North West Shelf Trunklines State Waters Operations Environment Plan Summary

November 2020

Revision 2

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1. INTRODUCTION

This North West Shelf (NWS) Trunklines (State Waters) Operations Environment Plan Summary (the Summary) summarises the NWS Trunklines (State Waters) Operations Environment Plan (EP). This Summary has been prepared in accordance with *Regulation 11(7)* and *Regulation 11(8)* of the *Petroleum (Submerged Lands) (Environment) Regulations 2012 (WA)* and the *Petroleum Pipelines (Environment) Regulations 2012 (WA)*.

The scope of the EP covers the following activities associated with the operations of the two trunklines within State waters along with the onshore portion of the second NWS trunkline:

- routine operation of the trunkline
- routine inspection, maintenance and repair activities
- accidental incident and non-routine activities
- activities of support vessels within the Operational Area.

The NWS trunklines, 1TL and 2TL, connect the NWS offshore facilities including the North Rankin Complex (NRC), Angel, Goodwyn-Alpha (GWA) and Okha facilities, to the onshore Karratha Gas Plant (KGP). The infrastructure covered by this EP includes:

- The portion of the first NWS trunkline (1TL) located in State waters (licence TPL/15)
- The portion of the second trunkline (2TL) located in State waters (licence TPL/16)
- The portion of the second trunkline (2TL) from Mean Low Water Mark (MLWM) to the onshore pig receiver (licence PL58).

The Operational area for the EP includes an area 500 m either side of the trunkline from the MLWM to the boundary of the Western Australian Territorial Sea and Commonwealth adjacent area (~3 nm offshore), and the area defined by licence PL58.

Infrastructure and vessel activities beyond the Operational Area is considered outside the scope of the EP. This EP does not include the operation of the offshore facilities or KGP, which are covered under separate environmental approvals. Decommissioning of the trunkline is not anticipated to occur within the next five years and is not considered in the EP.

1.1 Contact Information of the Operator

Woodside Energy Limited

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

ACN: 63 005 482 986

Daniel Clery

Corporate Affairs Manager

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

feedback@woodside.com.au

2. DESCRIPTION OF THE ACTIVITY

2.1 Location and Operational Area

The trunkline in State waters is located north-west of KGP on the Burrup Peninsula, within the Port of Dampier and Mermaid Sound (**Figure 2-1)**. The trunkline runs from the KGP through the Dampier Archipelago, about a kilometre from Conzinc, Angel and Gidley Islands and about 10 km from Rosemary Island. The Operational Area for the EP is restricted to State waters. Location details of the trunklines within State waters are presented in **Table 2-1.**

Table 2-1: NWS Trunklines and Associated Locations and Permit Areas

Item	Description			
Location	Burrup Peninsula to the boundary of the Western Australian Territorial Sea and Commonwealth adjacent area.			
Coordinates	**Structure**	**Latitude**	**Longitude**	**Licence**
	1TL			
	1TL (MLWM)	20°35’14.020”S	116°46’27.431”E	TPL/15
	1TL (State/Commonwealth boundary)	20°20’49.498”S	116°42’40.809”E	TPL/15
	2TL			
	2TL Onshore (pig receiver)	20°35’07.516”S	116°46’44.973”E	PL58
	2TL Onshore (MLWM)	20°35’00.77”S	116°46’39.758”E	PL58
	2TL (State / Commonwealth boundary)	20°20’20.265”S	116°43’54.167”E	TPL/16
Water depth	Depths along the trunkline alignment in State waters vary from the MLWM at the shore crossing to 36 m LAT			

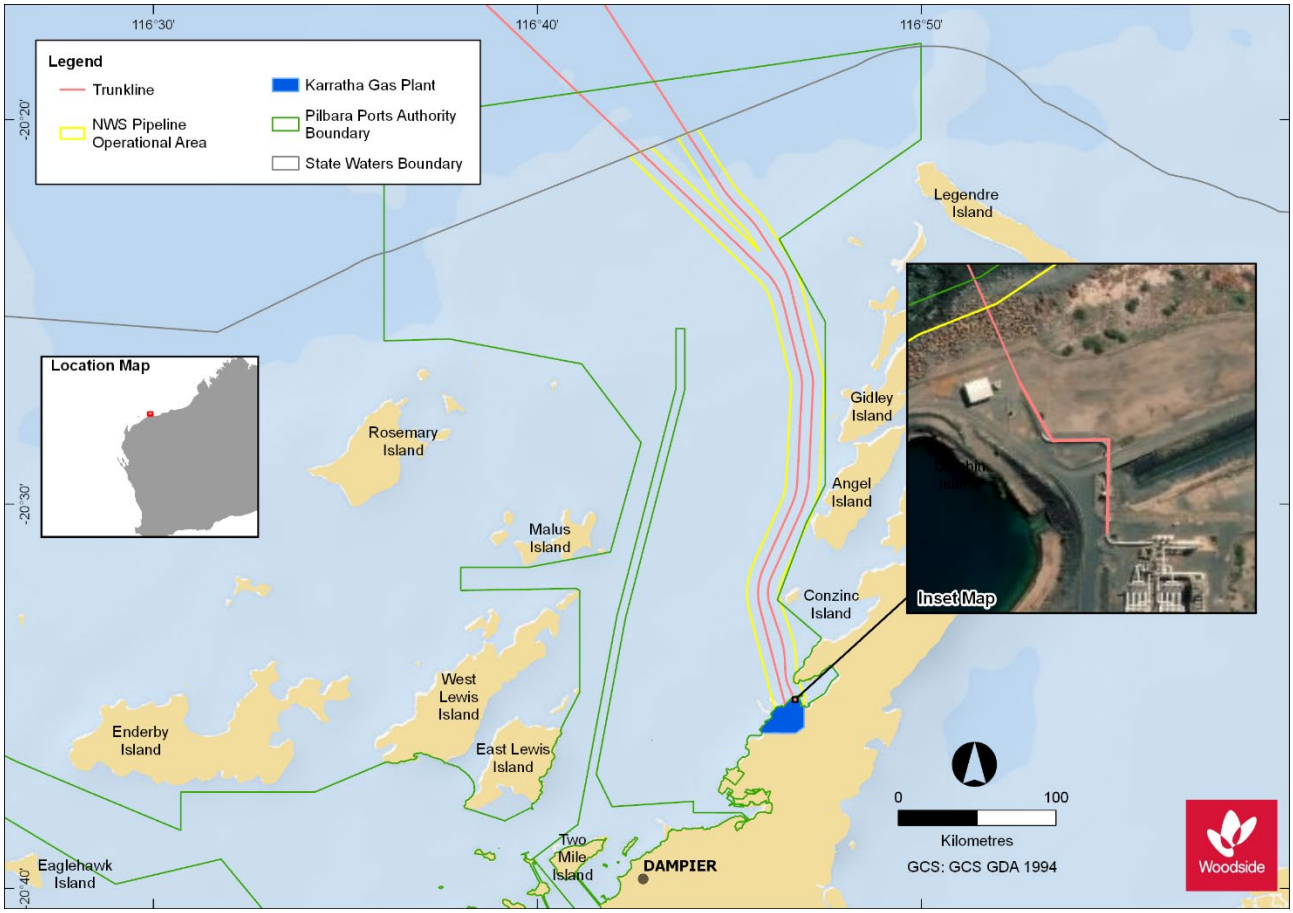

Figure 2-1: Location of Trunklines in State waters and Environment Plan Operational Area

2.2 Trunkline Description and Operations

Normal operations involve the delivery of raw gas and condensate from the offshore platforms to KGP. The production system includes pressure protection and monitoring of the trunklines, with flow rates of the fluids exported into the trunklines controlled from the offshore platforms. Communications are maintained between KGP and the offshore platforms to manage trunkline pressures. All process systems are designed to meet international, national and local industry practice.

The trunklines operate 24 hours per day, 365 days per year. The timing of supporting trunkline inspection and maintenance activities is governed by risk-based processes, which ensure integrity of the trunklines are maintained and inspections take place when required.

A summary of the key design specifications for the trunklines is provided in **Table 2-2** below. A fibre optic cable runs between KGP and North Rankin.

Table 2-2: North West Shelf Trunklines specifications in State waters

Component	Details	
Trunkline	***NWS 1TL***	***NWS 2TL***
Installed	1982	2002
Outside diameter of the trunkline	40"	42"

Component	Details	
Trunkline	***NWS 1TL***	***NWS 2TL***
Pipeline wall thickness	31.8 mm at the riser pipe, expansion loop and surf zone 23.8 mm outside this area	Kilometre Point (KP) 0 – KP 133.4 (DNV Zone 1): 23.9 mm KP 133.4 – KP 133.9 (DNV Zone 2): 30.0 mm Onshore: 30.0 mm
Pipeline length	29.7 km (State), 134.2 km (total)	29.2 km (State), 133.9 km (total) Onshore: 330 m
Pipe steel specifications	Type: Carbon Steel Specification: API 5LX Standard: DNV OS - F101 Grade: 450 (X65)	Type: Carbon Steel Specification: API 5L upgraded to meet additional requirements of standard: DNV OS – F101 Grade: 450 (X65)
Minimum yield strength of pipe steel	448 MPa at up to 50°C	450 MPa at up to 50°C
Design pressure and temperature	Pressure: 13.2 MPa (@+25m LAT) Inlet Temperature: Max 54°C, Min 18°C	Pressure: 14.2 MPa (@LAT) Inlet Temperature: Max: 60°C, Min: 0°C
Protective coating specifications	Asphalt or Coal Enamel	Asphalt Enamel
Product	Gas/condensate fluid	Gas/condensate fluid
Flow rates /capacity	3850 MMscf/d dry raw hydrocarbons	2630 MMscf/d dry raw hydrocarbons
Design life	35 years	40 years
Cathodic protection	Sacrificial bracelet anodes are spaced at similar intervals to protect the trunkline	Sacrificial bracelet anodes are spaced at similar intervals to protect the trunkline
Stabilisation methods	Concrete weight coating on trunkline Combination of rock placement and backfill stabilisation	Concrete weight coating on trunkline Combination of rock placement and backfill stabilisation

2.3 Inspection, Monitoring, Maintenance and Repair Activities

Subsea activities can be broadly categorised into inspection, monitoring, maintenance and repair (IMMR) activities. IMMR activities are typically undertaken from a support vessel via remotely operated vehicle (ROV), autonomous underwater vehicles (AUV) and/or divers.

Inspection and monitoring are undertaken to ensure the integrity of the infrastructure and identify any problems before they present an integrity risk. Maintenance and repair may be required for identified problems or to prevent deterioration of infrastructure, however the trunklines are designed to not require significant intervention. Planned activities associated with the trunklines are predominantly inspection and monitoring.

Typical inspection and monitoring activities undertaken include:

- visual inspections to assess infrastructure integrity
- cathodic protection testing
- wall thickness surveys to monitor the condition of subsea infrastructure

- side scan sonar (SSS) and multibeam echo sounder (MBES) to monitor trunkline movement and seabed features
- water quality and seabed sampling around the trunklines
- sampling of marine growth on the trunklines and stabilising rocks
- operational pigging (sending an internal tool through the trunklines using a pressure driver)
- post cyclone inspections using ROV or SSS to confirm position and integrity of trunklines

There is generally little maintenance and repair required for the trunklines in State waters. Typical maintenance and repair activities may include:

- marine growth removal using diluted acid, water jetting and/or brush systems
- corrosion protection (replacement of the sacrificial anodes spaced along the trunklines)
- sediment relocation around the trunkline
- pipeline coating repair
- pipeline stabilisation which may require the use of grout.

Support vessels are used for IMMR activities. The specifications of the vessel may vary depending on operational requirements, vessel schedules, capability and availability. Support vessels have appropriate lighting to ensure a safe working environment as per maritime requirements. All vessels are required to undergo a Woodside marine assurance inspection to review compliance with marine laws and Woodside safety and environment requirements.

Onshore activities are predominantly inspections.

3. DESCRIPTION OF THE ENVIRONMENT

The key existing environment characteristics of the activity are described in terms of the Operational Area and the environment that may be affected (EMBA). The Operational Area encompasses the key existing environment characteristics and receptors that may be affected by planned aspects of the Petroleum Activity Program. The EMBA encompasses all environmental characteristics and receptors with the potential to be impacted by unplanned activities.

The onshore component of the 2TL (PL58) is located within KGP in a cleared area. There are no key habitats, threatened ecological communities, or listed flora within KGP. KGP sits on a granitic land system with weathered, sandy soils (Woodside, 2019). Habitat types associated with PL58 include the rocky shoreline and the pre-disturbed industrial area of KGP. The surface soils where the onshore portion of the trunklines are located have been heavily modified by cutting, filling and levelling for construction and managing erosion from rainfall at KGP.

3.1 Physical Environment

The Operational Area is in the waters of the Mermaid Sound within the Dampier Archipelago. The coastal habitats along the Pilbara coast and nearshore islands, including the Dampier Archipelago, are part of the North West Shelf (NWS) which is a part of the wider North-west Marine Region (NWMR) as defined under the Integrated Marine and Coastal Regionalisation of Australia.

Climate

The climate of the region is a tropical monsoonal climate, with distinct wet (October to April) and dry (May to September) seasons. Rainfall in the region typically occurs during the wet season, with highest rainfalls observed during late summer, often associated with tropical low pressure systems and cyclones. Tropical low cyclones are relatively common in the region, with the Pilbara coast experiencing more cyclonic activity than any other region of the Australian mainland coast. Tropical cyclones occur between November and April and are most common between December and March. Winds are generally south-westerly during the wet season and south-easterly during the dry season. Winds typically weaken and are more variable during the transitional months between the wet and dry season.

Oceanography

The Leeuwin Current and the Indonesian Through Flow (ITF) are significant drivers of the NWMR ecosystems and are strongest during late summer and winter. Tidally driven currents are also a significant component of water movement in the NWS. Tides in the Dampier Archipelago are semi-diurnal and have a tidal range of up to 5.1 m, with pronounced spring and neap tides. Wind driven currents become dominant during the neap tide. Surface water temperatures are relatively warm, ranging seasonally from about 24.3 to 28.4ºC.

3.2 Biological Environment

Habitats

Seabed sediments in the Operational Area are predominantly fine sand with varying proportions of coarser sand, silt, shells and shell fragments, and coral cemented materials (including calcarenite gravel and cobbles). Physical habitat types within the wider EMBA include mud flats, rocky shorelines, sandy beaches and intertidal rock platforms.

Benthic primary producer habitats fringe the coast at locations across the Dampier Archipelago and wider EMBA. Communities of reef building corals, mangroves, seagrass and macroalgae are broadly distributed in the EMBA. Benthic habitats within the Operational Area are dominated by sand and silt, with small areas of coral reef, as well as seasonal coverage of seagrass or macroalgae present

in isolated locations. Fauna found in the benthic habitat of the Operational Area include polychaetes, echinoderms, molluscs and crustaceans.

There are no Critical Habitats or Threatened Ecological Communities (as listed under the EPBC Act), or Ramsar Wetlands known to occur within the Operational Area or EMBA.

Communities

Planktonic communities are important in the NWMR. Primary productivity of the NWS is largely driven by offshore influences, with periodic upwelling events and cyclonic influences driving coastal productivity and nutrient cycling. Phytoplankton communities in the NWMR are characterised by smaller taxa such as cyanobacteria, while shelf waters are dominated by larger taxa such as diatoms.

Fish communities in the Operational Area and EMBA comprise small and large pelagic fish species, as well as demersal species associated with certain habitats. Key demersal fish biodiversity areas are likely to occur in other complex habitats (e.g. coral reefs). The clearer waters in the northern perimeter of the archipelago near Legendre island support the most diverse fish assemblages, where it is estimated that there are 465 species of coral reef fishes. Closer to shore where waters are more turbid, fish diversity decreases to around 116 species, generally associated with mangroves or silty seabed habitats.

Species

A total of 70 EPBC Act Listed Threatened and/or Migratory species were identified as potentially occurring within the EMBA (Appendix A). Of these, 52 species were identified as potentially occurring within the Operational Area. There were 17 terrestrial species identified that were considered to be not credibly impacted by the Petroleum Activities Program. A description of the species relevant to the Operational Area and EMBA is described in **Table 3-1**.

Table 3-1: Summary of listed species within the Operational Area and EMBA

Receptor	Description
Turtles	Operational Area • Dampier Archipelago nesting locations and internesting buffer is identified as habitat critical to the survival of a species for the green turtle, flatback turtle and hawksbill turtle. • Dampier Archipelago is a biologically important area (BIA) for hawksbill turtle (nesting and internesting), loggerhead turtle (internesting), green turtle (migration, foraging, mating, nesting and internesting), and flatback turtle (migration, foraging, mating, nesting and internesting). • Nesting periods are November to March for green turtles, October to March for flatback turtles, October to February for hawksbill turtles, and December to January for loggerhead turtles. • Hatching periods are January to May for green turtles, February to March for flatback turtles, all year for hawksbill turtles. • The known nesting locations nearest to the Operational Area are Angel Island, Gidley Island and Conzinc Island. EMBA • The habitat critical to the survival of a species and the BIAs listed above overlap the majority of the EMBA. Internesting buffers are about 60 km for flatback turtles and 20 km for hawksbill turtles, green turtles, and loggerhead turtles.
Sea snakes	Operational Area and EMBA • Sea snakes frequent the waters of the continental shelf and around offshore islands. • There are 16 potentially occurring species of sea snake listed under the EPBC Act. • The short-nosed sea snake is a species endemic to WA and has been recorded from the Exmouth Gulf to the reefs of the Sahul Shelf.

Cetaceans and Dugongs	Operational Area and EMBA • An EPBC Act Protected Matters Search identified seven cetacean species that may occur within the Operational Area, including the Blue whale, Humpback whale, Bryde's whale, Killer whale, the Spotted bottlenose dolphin, the Indo-Pacific humpback dolphin, and the Dugong. These species may transverse the Operational Area at certain times of the year, but the likelihood of their occurrence is remote. Other cetacean species are likely to occur at low densities and may traverse through the Operational Area infrequently through the year. • Dugongs may transit within the Operational Area. • A humpback whale migration corridor (north and south) BIA overlaps the Operational Area and the majority of the EMBA; occurrence is expected between May and November. • A pygmy blue whale general distribution BIA overlaps the Operational Area and the EMBA; and may occur from April to November.
Sharks and Rays	Operational Area and EMBA • Whale sharks, great white sharks and grey nurse sharks occur in the region however presence within the Operational Area would be uncommon. • Narrow, dwarf and green sawfishes may be present in coastal waters within the Operational Area. • Giant and reef manta rays may occur in the EMBA and Operational Area.
Birds	Operational Area and EMBA • Twenty-two species of Threatened and/or Migratory bird species were identified as potentially occurring within the Operational Area. No EPBC listed critical habitat associated with these species has been identified within the Operational Area. • A foraging BIA for wedge-tailed shearwater, during their breeding season (August to April), overlaps the Operational Area. • Breeding BIAs for Australian fairy terns and roseate terns overlap the Operational Area. They are expected to occur between July to September and March to July, respectively.

3.3 Socio-economic and Cultural Environment

Heritage

There are 12 registered sites of Aboriginal cultural or heritage significance onshore in the vicinity of the Operational Area, however no registered sites fall within the onshore or offshore Operational Area. There are numerous registered sites, including middens, burial, ceremonial, artefacts, rock shelters, mythological, engraving sites and man-made structures recorded in the Dampier Archipelago. Many of the islands of Dampier Archipelago were included on the National Heritage list in 2007 due to their Aboriginal cultural significance and associated archaeological materials. In 2012, the Murujuga National Park was declared on account of rich rock art and ecological diversity. There is vegetation with high heritage value found throughout the Burrup Peninsula, that is traditionally used for hunting, food and medicine.

Commercial Fisheries

There are a number of Commonwealth and State fisheries designated management areas that overlap the Operational Area. However, only the following State managed fisheries have the potential to interact with the Operational Area:

- WA Pilbara Demersal Scalefish Fishery (mainly trap fishing)
- Pilbara Crab Managed Fishery (mainly trap fishing)
- Specimen Shell Managed Fishery (diving and ROV methods)
- Nickol Bay Prawn Managed Fishery (trawl)

- Mackerel Managed Fishery (near-surface trawling and jig methods)
- Marine Aquarium Fish Managed Fishery
- Western Australian Sea Cucumber Fishery

Traditional Fisheries

Within the EMBA and Operational Area, traditional fisheries are typically restricted to shallow coastal waters and/or areas with structures such as reefs. The waters surrounding the Burrup Peninsula are traditionally used by Aboriginal communities through methods such as hunting, capturing fish and gathering shellfish.

Tourism and Recreation

Recreational fishing is expected to occur throughout the Operational Area and EMBA. The Dampier Archipelago and Montebello Islands are particularly popular for marine nature-based tourist activities. Tourism in the region typically peaks in winter when significant numbers of metropolitan and interstate tourists travel through the area and visit the Pilbara. Licenced fishing tours in the region are also a popular tourist attraction.

Industrial Development

The Operational Area is located within the Port of Dampier, which is managed by the Pilbara Ports Authority. The coastal waters of the region support significant commercial shipping activity, mostly associated with mining and oil and gas. The Operational Area overlaps the Pilbara Port Authority shipping channels for Woodside.

The Operational Area abuts the Burrup Peninsula, which is an area of established oil and gas operations including the Karratha Gas Plant (operated by Woodside), King Bay Supply Base and Dampier Port. Subsea infrastructure in the area includes the Pluto and NWS trunklines.

Defence

There are designated Department of Defence practice areas in the offshore marine waters off Ningaloo and the North West Cape. However, there are no designated Defence practice areas in the Operational Area or EMBA.

3.4 Values and Sensitivities

The offshore environment of the NWMR contains environmental assets of high value or sensitivity including coastal waters and habitats of the Dampier Archipelago and the associated resident, temporary or migratory marine life.

Sensitive receptor locations are protected as part of Commonwealth and State managed areas and have been allocated conservation objectives (International Union for Conservation of Nature (IUCN) Protected Area Category) based on the Australian IUCN reserve management principles in *Schedule 8 of the EPBC Regulations 2000.* These principles determine what activities are acceptable within a protected area under the EPBC Act. The Operational Area does not overlap any protected areas, with the closest to the operational area being the Dampier Australian Marine Park. The Barrow Island (Marine Park and Marine Management Area) and Montebello Islands (Conservation Park, State Marine Park, Commonwealth Marine Park) also fall within the EMBA.

No key ecological features (KEFs) occur in the Operational Area, however the Ancient Coastline at 125 m Depth Contour KEF falls within the EMBA.

4. STAKEHOLDER CONSULTATION

In support of the EP Woodside conducted a stakeholder assessment based on the activity location and potential impacts. A consultation package was sent electronically to the relevant stakeholders with the opportunity for stakeholders to assess potential impacts of the proposed activity and provide feedback. A list of relevant stakeholders consulted is provided in **Table 4-1**.

Table 4-1: Summary of stakeholder consultation activities undertaken for the EP

Stakeholder	Relevance to Activity
Australian Government department or agency	
Australian Customs Service – Border Protection Command (ACS)	Responsible for coordinating maritime security.
Australian Hydrographic Office (AHO)	Responsible for maritime safety and Notice to Mariners. The location of the trunklines need to remain marked on navigation charts.
Australian Maritime Safety Authority (AMSA)	Legislated responsibility for oil pollution response in Commonwealth waters.
Department of Agriculture, Water and the Environment (DAWE)	Responsible for implementing Commonwealth policies and programmes to support agriculture, water resources, the environment and heritage. Whilst there are no planned activities that have the potential to impact DAWE's interests, Woodside has provided information on management measures for the prevention of introduced marine species.
Department of Industry, Science, Energy and Resources (DISER)	Department of relevant Commonwealth Minister and is required to be consulted under the Regulations.
Director of National Parks (DNP)	Responsible for the management of Commonwealth parks and conservation zones. Whilst no field activities are planned that would trigger the DNP's functions, interests or activities, Woodside has chosen to provide information on arrangements for unplanned events, such as an oil spill, which have potential to impact the values within a Commonwealth marine park.
Western Australian Government department or agency or advisory body	
Department of Biodiversity, Conservation and Attractions (DBCA), Parks and Wildlife Service	Responsible for the management of State parks and conservation zones. Whilst no field activities are planned that would trigger DBCA's functions, interests or activities, Woodside has chosen to provide information on arrangements for unplanned events, such as an oil spill, which have potential to impact the values within a State marine park.
Department of Primary Industries and Regional Development (DPIRD)	Responsible for management of State fisheries. There has been commercial fishing effort in State-managed fisheries that overlap the Operational Area.
Department of Transport (DoT)	Legislated responsibility for oil pollution response in State waters.
Pilbara Ports Authority – Port of Dampier	Responsible for maritime safety in State waters.
State fisheries*	
• Mackerel Managed Fishery – Pilbara (Area 2) • Marine Aquarium Fish Managed Fishery • Nickol Bay Prawn Managed Fishery • Pilbara Demersal Scalefish Fisheries (Pilbara Trawl, Trap and Line) • Pilbara Crab Managed Fishery • Sea Cucumber Fishery	The fishery overlaps the Operational Area and DPIRD data indicates active fishing within the Operational Area.

Stakeholder	Relevance to Activity
• Specimen Shell Managed Fishery	
Other marine users	
• Nickol Bay Sport Fishing Club • King Bay Game Fishing Club • Hampton Harbour Boat & Sailing Club • Port Walcott Yacht Club • Port Walcott Volunteer Marine Rescue • West Pilbara Volunteer Sea Search and • Rescue Group • Discovery Cruising • Andro Charters • Warrior Princess Charters	Other marine users listed have the potential to be active within the Operational Area.
Near neighbours to Karratha Gas Plant and Pluto LNG	
• Rio Tinto • Yarra Pilbara	Organisations that would be consulted in the event of planned or unplanned activities from the operation of the trunklines that have potential to impact their interests or operations.
Aboriginal corporations and organisations	
• Ngarluma Aboriginal Corporation • Ngarluma Yindjibarndi Foundation • Murujuga Aboriginal Corporation • Yindjibarndi Aboriginal Corporation • Wong-Goo-Tt-Oo • Wirrawandi Aboriginal Corporation	Organisations representing the rights and interests of Indigenous people of the region.
Industry representative organisations	
Australian Petroleum Production and Exploration Association (APPEA)	Represents the interests of oil and gas explorers and producers in Australia.
Pearl Producers Association	Represents the interests of the Australian South Sea Pearling industry. Whilst proposed activities are not expected to impact the pearling industry, the Pearl Producers Association has previously requested to be kept informed about Woodside's planned petroleum activities.
Recfishwest	Represents the interests of recreational fishers in Western Australia. Activities have the potential to impact recreational fishers.
Western Australian Fishing Industry Council (WAFIC)	Represents the interests of commercial fishers with licences in State waters. Potential for interaction with licence holders in the Pilbara Line Fishery.
Local Government and other representative organisations	
• City of Karratha • Dampier Community Association • Karratha Districts Chamber of Commerce Industry • Pilbara Development Commission	Local government service providers and organisations responsible for promoting or representing the interests of local business and community members.

5. ENVIRONMENTAL IMPACTS AND RISKS

Woodside undertook an environmental risk and impact assessment to understand the potential environmental impacts associated with the Petroleum Activities Program, and used Woodside standards and methods to ensure they are reduced to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level. All control measures described below will be implemented to ensure risks and impacts are reduced to ALARP and an acceptable level. Onshore risks and impacts are managed under the Karratha Gas Plant operations.

Table 5-1: Source of Environmental Risk, Key Potential Environmental Impact and Control Measures for the NWS Trunklines

Risk	Source of Environmental Risk	Key Potential Environmental Impact	Control Measures
Planned (routine and non-routine) activities			
Physical presence (displacement)	Displacement of other users – proximity of support vessels interfering with or displacing third-party vessels (commercial fishing and commercial shipping).	Potential isolated social impact resulting from interference with other sea users (e.g. commercial and recreational fishing, and shipping).	• Vessels complying with Marine Orders for safe vessel operations: – Marine Order 21 (Safety of navigation and emergency procedures) – Marine Order 27 (Safety of Navigation and Radio Equipment) – Marine Order 30 (Prevention of Collisions). • Undertaking consultation program to advise relevant persons of the Petroleum Activities Program which ensures marine users are aware of the activity. • Implement risk management approach in determining inspection, monitoring and maintenance requirements which minimises unnecessary time in the Operational Area.
	Presence of subsea infrastructure interfering with or displacing third-party vessels (commercial/ recreational fishing).		
Physical presence (seabed disturbance)	Presence of subsea infrastructure modifying marine habitats.	Localised modification of seabed habitat within Operational Area with no lasting effect.	• Implement risk management approach in determining inspection, monitoring and maintenance requirements which minimises unnecessary time in the Operational Area.
	Subsea operations, inspection, maintenance and repair activities resulting in disturbance to seabed.	Temporary, localised modification of seabed habitat within Operational Area and temporary and localised increase in turbidity with no lasting effect on benthic primary producers.	
Routine acoustic emissions	Noise generated within the Operational Area from vessel and subsea IMMR activities.	Localised behavioural impacts (avoidance) to fish, turtles and cetaceans with no lasting effect.	• Vessels will comply with EPBC Regulations 2000 – part 8 Division 8.1 Interacting with Cetaceans, which reduces the impact of vessel noise on cetaceans.
Routine and non-routine	Discharge of chemicals (e.g. acid and grout) during	Potential localised decrease in water quality at release	• Woodside's Chemical Selection and Assessment Environment

discharges (chemicals)	subsea maintenance activities such as marine growth removal or trunkline stabilisation.	location during IMMR activities with no lasting effect.	Guideline will be applied which ensures that suitable chemicals are selected to reduce the environmental impacts. • Implement risk management approach in determining inspection, monitoring and maintenance requirements which minimises unnecessary time in the Operational Area.
Routine and non-routine discharges (vessels)	Discharges from vessels (grey water, cooling water, brine) to the marine environment.	Localised decrease in water quality (increased nutrients and biological oxygen demand) with no lasting effect.	• Compliance with the Port of Dampier Handbook which includes requirements for grey water and bilge/oily water discharges within Port limits. • Compliance with Marine Orders which reduce the potential impact of discharges on water quality – Marine Order 95 – pollution prevention – garbage (as appropriate to vessel class) – Marine Order 96 – pollution prevention – sewage – Marine Order 91 – pollution prevention – oil.
Routine and non-routine atmospheric emissions	Internal combustion engines and incinerators on vessels.	Potential, localised decrease in air quality with no lasting effect.	• Vessels complying with Marine Order 97 (Marine Pollution Prevention – Air Pollution) which reduces air pollution from vessels. • Implement risk management approach in determining inspection, monitoring and maintenance requirements which minimises unnecessary time in the Operational Area.
Routine light emissions	Light emissions from vessels, ROVs, inspection tools when IMMR activities are undertaken.	Localised potential for behavioural disturbance to individuals of sensitive species in close proximity to vessels with no lasting effect.	• Implement risk management approach in determining inspection, monitoring and maintenance requirements which minimises unnecessary time in the Operational Area. • Implementation of appropriate management measures according to best practice lighting design, as described in the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, depending on the nature and timing of the proposed activity.
Unplanned activities (accidents / incidents)			
Unplanned discharges from vessels	Accidental discharge of chemicals, control fluids, solid waste/dropped objects, or hydrocarbons to the marine environment during storage or use.	Potential slight short-term impacts to the marine fauna, and localised temporary impacts to water quality and marine sediments.	• Compliance with Marine Orders which reduce the likelihood of unplanned discharges to the marine environment

	Loss of hydrocarbons to marine environment due to a vessel collision or grounding.	Potential for medium term impact on valuable communities and protected species in the affected area within the Dampier Archipelago.	• Marine Order 30 - prevention of collisions • Marine Order 21 - safety of navigation and emergency procedures • Marine Order 27 (Safety of Navigation and Radio Equipment) • Marine Order 95 - pollution prevention – garbage • Marine Order 91 – marine pollution prevention – oil • Implement the Nearshore Pipelines Oil Pollution First Strike Plan in the event of spill which will reduce the consequences of an unplanned hydrocarbon release to the environment. Spill response kits will be available of vessels and incidents are reported. • Woodside's Chemical Selection and Assessment Environment Guideline will be applied which ensures that suitable chemicals are selected to reduce the environmental impacts. • Appropriate waste management and storage • Attempt recovery of material (solid object/waste) lost overboard if safe and practicable to do so.
Physical presence (collision with marine fauna)	Physical presence of vessels resulting in collision with marine fauna from vessels and associated activities.	Potential injury or death of marine fauna (single animal), including protected species.	• Vessels will comply with EPBC Regulations 2000 – part 8 Division 8.1 Interacting with Cetaceans, which reduces the likelihood of a collision with cetaceans.
Physical presence (introduction of invasive marine species)	Invasive species in vessel ballast tanks or on vessels/submersible equipment.	Potential introduction of invasive marine species resulting in an alteration of the localised environment.	• Appropriate ballast water management for vessels mobilising from overseas. • Woodside's Invasive Marine Species risk assessment process is implemented which identifies potential risks and additional controls to minimising the likelihood of introducing a species to the region.
Unplanned activities (accidents / incidents)			
Trunkline loss of containment	Release of hydrocarbons resulting from loss of containment due to trunkline loss of integrity.	Potential significant impacts to the marine and terrestrial environment: • Long-term impacts to sensitive offshore and nearshore areas • Disruption to marine fauna, including protected species	• Maintain pipeline integrity to avoid a trunkline loss of containment. • Maintain Safety Instrumented System to detect and respond to pre-defined initiating conditions and/or initiate responses that put the process and equipment in a safe condition to prevent or

		• Potential short-term interference with or displacement of other sea users.	mitigate the effects of a trunkline loss of containment. • Compliance with the approved Pipeline Management Plan for the NWS Pipelines. • Maintain availability of critical external and internal communication systems to facilitate prevention and response to accidents and emergencies. • Maintain environmental incident response equipment to enact the Nearshore Pipelines Oil Pollution First Strike Plan. • Incident reports are raised for unplanned releases, and Reportable Incidents notified for any unplanned loss of containment from the trunkline.

6. IMPLEMENTATION STRATEGY

6.1 Systems, Practices and Procedures

Woodside Management System

The Woodside Management System (WMS) provides a structured framework of documentation to set common expectations governing how all employees and contractors at Woodside will work. Many of the standards presented in the EP are drawn from the WMS documentation, which comprises the following four elements:

- **Compass and Policies**: Set the enterprise-wide direction for Woodside by governing our behaviours, actions, and business decisions and ensuring we meet our legal and other external obligations.
- **Expectations**: Set essential activities or deliverables required to achieve the objectives of the Key Business Activities and provide the basis for developing processes and procedures.
- **Processes and Procedures**: Processes identify the set of interrelated or interacting activities that transforms inputs into outputs, to systematically achieve a purpose or specific objective. Procedures specify what steps, by whom, and when required to carry out an activity or a process.
- **Guidelines**: Provide recommended practice and advice on how to perform the steps defined in Procedures, together with supporting information and associated tools. Guidelines provide advice on how activities or tasks may be performed, information that may be taken into consideration, or, how to use tools and systems.

Management of Change

Woodside's Change Management Procedure describes Woodside's requirements for change management at Woodside owned or controlled operations. Changes relevant to the EP will be managed in accordance with the Change Management Procedure. Such changes may concern activity description, including review of advances in technology, new equipment selected, changes in understanding of the environment, and potential new advice from external stakeholders.

In the event of a change to Woodside's nominated liaison person, or a change to the contact details for the titleholder or the nominated liaison person, Woodside will notify DMIRS of the change in writing as soon as practicable.

6.2 Roles and Responsibilities

Table 6-1: Roles and responsibilities

Title (role)	Environmental Responsibilities Related to the EP
Office-based Personnel	
Woodside Asset Manager	• Systems, practices and procedures • Resourcing, training and competencies • Monitoring, auditing, non-conformance and emergency response
Subsea and Pipelines (IMMR) Activity Manager	• Systems, practices and procedures • Resourcing, training and competencies • Monitoring, auditing, non-conformance and emergency response
Woodside Environmental Adviser	• Environmental approvals, monitoring and inspections • Compliance with EP performance objectives and performance standards • Response to environmental incidents

Title (role)	Environmental Responsibilities Related to the EP
	• Liaising with relevant regulatory authorities as required. • External regulatory reports • Ensuring personnel understanding of environmental requirements
Woodside Marine Services Function	• Pre-charter assurance for all contracted vessels • Conduct ongoing operational assurance of vessels contracted through Woodside Marine, to confirm vessels operate in compliance with relevant legislation, rules and Woodside Marine Charterers Instructions in order to be able to meet safety, navigation, operational and emergency response requirements.
Contractor Sponsors	• Ensure implementation of EP for the contractor's scope of work • Ensure contractors have adequate environmental capability • review contractor environmental performance as required
Woodside Corporate Affairs Adviser	• Stakeholder identification, consultation and reporting
Woodside Corporate Incident Coordination Centre (CICC) Duty Manager	• Take control of Incident Management Team and establish an action plan.
Vessel and Site Based Personnel	
Woodside Site Representative	• Systems, practices and procedures • Resourcing, training and competencies • Monitoring, auditing, non-conformance and emergency response
Vessel Master (IMMR Vessel)	• Systems, practices and procedures • Monitoring, auditing, non-conformance and emergency response
All marine crew	• Systems, practices and procedures • Monitoring, auditing, non-conformance and emergency response
Vessel Logistics Coordinators	• Ensure waste is managed on the relevant vessels and sent to shore as per the relevant Waste Management Plan.
Everyone – all personnel	• Complying with Woodside standards and procedures that apply to their area of work • Understanding the environmental risks and controls applicable to area of work • Following instructions from the relevant supervisor with respect to environmental protection and measurement criteria outlined in this EP. • Carry out assigned activities in accordance with approved procedures and the EP

6.3 Training and Competency

Environmental awareness training is required for all personnel, detailing awareness and compliance with the Contractor's environmental policy and environmental management system.

Inductions are provided to all relevant personnel (e.g. Contractors and Company representatives) before mobilising to or on arrival at the activity location. The induction covers the HSE requirements and environmental information specific to the activity location. Attendance records are maintained.

6.4 Monitoring and Management of Compliance

Monitoring is conducted during an activity to monitor compliance against the environmental performance objectives, environmental performance standards and measurement criteria which are developed based on the impacts, risks and associated controls described above. These are reviewed throughout the life of the EP to identify opportunities for improvement.

Any non-conformances with the environmental performance objectives and environmental performance standards in the EP are classified as environmental incidents. These are reported and managed in accordance with Woodside's Health, Safety and Environment Event Reporting and Investigation Procedure and the EP.

All emissions and discharges to the environment from vessels will be monitored to assess the environmental performance, as required in the EP.

6.5 Reporting

To meet the environmental performance objectives and standards outlined in this EP, Woodside reports at a number of levels. Internal reporting includes:

- daily progress reports and meetings
- regular HSE meetings
- performance reporting.

External routine reporting also occurs, which includes:

- environmental performance review and reporting
- incident reporting
- quarterly emissions and discharges reporting.

6.6 Emergency Preparedness and Response

Woodside has detailed Oil Pollution Emergency Arrangements and Hydrocarbon Spill Preparedness and Response Procedures. These are supported by various plans that detail the actions and resources available in the event of various emergency scenarios.

The vessel is required to have a Ship Oil Pollution Emergency Plan (SOPEP) in accordance with the requirements of the Australian Marine Orders. These plans outline responsibilities, specify procedures and identify resources available in a hydrocarbon or chemical spill from vessel activities.

The Nearshore Pipelines Oil Pollution First Strike Plan provides immediate actions required to commence a response if hydrocarbons are released to the marine environment and would be implemented in conjunction with the Ship Oil Pollution Emergency Plan and the Tactical Response Plans that have been developed for priority protection areas.

In the event of a major spill, the Department of Transport (DoT) as the administrator of the State Hazard Plan Maritime Environmental Emergencies provides support to Woodside through advice and access to equipment, people and liaison. The interface and responsibilities are described in the Oil Pollution Emergency Arrangements and the Nearshore Pipelines Oil Pollution First Strike Plan. In the event of a Level 2/3 spill, the role of Controlling Agency may be appointed to either DoT or the Pilbara Ports Authority (PPA), and will be determined by the Jurisdictional Authority (DoT) in consultation with the PPA. The Controlling Agency will be the agency deemed most capable of performing the role of Controlling Agency. The Controlling Agency will appoint an Incident Controller and form a separate Incident Management Team.

Testing of Hydrocarbon Spill Response Arrangements

Woodside's emergency response testing regime is aligned to existing or developing risks associated with Woodside's operations and activities. Woodside regularly tests hydrocarbon spill arrangement to:

- ensure relevant responders, contractors and key personnel practice their assigned roles and responsibilities in hydrocarbon spill response

- test response arrangements and actions to validate response plans
- ensure lessons learned are incorporated into Woodside processes and procedures and improvements made where required.

Testing methods may include audits, drills, field exercises, functional workshops, assurance reporting, assurance monitoring and review of key external dependencies.

APPENDIX A

Species identified by the EPBC Act Protected Matters Search Tool as potentially occurring within the Operational Area or EMBA

Species Name	Common Name	Threatened Status	Migratory Status	Operational Area	EMBA
Mammals					
Balaenoptera musculus	Blue whale	Endangered	Migratory	✓	✓
Megaptera novaeangliae	Humpback whale	Vulnerable	Migratory	✓	✓
Balaenoptera edeni	Bryde's whale	N/A	Migratory	✓	✓
Orcinus orca	Killer whale	N/A	Migratory	✓	✓
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	N/A	Migratory	✓	✓
Sousa chinensis	Indo-Pacific humpback dolphin	N/A	Migratory	✓	✓
Dugong dugon	Dugong	N/A	Migratory	✓	✓
Balaenoptera borealis	Sei whale	Vulnerable	Migratory	X	✓
Physeter macrocephalus	Sperm whale	N/A	Migratory	X	✓
Eubalaena australis	Southern right whale	Endangered	Migratory	X	✓
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	X	✓
Reptiles					
Caretta caretta	Loggerhead turtle	Endangered	Migratory	✓	✓
Chelonia mydas	Green turtle	Vulnerable	Migratory	✓	✓
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	✓	✓
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	✓	✓
Natator depressus	Flatback turtle	Vulnerable	Migratory	✓	✓
Aipysurus apraefrontalis	Short-nosed sea snake	Critically Endangered	N/A	✓	✓
Fishes and Elasmobranchs					
Carcharodon carcharias	Great white shark	Vulnerable	Migratory	✓	✓
Carcharias taurus	Grey nurse shark (west coast population)	Vulnerable	N/A	✓	✓
Rhincodon typus	Whale shark	Vulnerable	Migratory	✓	✓
Pristis zijsron	Green sawfish	Vulnerable	Migratory	✓	✓
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	✓	✓
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	✓	✓

Species Name	Common Name	Threatened Status	Migratory Status	Operational Area	EMBA
Manta birostris	Giant manta ray	N/A	Migratory	✓	✓
Manta alfredi	Reef manta ray	N/A	Migratory	✓	✓
Isurus oxyrinchus	Shortfin mako	N/A	Migratory	X	✓
Isurus paucus	Longfin mako	N/A	Migratory	X	✓
Birds					
Calidris canutus	Red knot, knot	Endangered	Migratory	✓	✓
Numenius madagascariensis	Eastern curlew, Far eastern curlew	Critically Endangered	Migratory	✓	✓
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory	✓	✓
Macronectes giganteus	Southern giant-petrel	Endangered	Migratory	✓	✓
Sternula nereis nereis	Australian fairy tern	Vulnerable	N/A	✓	✓
Limosa lapponica	Bar-tailed godwit	N/A	Migratory	✓	✓
Limosa lapponica baueri	Bar-tailed godwit (baueri)	Vulnerable	N/A	✓	✓
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	Critically Endangered	N/A	✓	✓
Rostratula australis	Australian painted snipe	Endangered	N/A	✓	✓
Anous stolidus	Common noddy	N/A	Migratory	✓	✓
Fregata ariel	Lesser frigatebird	N/A	Migratory	✓	✓
Actitis hypoleucos	Common sandpiper	N/A	Migratory	✓	✓
Calidris acuminata	Sharp-tailed sandpiper	N/A	Migratory	✓	✓
Calidris melanotos	Pectoral sandpiper	N/A	Migratory	✓	✓
Pandion haliaetus	Osprey	N/A	Migratory	✓	✓
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	✓	✓
Apus pacificus	Fork-tailed swift	N/A	Migratory	✓	✓
Ardenna pacifica	Wedge-tailed shearwater	N/A	Migratory	✓	✓
Hydroprogne caspia	Caspian tern	N/A	Migratory	✓	✓
Sterna dougallii	Roseate tern	N/A	Migratory	✓	✓
Charadrius veredus	Oriental plover	N/A	Migratory	✓	✓
Glareola maldivarum	Oriental pratincole	N/A	Migratory	✓	✓
Tringa nebularia	Common greenshank	N/A	Migratory	✓	✓
Fregata minor	Greater frigatebird	N/A	Migratory	X	✓
Onychoprion anaethetus	Bridled tern	N/A	Migratory	X	✓

Species Name	Common Name	Threatened Status	Migratory Status	Operational Area	EMBA
Thalasseus bergii	Crested tern	N/A	Migratory	X	✓