sediments and associated benthic fauna. The predominant habitat type in the Defined Area is soft unconsolidated sediments. Unplanned events associated with operations activities (i.e. a hydrocarbon spill) could potentially impact shallow waters and shorelines of the mainland coast and offshore islands. Additional benthic habitat types that could be affected including coral reefs, macroalgae, seagrass, mangroves, intertidal sand/mud flats, sandy beaches and rocky platforms and shorelines.

Marine and coastal fauna that could potentially be impacted from routine and unplanned events associated with the Reindeer WHP and offshore gas supply pipeline include plankton, invertebrates, fish, marine mammals, marine reptiles and seabirds/shorebirds. A number of threatened and/or migratory species, as defined under the Environment *Protection and Biodiversity Conservation Act 1999* (EPBC Act) may occur within the marine and coastal habitats within the Regional Area and include various species of whales, dolphins, sea turtles, sharks and seabirds as well as whale sharks, dugongs and the short-nosed sea snake.

A number of protected areas and key ecological features (KEFs) could also potentially be impacted by unplanned events associated with the Reindeer WHP and offshore gas supply pipeline operations activities.

Protected areas include State marine reserves (e.g. Montebello/Barrow Islands Marine Conservation Reserve and Muiron Islands Marine Management Area) and World Heritage Areas (e.g. Ningaloo Coast), Commonwealth marine reserves (e.g. Montebello and Ningaloo) other places classed as Matters of National Environmental Significance (NES) under the EPBC Act (National Heritage Places, Commonwealth Heritage Places). KEFs include, Ancient coastline at 125 m contour, Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula, Continental Slope demersal fish communities, Exmouth plateau and Glomar Shoals.

4.3 Socio-economic environment

The population centres adjacent to the Regional Area are the port towns of Dampier, Karratha and Port Hedland and the smaller coastal and fishing towns of Exmouth, Onslow and Point Samson. Socio-economic activities that may occur within the Defined Area include commercial fishing and oil and gas exploration and production; and to a lesser extent, recreational fishing and tourism. Water-based tourism activities include whale watching, recreational boating and fishing, charter boat fishing, snorkelling and diving.

There are no World Heritage properties, National Heritage places, wetlands of international importance or Aboriginal heritage sites located within the Defined Area. There are no historic shipwrecks in the Defined Area and the closest shipwreck is located approximately 90 km west (the *Trail*). Further afield, seven shipwrecks occur in the 'Montebello Area 'and 51 in the 'Dampier Area' (SEWPaC 2013e).

A valuable and diverse commercial fishing industry is supported by both the offshore and coastal waters in the Regional Area, mainly dominated by the Pilbara fisheries. The North West Slope Trawl Fishery are the only Commonwealth licensed fishery with recent fishing effort within the NWS.

Commercial shipping moves through the offshore waters *en route* to or from the marine terminals at Thevenard, Barrow and Varanus Islands. The Australian Maritime Safety Authority (AMSA) has established a network of Shipping Fairways off the north-west coast of Australia designed to keep shipping traffic away from offshore infrastructure and aimed to reduce the risk of vessel collisions (AMSA 2012). The Reindeer WHP and offshore pipeline resides between two shipping fairways, located approximately 50 km to the east and west of the boundary of the Reindeer WHP (AMSA 2012). There is also a shipping fairway approximately 25 km south of the Reindeer WHP which crosses the offshore gas pipeline.

5. STAKEHOLDER CONSULTATION

AEL maintains a comprehensive stakeholder database for all AEL activities, containing fishing interest groups, government and non-government authorities and other stakeholder parties including the community. This database was used to identify stakeholders potentially affected by the Reindeer WHP and offshore gas supply pipeline operations activities described in the EP. AEL has built and maintained local stakeholder relationships for many years to assist information sharing with key stakeholders, and AEL regularly communicates with these stakeholders on a variety of activities, always seeking comment and fielding enquiries.

Relevant parties consulted regarding Reindeer WHP and offshore gas supply pipeline activities in Commonwealth waters are listed in **Table 5-1**.

Table 5-1: Summary of stakeholders consulted

Group	Stakeholders
Commercial fisheries	• A Raptis and Sons • Austral Fisheries • Australian Fisheries Management Authority (AFMA) • Commonwealth Fisheries Association (CFA) • Department of Fisheries (DoF) • MG Kailis • Pearl Producers Association • Shark Bay Seafoods • Western Australian Fishing Industry Council (WAFIC) • WestMore Seafoods • State commercial fishing licence holders
Recreational fisheries	• Marine Tourism WA
Conservation	• Department of the Environment (formerly SEWPaC) • Department of Parks and Wildlife (DPaW)
Marine activities, spill response and safety	• Australian Marine Oil Spill Centre (AMOSC) • Australian Maritime Safety Authority (AMSA) • Department of Mines and Petroleum (DMP) • Department of Defence • Department of Transport (DoT)
Karratha/Dampier stakeholders	• Dampier Port Authority • Shire of Roebourne

5.1 Consultation summary

AEL has had continuous open consultation with local stakeholders since 2007, starting during the Devil Creek Development Project phase. Ongoing feedback that has been provided to AEL through a number of offshore activities undertaken in 2013/2014 indicates no concern with the identified stakeholders regarding the Reindeer Platform and Pipeline. Communication with stakeholders has included formal and informal

meetings, surveys, and other verbal and written communications. All formal correspondence with relevant persons is recorded in the stakeholder database.

AEL considers that consultation with relevant persons has been adequate; all relevant persons have been actively engaged by AEL regarding the AEL developments on the NWS (including Reindeer) and also, where applicable the proposed oil spill response strategies for these activities.

Although activities have not significantly changed since submission and acceptance of the original EP, further and ongoing consultation will take place if Reindeer WHP and offshore gas supply pipeline operations changes and subsequent risk increases compared to that previously communicated. In addition to this, priority stakeholders (those deemed to be active in the NWS) are contacted by AEL's Consultation Coordinator frequently (minimum of quarterly) in relation to AEL's activities on the NWS.

6. ENVIRONMENTAL HAZARDS AND CONTROLS

Identification of hazards and assessment of risks and impacts were determined using a qualitative assessment process. *The Environmental Impact and Risk Assessment Methodology* 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). The original Hazard Identification (HAZID) was supplemented by an Environmental Identification (ENVID) workshop on 23rd June 2011 to re-examine the environmental impacts associated with the operations phase of the Reindeer WHP and gas pipeline (Commonwealth waters). A further review of the identified risks and impacts was conducted during the development of the EP. The ENVID included relevant technical, operational and environmental personnel within AEL and key contractor companies.

The key environmental hazards and control measures to be applied are provided in **Section 9**. These are consistent with AEL 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

Operations activities for the Reindeer WHP and offshore gas supply pipeline will be managed in compliance with the *Reindeer Wellhead Platform and Offshore Gas Supply Pipeline Operations Environment Plan* (EA-14-RI-10002.01) accepted by NOPSEMA under the OPGGS (E) Regulations, other environmental legislation and AEL's Management System (e.g. Apache Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts and risks associated with the Reindeer WHP and offshore gas supply pipeline 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 and be of an acceptable level for the activity to be undertaken.

The EP details, for each environmental hazard identified (and assessed in the Environmental Impact and 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. Management of Change;
2. Systems, practices and procedures;
3. Key roles and responsibilities;
4. Training, competencies and ongoing awareness;
5. Monitoring, auditing, inspections and management of non-conformance;
6. Reporting;
7. Emergency preparedness and response;
8. Record management; and
9. Review and continual improvement.

The reporting requirements for routine activities and environmental incidents (recordable and reportable) and reporting on EP compliance are also detailed in the EP. This includes environmental performance reporting to assess compliance against environmental performance objectives, standards and the implementation strategy described in the EP; an environmental performance report will be submitted at least annually from the date of acceptance of the EP.

AEL will also audit the implementation strategy provided in the EP at least annually from the time of acceptance of this EP. The audit of the implementation strategy will have the overall aim to evaluate if the commitments made in the implementation strategy in the EP are being met. The results of the implementation strategy audit will be detailed in annual compliance reports.

7.1 Oil Spill Response

The Devil Creek Offshore Pipeline and Reindeer WHP OSCP (EA-14-RI-10001.02) details incident response arrangements in the event of:

1. Non-ship sourced spills in Commonwealth and State waters;
2. Ship-sourced spills in Commonwealth waters;
3. Ship-sourced spills in State waters; and
4. Onshore/land-based spills.

The OSCP details Apache's response preparedness and strategies, monitoring and evaluation strategies, termination criteria and performance objectives, standards and measurement criteria for each of the critical controls described in the OSCP. The response strategies for the spill scenarios identified include:

- Source control (all tiers);
- Monitor and evaluate: surveillance and spill fate modelling (all tiers);
- Mechanical dispersion: used to assist with the natural dispersion process of hydrocarbon at sea surface (tier 2 spills);
- Nearshore and shoreline protection and deflection: considered if spill is predicted to impact sensitive shorelines;
- Shoreline clean-up: physical removal, surf washing, flushing, bioremediation or natural dispersion: if shoreline is impacted;
- Oil wildlife response: vessel-based hazing, pre-emptive capture and cleaning/rehabilitation (tier 2 spills); and
- Scientific monitoring: impact and recovery assessment of sensitive marine receptors exposed to oil (tier 2 spills).

8. CONTACT DETAILS

Further information about the Reindeer WHP and Offshore Gas Supply Pipeline Operations in Commonwealth waters can be obtained from:

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9. ENVIRONMENTAL HAZARDS AND CONTROLS

The following tables (refer to **Table 9-1** and **Table 9-2** below) provide a summary of potential environmental hazards and impacts that could be expected from the Reindeer WHP and offshore gas supply pipeline for planned activities and unplanned events. It lists the activities which might give rise to environmental hazards and impacts and the subsequent controls and measures which eliminate or ensure the environmental risk is reduced to ALARP and is of an acceptable level.

Table 9-1: Environmental risk summary for planned activities

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
Artificial light	Safety and operational lighting on vessels during night time activities.	Potential attraction/ disturbance to marine biota including, most relevantly, marine turtles and seabirds.	No control measures will be implemented to reduce the impacts of artificial lighting on marine fauna as there is not expected to be any significant impact to marine fauna.
Noise emissions	Noise generated by vessels and helicopters.	Physiological or behavioural effects to fauna.	• Engines, machinery and geophysical equipment are maintained in accordance with vessel Preventative Maintenance System (PMS); • WHP engines/generators maintained in accordance with Computerised Management Maintenance System (CMMS); • When the activity is being conducted solely from a vessel - AEL will complete a project kick-off meeting with the vessel contractor. The meeting will outline the key environmental risks and impacts, Vessel Master and crew roles and responsibilities and control measures to be complied with for vessel activity as described in this EP. The contractor is responsible to demonstrate that all the vessel crew are aware of their roles and responsibilities as well as these key environmental risks, impacts and controls prior to commencing the activity; • Marine fauna (being whales, dolphins, turtles, dugongs and whale sharks) sightings shall be recorded on AEL Marine Fauna Sighting Datasheets and submitted to AEL; • Fauna observation kits including identification posters and Marine Fauna Sighting Datasheets shall be present on-board the vessels and the WHP; and • Personnel conducting activities on the WHP will complete the AEL Reindeer WHP induction.
Air emissions	Power generation; Engine exhausts; Ozone depleting substances in closed system rechargeable refrigeration systems.	Reduction in air quality; Greenhouse gas emissions.	• No HFO will be used; • As per MARPOL 73/78 Annex VI: - An International Air Pollution Prevention Certificate (IAPP) is required for every ship of 400 gross tonnage and above; - Vessel engines (by class) shall meet prescribed NOx emission levels; - Incinerators shall be approved by the Administration and the manufacturer's operating manual shall be on-board; - Every vessel of 400 gross tonnage and above shall comply with a Ship Energy Efficiency Management Plan (SEEMP); - The sulphur content of any fuel oil used on-board shall not exceed 3.50% m/m.;

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			- Certain substances shall not be incinerated; and - ODS shall not be deliberately released. • Details of fuel oil (marine grade oil only) for combustion purposes delivered to and used on the vessel shall be recorded by means of bunkering delivery note that shall contain the information prescribed in MARPOL 73/78 Annex VI; • Vessel combustion engines are maintained in accordance with vessel PMS; • WHP combustion engines are maintained in accordance with CMMS; • As per the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, an ODS Record Book shall be maintained if the vessel has a rechargeable system that contains ozone-depleting substances. The record may form part of an existing logbook or electronic recording system as approved by the Administration. Records shall be maintained without delay; and • Depressurisation and draining the pig launcher at the WHP is completed via controlled release.
Liquid waste discharges	Deck drainage; Bilge water; Sewage and grey water; Putrescible waste; Desalination brine; Cooling water.	Reduction in water quality Potential toxicity to marine biota	• Sewage treatment plant and food macerator are maintained in accordance with vessel PMS; • Persons-on-board (POB) shall not exceed the maximum carrying capacity of the vessel's sewage treatment plant; • As per *the Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, any oily water discharged to sea will be processed through oil filtering equipment, will not exceed 15 ppm oil content and will be discharged while proceeding en route; • Oily water filtering equipment by-pass valve shall be locked or designed to prevent accidental discharge of unprocessed oily water; • As per MARPOL 73/78 Annex I: - Vessels shall have oily water filtering equipment of a design approved by the Administration; - An International Oil Pollution Prevention (IOPP) Certificate is required for any vessel of 400 gross tonnage and above. • As per MARPOL 73/78 Annex V: - Food waste can only be discharged to sea if ground or comminuted to 25 mm or less and discharged en route when greater than 3 nautical miles from the 'territorial sea baseline'; - If food is not ground or comminuted to 25 mm or less it must be discharged greater than 12 nautical miles from the territorial sea baseline while en route. • As per MARPOL 73/78 Annex IV: - Vessels shall have a sewage treatment plant of a type approved by the Administration; - An International Sewage Pollution Prevention Certificate (ISPP) is required for any vessel of 400 gross

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			tonnage and above, and any vessel certified to carry more than 15 persons; - Sewage will be treated and discharged in compliance with one of the following: 1) Via a sewage treatment plant certified to meet the requirements of MARPOL Annex IV Regulation 9.1.1, providing the effluent does not produce visible floating solids or cause discolouration of the waters of the sea; or 2) Via a comminuting and disinfecting system certified to meet the requirements of MARPOL Annex IV Regulation 9.1.2, where the discharge is made no less than 3 nm from the territorial sea baseline, discharges are to be made at a moderate rate while the vessel is proceeding en route at a speed of not less than 4 knots; or 3) If not comminuted or disinfected, the discharge is made no less than 12 nm from the territorial sea baseline, discharges are to be made at a moderate rate while the vessel is proceeding en route at a speed of not less than 4 knots; or 4) If options 1–3 are not available, sewage will be stored in holding tanks and transferred ashore for appropriate treatment. • Vessel scupper plugs or equivalent deck drainage control measures shall be available where chemicals and hydrocarbons are stored and frequently handled; • Secondary containment shall be available for all machinery or equipment on vessels with potential to leak chemicals or hydrocarbons to the marine environment; • Hazardous substances separated, labelled and stored on-board vessels within secondary containment; • Drip trays shall be used under portable equipment and machinery on vessels; • Bunded areas (fixed and portable) shall be maintained to retain their storage capacity on vessels, including deck bunding inspection following rainfall; • Inspection and maintenance of bunding and the open drain system on the Reindeer WHP is undertaken; • Only non-hazardous, biodegradable detergents shall be used during vessel deck washing; • Material Safety Data Sheets (MSDS) shall be available at the place of storage for all chemicals on the vessel; and chemicals shall be managed in accordance with the MSDS as a minimum; • A manifest of chemicals stored on the vessels shall be maintained; • Spill clean-up equipment shall be located where chemicals are stored and frequently handled on vessels.
Seabed disturbance	Placement of anchors on the seabed, creations of artificial habitat	Physical disturbance to seabed, benthic habitats and associated biota.	• While under contract to AEL, there will be no fishing from the vessel; • Anchoring locations outside port limits shall be agreed with AEL prior to anchoring and complied with by the Vessel Master: - AEL will define the coordinates (Latitudes and Longitudes) of suitable anchoring areas that are restricted

PLANNED ACTIVITIES			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
	because of the physical presence of infrastructure and removal of marine growth during maintenance activities.		to soft sediment types; and - The assessment of seabed type is supported by geophysical survey data.
Physical disturbance to marine fauna	Presence of vessels, ROV, divers and WHP infrastructure.	Physical disturbance to marine fauna.	• In accordance with Part 8 of EPBC Regulations, Vessels Masters must: - Operate the vessel at a constant speed of less than 6 knots and minimise noise within 300 metres of a whale. - Not change the course of the vessel suddenly in the presence of a whale. - Not restrict the path of a whale. - Not drift or approach closer than 100 metres of a whale. - Not approach within 300 metres of a whale calf.
Interference with other marine users	The physical presence of the vessel carrying out the petroleum activity.	Potential loss of fishing area and/ or disruption to shipping or other operators.	• Navigational aids on Reindeer WHP are inspected and maintained as per PS-04: Navigational Aids RE-00-RG-045; • Navigational lighting is inspected and maintained to alert marine vessels and aircraft of the position of the facility to minimise the potential for collision; • Reindeer WHP location, 500 m exclusion and 3 nm cautionary zones are marked on Australian Hydrographic Service (AHS) navigational charts.

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

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
Dropped objects	Loss of survey equipment; Material transfers.	Physical disturbance to seabed, benthic habitats and associated biota.	• Material handling and lifting equipment maintained in accordance with the vessel PMS; • WHP lifting equipment shall be certified; • Transfers to and from offshore vessels (e.g. cargo, diesel, victuals, etc.) in accordance with relevant contractors procedures for berthing, lifting and bunkering, etc.;

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
		Water quality reduction from loss of containment	• Reindeer WHP lifting equipment is inspected and maintained; • JSA and PTW documentation are completed for 'complex lifts' onto the WHP; • Vessel Master shall report environmental incidents in accordance with AEL's Environment Incident Notification Matrix for Support Vessels; • Devil Creek PIC shall report environmental incidents in accordance with AEL's Environment Incident Notification Matrix for the Reindeer WHP or gas supply pipeline.
Vessel collision with marine fauna	Movement of vessel.	Behavioural impacts to marine fauna; Injury or death of marine fauna	• In accordance with Part 8 of EPBC Regulations, Vessels Masters must: - Operate the vessel at a constant speed of less than 6 knots and minimise noise within 300 metres of a whale. - Not change the course of the vessel suddenly in the presence of a whale. - Not restrict the path of a whale. - Not drift or approach closer than 100 metres of a whale. - Not approach within 300 metres of a whale calf.
Marine pest introduction	Biofouling on submerged surfaces/niche areas on vessels; Biofouling on immersible equipment; Ballast water exchange.	increased competition, predation or displacement of native species	• Following Commonwealth Government approval to enter Australian waters, vessels shall maintain the Ballast Water Management System; • Vessel anti-foulant systems are maintained in compliance with *International Convention on the Control of Harmful Anti-fouling Systems on Ships*; • An AEL VRASS will be completed prior to mobilisation to Australia waters as defined within the *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry* (Commonwealth of Australia 2008). Through completion of a VRASS and associated mitigating actions the risk of introducing marine pests to Australian waters shall be 'low'.
Accidental release of non-hazardous and hazardous solid waste	Equipment failure; Human error; Dropped objects.	Reduction of water quality; Harm to marine fauna; Seabed disturbance.	• As per MARPOL 73/78 Annex V: - A Garbage Management Plan will be implemented for every ship of 400 gross tonnage and above, and every ship which is certified to carry 15 persons or more. The plan shall provide written procedures for collecting, storing, processing and disposing of garbage, including the use of equipment on-board. The plan shall be in accordance with guidelines developed by IMO; - A Garbage Record Book shall be maintained for every ship of 400 gross tonnage and above, and every ship which is certified to carry 15 persons or more; - Placards shall be displayed to provide guidance on garbage disposal requirements. • As per the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*: - No garbage, other than macerated food scraps, shall be disposed into the sea;

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			- Recyclable garbage shall be segregated from general waste on the vessel; - Recyclable garbage shall be disposed of onshore for recycling; - Vessel-specific garbage receptacles on deck shall have lids or covers; - Vessel-specific garbage receptacles to be clearly labelled as to content. • Personnel conducting activities on the WHP will complete the AEL Reindeer WHP induction, which includes instructions for all waste to be removed from the Reindeer WHP.
Accidental release of hazardous liquids	Equipment failure; Human error; Dropped objects.	Reduction of water quality; Harm to marine fauna.	• *As per the Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, vessel-specific garbage receptacles to be clearly labelled as to content. • Scupper plugs or equivalent deck drainage control measures shall be available where chemicals and hydrocarbons are stored and frequently handled; • Secondary containment shall be available for all machinery or equipment with potential to leak chemicals or hydrocarbons to the marine environment; • Hazardous substances separated, labelled and stored on-board within secondary containment; • Drip trays shall be used under portable equipment and machinery; • Bunded areas (fixed and portable) shall be maintained to retain their storage capacity, including deck bunding inspection following rainfall; • Only non-hazardous, biodegradable detergents shall be used during deck washing; • Material Safety Data Sheets (MSDS) shall be available at the place of storage for all chemicals on the vessel; and chemicals shall be managed in accordance with the MSDS as a minimum; • A manifest of chemicals stored on the vessels shall be maintained; • Spill clean-up equipment shall be located where chemicals are stored and frequently handled; • Hydraulic fluids and chemicals used on the Reindeer WHP are risk assessed and chemicals and fluids are preferentially selected with a lower environmental risk ranking (using ecotoxicity, biodegradation and bioaccumulation data) as per the Offshore Chemical Notification Scheme (OCNS) process. • The *Operations Chemical Selection, Evaluation and Approval Procedure* (EA-91-II-10001) will apply to all activities involving chemicals in connection with the Reindeer WHP.
Unplanned hydrocarbon release	WHP loss of integrity; Vessel collision; Release from leaking or ruptured	Reduction of water quality; Potential toxic impact on flora and fauna.	• No HFO used as fuel; • Any vessel-to-vessel bunkering or bulk transfers require prior written approval from AEL; • Transfers to and from offshore facility (e.g. cargo, diesel, victuals, etc.) in accordance with relevant facility procedures for berthing, lifting and bunkering, etc.;

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
	pipeline; Refuelling failures; Miscellaneous spills.		• Vessel bunkering checklist must be completed; • Deck drains closed prior to fuel transfer; • Hydrocarbon and chemical transfer hoses on vessels maintained in accordance with the vessel PMS; • As per the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, any oily water discharged to sea will be processed through oil filtering equipment, will not exceed 15 ppm oil content and will be discharged while proceeding en route. • Oily water filtering equipment by-pass valve shall be locked or designed to prevent accidental discharge of unprocessed oily water. • As per MARPOL 73/78 Annex I, vessels shall have oily water filtering equipment of a design approved by the Administration. • Navigational aids on Reindeer WHP are inspected and maintained as per PS-04: Navigational Aids RE-00-RG-045. • Navigational lighting is inspected and maintained to alert marine vessels and aircraft of the position of the facility to minimise the potential for collision. • Reindeer WHP location, 500 m exclusion and 3 nm cautionary zones are marked on Australian Hydrographic Service (AHS) navigational charts. • All offshore vessels shall maintain a current (<12 months) Common Marine inspection Document (CMID) inspection or equivalent (such as Oil Companies International Marine Forum (OCIMF) Offshore Vessel Inspection Database (OVID) audit). • Navigation equipment is compliant with marine navigation and vessel safety requirements under the *International Convention of the Safety of Life at Sea (SOLAS) 1974* and *Navigation Act 2012*; • Offshore vessels greater than 400 gross tonne will be equipped with an automatic identification system (AIS) and an automatic radar plotting aid (ARPA); • In accordance with the International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW95), competently trained crew shall maintain a constant bridge-watch to prevent a vessel collision. • A copy of the in force *Reindeer WHP and Offshore Gas Supply Pipeline EP* (this document) and *Devil Creek Offshore Pipeline and Reindeer WHP OSCP* (EA-14-RI-10001.02) is present on-board the vessel. • Visible traces of oil on or below the surface of the water in the immediate vicinity of a vessel shall be investigated and reported to AEL; • As per MARPOL Annex I, a Shipboard Oil Pollution Emergency Plan (SOPEP) approved by the Administration is

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
			required for any vessel of 400 gross tonnage and over. Defined within MARPOL, a SMPEP may be required instead of SOPEP depending on the vessel; • Regular drills and exercises shall be carried out on support vessels in-line with IMO (e.g. SOLAS and MARPOL) requirements to refresh the crew in using response equipment and implementing incident response procedures. SOPEP/SMPEP spill response exercise shall be conducted every three months. • Wellheads are certified and well integrity is pressure tested as per project specific Well Services Procedures and Asset Integrity Management Programme (AE-91-IP-302). • An approved well operations management plan (WOMP) for Reindeer production wells is in place to specifically manage the risks associated with operation of these wells (including well intervention and maintenance activities). • Reindeer WHP well intervention and maintenance is conducted under a PTW system to ensure competency, communication and procedural requirements are met. • Platform structures and hydrocarbon containing equipment are routinely inspected to ensure integrity and function is maintained, reducing likelihood of a condensate release. • ESDVs on the WHP will be routinely tested to ensure that they are performing in accordance with design criteria. • SIS equipment meet test criteria and test frequency to ensure that the system will automatically detect abnormal process conditions, alert the operator and execute actions (such as isolate process inventories, initiate blowdown and shutdown equipment). • Pressure Safety Valves meet test/inspection criteria and test/inspection frequency in order to prevent an unplanned loss of containment from equipment and piping. • Emergency generators and Uninterruptible Power Supply (UPS) meet test/inspection criteria and test/inspection frequency to secure secondary power source for SIS • The all pipelines containing hydrocarbons, including the Reindeer gas supply pipeline are routinely inspected to ensure integrity and function is maintained reducing likelihood of condensate release. • ESDVs on the pipeline will be routinely tested to ensure that they are performing in accordance with design criteria. • A minimum clearance of 300 m between anchors and pipelines or installations shall be observed to help prevent anchor dragging across a pipeline. • Anchoring positions are recorded in the vessel anchor handling log book.
Hydrocarbon	Implementation of	Hydrocarbon spill	• All response activities will be implemented in accordance with the *Devil Creek Offshore Pipeline and Reindeer*

UNPLANNED EVENTS			
Hazard	**Cause**	**Potential Impacts**	**Risk Treatment** **Avoidance, Mitigation & Management Controls**
spill response	hydrocarbon spill response strategies.	response activities can exacerbate or cause further environmental harm.	*WHP OSCP* (EA-14-RI-10001.02), which contains numerous control measures to reduce the environmental impacts of all response strategies. • All response activities will be selected based on an ongoing Net Environmental Benefit Analysis (NEBA).

10. REFERENCES

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