

# SCARBOROUGH SEABED INTERVENTION AND TRUNKLINE INSTALLATION

## CARNARVON BASIN, NORTH-WEST AUSTRALIA

Woodside is planning to undertake seabed intervention and Trunkline installation activities in Commonwealth waters for the proposed Scarborough development, in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

The activity involves installation of a carbon steel pipeline (Trunkline) that runs approximately 430 km from the proposed offshore Scarborough Floating Production Unit (FPU) to the existing onshore Pluto LNG facility. The scope of this Environment Plan (EP) covers seabed intervention and installation activities for the section of the Trunkline in Commonwealth waters from the State waters boundary to the Pipeline End Termination (PLET) in WA-61-L. A separate EP is

planned to address seabed intervention and Trunkline installation activities in State waters, for approval by the Western Australian Department of Mines, Industry Regulation and Safety.

Subject to relevant approvals and other constraints such as vessel availability and weather, seabed intervention activities are expected to start in mid 2023. Trunkline installation activities in Commonwealth waters are expected to commence in late 2023 following successful completion of the State waters installation scope. The Petroleum Activities Program is expected to take around 24 months to execute with activities occurring in multiple campaigns.

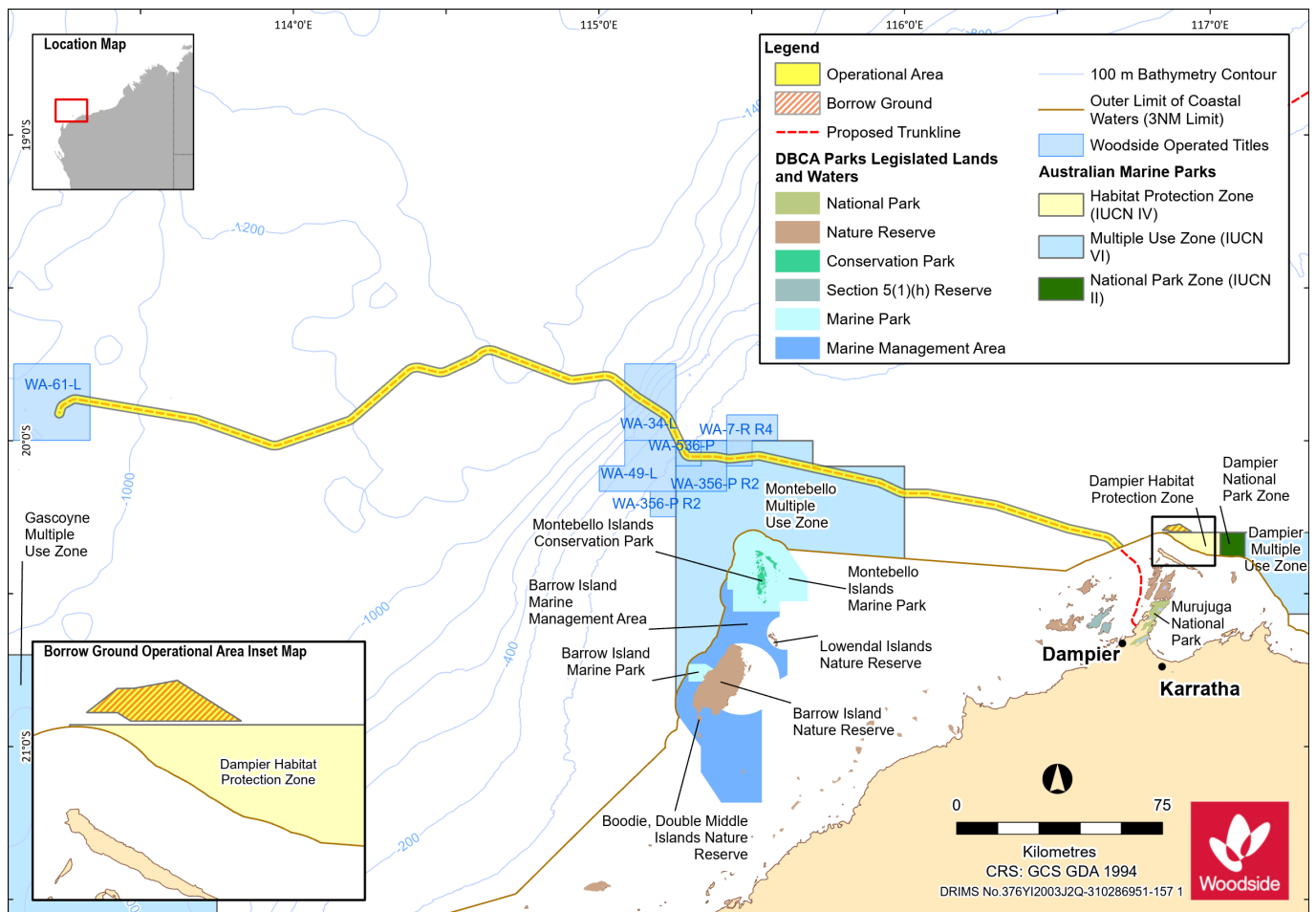


Figure 1. Proposed Scarborough Seabed Intervention and Trunkline Installation Operational Area.

## Proposed activity

**Table 1 – Activity summary and project vessels**

| Item   | Details   |
|--|---|
| <b>Location</b>  | <ul style="list-style-type: none"> <li>Carnarvon Basin, North-West Australia</li> </ul>   |
| <b>Water depth</b>   | <ul style="list-style-type: none"> <li>Approximately 32 m (Trunkline route at State waters boundary) to 1400 m (deepest point approximately 275 km along the Trunkline route)</li> </ul>  |
| <b>Earliest commencement date</b>                            | <ul style="list-style-type: none"> <li>Seabed intervention activities: mid 2023 pending approvals, vessel availability and weather constraints</li> <li>Trunkline installation activities: Q4 2023 pending successful completion of State waters installation scope, approvals, vessel availability and weather constraints</li> </ul>  |
| <b>Estimated duration</b>                                    | <ul style="list-style-type: none"> <li>Approximately 24 months across multiple campaigns</li> </ul>   |
| <b>Distance from Operational Area to nearest port/marina</b> | <ul style="list-style-type: none"> <li>Eastern end of the Trunkline route overlaps with the Pilbara Port Authority Dampier Port Limits</li> </ul>   |
| <b>Distance from Operational Area to nearest marine park</b> | <ul style="list-style-type: none"> <li>The trunkline corridor runs through the Montebello Marine Park – Multiple Use Zone (Cwlth), close to the northern boundary</li> <li>Offshore borrow ground located to the north of the Dampier Marine Park Habitat Protection Zone</li> </ul>  |
| <b>Seabed Intervention</b>                                   |   |
| <b>Key Vessels</b>   | <ul style="list-style-type: none"> <li>Trailing suction hopper dredge (TSHD)</li> <li>Offshore construction vessel (OCV)</li> <li>Rock Installation Vessel (RIV)</li> <li>Survey vessels</li> <li>Support vessels</li> <li>Fuel bunkering vessels</li> </ul>  |
| <b>Key Activities</b>  | <ul style="list-style-type: none"> <li>Surveys: <ul style="list-style-type: none"> <li>Geophysical (including hydrographic surveys)</li> <li>Geotechnical</li> <li>Prelay survey before pipelay (visual and multibeam echo sounder)</li> </ul> </li> <li>Trenching along the Trunkline route and material disposal at existing Spoil Ground 5A</li> <li>Borrow ground dredging and backfill along the trunkline</li> <li>Continental slope crossing seabed preparation</li> <li>Trunkline and infrastructure crossing supports installation, using rock and mattresses</li> <li>Trunkline pre and post lay span rectification</li> <li>Contingent seabed intervention activities including maintenance, dredging/excavation of resettled material in the trench prior to pipelay, post lay dredging, grout bags and rock placement</li> </ul>   |
| <b>Trunkline Installation</b>                                |   |
| <b>Key Vessels</b>   | <ul style="list-style-type: none"> <li>Pipelay Vessel (PV) multi-joint operation</li> <li>Shallow Water Lay Barge (SWLB)</li> <li>Anchor handling vessel/tug</li> <li>Pipe supply vessels</li> <li>Offshore construction vessel (OCV)</li> <li>Survey vessels</li> <li>Fuel bunkering vessels</li> </ul>  |
| <b>Key activities</b>  | <ul style="list-style-type: none"> <li>Surveys: <ul style="list-style-type: none"> <li>Pre-lay survey of the trunkline route prior to commencement of pipelay (visual and multibeam echo sounder)</li> <li>Post-lay as-built survey of the completed trunkline (visual and multibeam echo sounder)</li> </ul> </li> <li>Installation of the Trunkline by a SWLB in the shallow water section of the route where the DP pipelay vessel may not be able to access due to water depth restrictions</li> <li>Setting of SWLB anchors with anchor handling vessel/tug</li> <li>Installation of the Trunkline by the PV, including over other operator pipelines</li> <li>Installation of PLET and in-line tee assembly, hot tap tee assembly and ancillary structures as required through design by the PV</li> <li>Continuous delivery of pipe to the SWLB and PV by pipe supply vessels</li> <li>Installation of the foundations for the PLET structure by a construction vessel prior to the installation of the PLET</li> <li>Dry pre-commissioning of the trunkline by a construction vessel</li> <li>Contingent activities including wet buckle recovery and Flood, Clean, Gauge, Testing</li> </ul> |

## Proposed locations

The Operational Area includes the following Project Areas:

- **Scarborough Trunkline Project Area:** The proposed Trunkline from the Scarborough FPU (approximately 430 km north-west of the Burrup) to the State waters boundary and 1.5 km either side of the proposed Trunkline centreline to allow for the movement and positioning of vessels (includes Spoil Ground 5A which is included in the Trunkline operational area.).
- **Offshore Borrow Ground Project Area:** Offshore Borrow Ground (location where sand will be sourced to assist with Trunkline stabilisation).

Within Commonwealth waters, the Scarborough Trunkline will extend from the FPU towards the existing Pluto offshore platform and infrastructure, approximately 200 km offshore north-west of the Burrup. The Scarborough Trunkline will then deviate to the south to avoid the existing facilities and minimise environmental, technical and safety risks. From approximately 20 km south-east of the Pluto platform, the Trunkline will be routed alongside the Pluto Trunkline until it reaches Mermaid Sound.

Sand may be required to assist with stabilisation along a ~20 km section of the Scarborough Trunkline from the State waters boundary. This sand is proposed to be obtained from the Offshore Borrow Ground Project Area in Commonwealth waters, as shown in Figure 1. The Offshore Borrow Ground is approximately 17 km<sup>2</sup>, located 20 km to the east of the proposed Trunkline route and adjacent to the Dampier Marine Park. A minimum 250 m buffer will be in place from the Marine Park boundaries.

## Communications with mariners

Safety exclusion zones will apply around applicable seabed intervention and the Trunkline installation vessels. Marine notices will be issued prior to activity commencement to alert vessels which may be operating in waters nearby.

## Implications for stakeholders

Woodside will consult relevant stakeholders whose interests, functions, and activities may be affected by the proposed activities. We will also keep informed other stakeholders who have an identified interest in the planned activities. Woodside has undertaken an assessment to identify potential risks to the marine environment and relevant stakeholders, considering timing, duration, location and potential impacts arising from the construction and installation activities. This EP approval falls under the primary environmental approval of the Scarborough Offshore Project Proposal (OPP) and the activities will be conducted in line with relevant requirements of the OPP. A number of mitigation and management measures will be implemented and are summarised in Table 2. These measures will continue to be developed in conjunction with the EP, including impact assessments and controls to reduce impacts to an ALARP and acceptable level. Further details will be provided in the EP.

## About Scarborough

The Scarborough gas resource is located offshore, approximately 375 km west-northwest of the Burrup Peninsula and is part of the Greater Scarborough gas fields which are estimated to hold 13.0 Tcf (2C, 100%) of dry gas.

Woodside, as operator of the Scarborough Joint Venture, is proposing to develop the Scarborough gas resource through new offshore facilities connected by an approximately 430 km pipeline to a proposed expansion of the existing Pluto LNG onshore facility (Pluto Train 2).

For more information about the proposed Scarborough development, visit [woodside.com.au](http://woodside.com.au).

## Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where the Scarborough Seabed Intervention and Trunkline Installation Activity could potentially have an environmental consequence (direct or indirect impact). The broadest extent of the EMBA takes into consideration planned and unplanned activities, and for this Environment Plan (EP) is determined by a highly unlikely release of marine diesel to the environment as a result of vessel collision. This is depicted in Figure 2.

The EMBA does not represent the extent of predicted impact of the highly unlikely marine diesel release. Rather, the EMBA represents the merged area of many possible paths a highly unlikely hydrocarbon release could travel depending on the weather and ocean conditions at the time of the release.

This means in the highly unlikely event a hydrocarbon release does occur, the entire EMBA will not be affected and the specific and minimal part of the EMBA that is affected will only be known at the time of the release.

The three hydrocarbon spill modelling sites are representative of the range of locations where vessel collision could occur in the Operational Area and are summarised below. The EMBA has been defined using a combination of all three locations:

- **Outside Mermaid Sound (Location 1):** Near the State Waters Boundary, this site represents the closest location to shore activities that will occur under this EP.
- **Montebello Marine Park Multiple Use Zone (Location 2):** This location was chosen to represent worst-case potential impact potential to sensitive environmental receptors and is almost half-way along the trunkline length.
- **Scarborough Field (Location 3):** This location is representative of a spill in the deep-water open-ocean environment in permit area WA-61-L, close to the pipeline end termination (PLET) and activities at the most western end of the Operational Area.

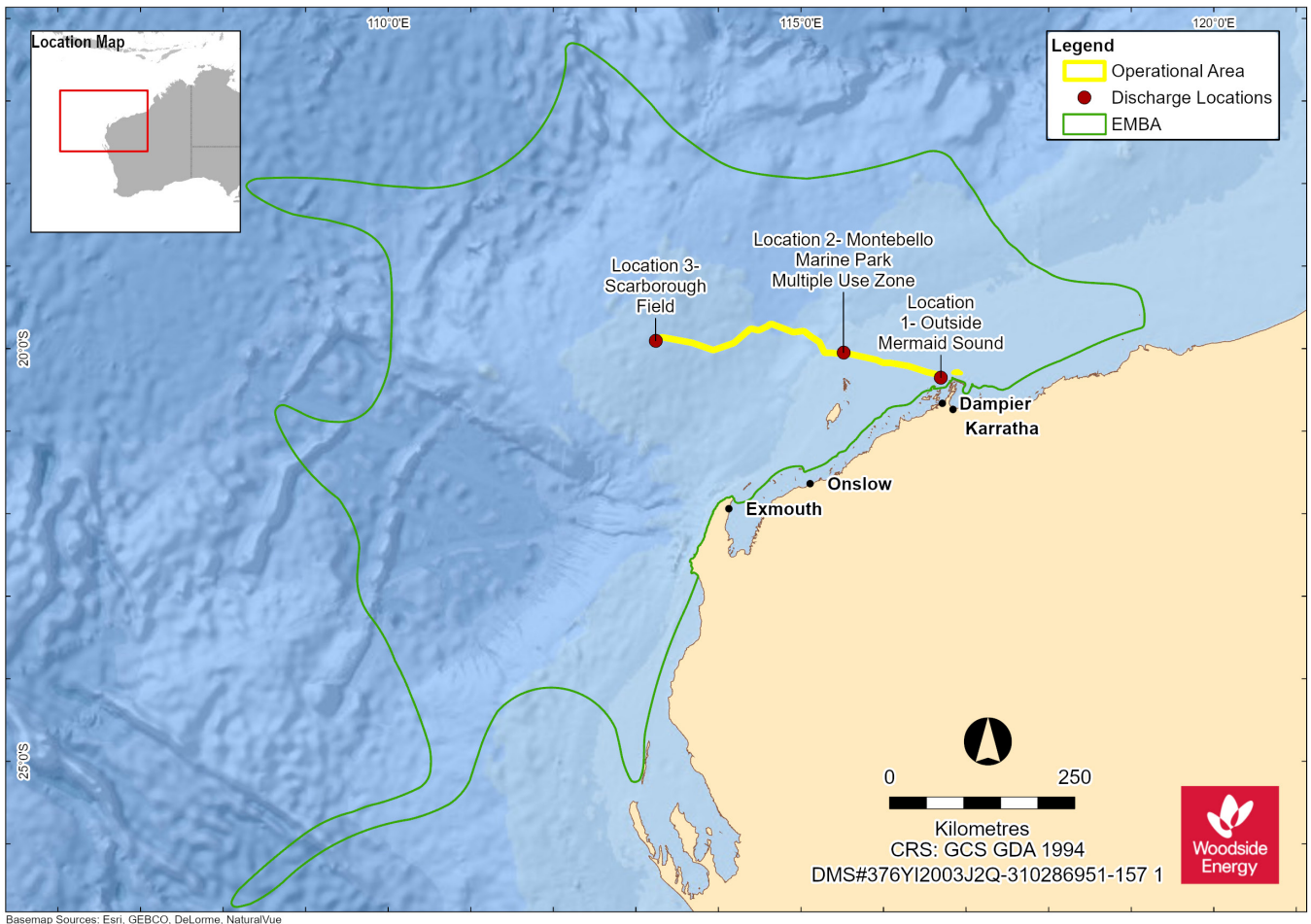


Figure 2. Environment that May Be Affected by the Scarborough Seabed Intervention and Trunkline Installation Activity

## Mitigation and management measures

Woodside has undertaken an assessment to identify potential impacts and risks to the environment arising from the Scarborough Seabed Intervention and Trunkline Installation Activity.

A number of mitigation and management measures for the Scarborough Seabed Intervention and Trunkline Installation Activity are outlined in **Table 2**.

**Table 2 - Summary of key risks and/or impacts and preliminary management measures for the Scarborough Seabed Intervention and Trunkline Installation Activity**

| Potential Impact/Risk   | Description of Source of Potential Impact/Risk   | Description of Potential Impact/Risk   | Preliminary Mitigation and/or Management Measures <sup>1</sup>  |
|---|--|--|---|
| <b>Planned</b>  |  |  |   |
| <b>Physical presence and interactions with other marine users</b> | <ul style="list-style-type: none"> <li>Several vessel types will be required to complete the activity, including a Trailing Suction Hopper Dredge (TSHD), Rock Installation Vessel (RIV), Pipelay Vessel (PV), Offshore Construction Vessel (OSV) and other support and survey vessels. Vessels will not usually anchor within the Operational Area.</li> <li>The physical presence and movement of project vessels within the Operational Area has the potential to displace other marine users.</li> <li>Vessels will typically be moving continually. PV will move at a rate of around 3 km per day.</li> <li>Helicopters will be used to transport personnel. Transport will occur on a regular basis, potentially with multiple flights per day for larger vessels such as the PV, and up to six days a week.</li> <li>The activity may not be executed as a single campaign or in a consecutive sequence.</li> </ul> | <ul style="list-style-type: none"> <li>Fishing vessels will not be excluded from the entire Operational Area for the total duration of the Scarborough Seabed Intervention and Trunkline Installation Activity. Displacement of fishing activities will be temporary and have no lasting effect.</li> <li>Impact to commercial shipping is limited to the temporary presence of activity vessels. Several Australian Maritime Safety Authority (AMSA) marine fairways intersect with the Operational Area. The presence of vessels and exclusion zones around them, will be limited to specific areas of the Operational Area at any one time, therefore resulting in a minor interference and localised displacement/avoidance by shipping.</li> <li>Potential impacts to tourism and recreational activities would likely be a minor interference (i.e. navigational hazard) and temporary, localised displacement/avoidance.</li> <li>Several oil and gas facilities are located in proximity to the Operational Area. Activities associated with the physical presence of vessels may result in localised, short-term interference to industry vessels requiring minor course alteration or readjustment in asset management.</li> </ul> | <ul style="list-style-type: none"> <li>Vessels adhere to regulatory requirements for navigational safety.</li> <li>Establish temporary 500 m exclusion zones around applicable vessels which are communicated to marine users.</li> <li>Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and upon completion of activities.</li> <li>Notify the Australian Hydrographic Service (AHS) prior to commencement of the activity to enable them to update maritime charts, so that marine users are aware of the activity.</li> <li>Consult with relevant persons so that they are informed of the proposed activities.</li> </ul> |

<sup>1</sup> This EP is currently under assessment - these mitigation and management measures are subject to change through the consultation and assessment process and may not represent content in the publicly available EP or in the final plan once accepted.

| Potential Impact/<br>Risk  | Description of<br>Source of Potential<br>Impact/Risk   | Description of Potential Impact/Risk  | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>  |
|--|--|---|--|
| <b>Physical presence – seabed disturbance (trenching, spoil disposal, borrow ground dredging and trunkline backfill)</b> | <ul style="list-style-type: none"> <li>To help stabilise the trunkline, seabed trenching and sand back-fill over the trunkline will occur no further than 50 km offshore.</li> <li>Spoil from trenching will be placed in an existing spoil ground, consistent with a Sea Dumping Permit (SD2019/3982).</li> <li>Sand for trunkline backfill will be sourced from an offshore borrow ground area with dredging and backfill activities being carried out by a TSHD.</li> </ul> | <ul style="list-style-type: none"> <li>Seabed disturbance has the potential to result in change in habitat, water quality and sediment quality, which may in turn affect fauna. Water quality change occurs when seabed sediments enter the water column (turbidity). Turbidity may occur during an activity which requires contact with, or occurs in proximity to, the seabed. After a period, the suspended sediments settle and the turbidity in the water column returns to pre-disturbance levels.</li> <li>The mobilisation of sediments along the trunkline during trenching and installation, and during borrow ground dredging activities may alter the seabed habitats over which the activities occur, resulting in community changes. Given the habitats likely to be present along the trunkline and within the borrow ground area, and the temporary nature of the elevations in turbidity, the potential impacts from seabed disturbance on epifauna and infauna is considered to be slight.</li> <li>Sediment dispersion modelling has indicated indirect impacts to coral habitat of the Dampier Archipelago are not predicted from seabed intervention activities in Commonwealth waters.</li> <li>Seabed disturbance is not expected to impact adversely on biologically important behaviours or biologically important habitat of marine turtles, including habitat critical to survival. Displacement of individuals from areas utilised as foraging habitat will not result in significant impacts at a population level.</li> <li>The project area has been subject to ethnographic surveys, which have found no cultural heritage values that will be affected by the development.</li> <li>Sediment dispersion modelling has indicated that detectable water quality changes are not predicted within the National Park Zone (II) of the Dampier Australian Marine Park (AMP).</li> </ul> | <ul style="list-style-type: none"> <li>Comply with Sea Dumping Permit so that dredged material isn't placed outside approved spoil ground and bathymetric survey of the disposal sites is undertaken as required.</li> <li>Implement the water quality monitoring program and Tiered Monitoring and Management Framework to manage water quality associated with Commonwealth dredging, spoil disposal and backfill activities to avoid reversible impacts to coral communities as the most sensitive receptor in Mermaid Sound and sponges in the offshore waters.</li> <li>Implement 250 m buffer zone between the offshore borrow ground and the Dampier Australian Marine Park (AMP).</li> <li>TSHD draghead will be positioned within approved footprints prior to and during trenching, borrow ground dredging and backfill activities.</li> <li>TSHD controls in place to minimise to sediment loss from the dredge.</li> </ul> |



| Potential Impact/<br>Risk   | Description of<br>Source of Potential<br>Impact/Risk  | Description of Potential Impact/Risk   | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>  |
|---|---|--|--|
| <b>Physical presence – seabed disturbance (Intervention and Trunkline Installation)</b> | <ul style="list-style-type: none"> <li>Seabed disturbance may result from:               <ul style="list-style-type: none"> <li>Trunkline and ancillary structure(s) installation,</li> <li>Pipeline and infrastructure crossings; and</li> <li>Other intervention works such as continental slope excavation, PLET and foundation installation and Remotely Operated Vehicle (ROV)/survey activities.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Seabed disturbance has the potential to result in change in habitat, water quality and sediment quality, which may in turn affect fauna. However, impacts from seabed disturbance will be highly localised and temporary in nature.</li> <li>The mobilisation of sediments along the trunkline during installation, and placement of infrastructure may alter the seabed habitats over which the activities occur, resulting in epifauna and infauna community changes. The potential impacts from seabed disturbance on epifauna and infauna is considered to be slight based on the localised footprint of disturbance and temporary nature of the elevations in turbidity.</li> <li>It is unlikely interesting turtles will occur in the Trunkline Project Area near the Montebello Islands, and seabed disturbance adjacent to the Dampier Archipelago is not expected to impact adversely on biologically important behaviours or biologically important habitat, including habitat critical to the survival of marine turtles.</li> <li>The project area has been subject to ethnographic surveys which have found no cultural heritage values will be affected by the development.</li> <li>Impacts from seabed disturbance within the Montebello Australian Marine Park (AMP) are considered to be minor and are not inconsistent with the objectives of the North-West Marine Parks Network Management Plan or the zoning of the Montebello AMP.</li> <li>Impacts to Key Ecological Features (KEFs) are considered to be minor as the disturbance will occur in a small proportion of each of the KEFs and avoids important or substantial areas of habitat, including hard substrates of the Ancient Coastline at 125 m Depth Contour KEF.</li> </ul> | <ul style="list-style-type: none"> <li>Infrastructure will be placed on the seabed within the predefined design footprint using positioning technology to limit seabed disturbance.</li> <li>Design for the continental slope crossing is engineered to minimise seabed excavation.</li> <li>Excavated material for the continental slope crossing will be placed in designated areas near the trench to limit seabed disturbance.</li> <li>If rock placement test dumps are required, they will be conducted within the indicative 30 m trunkline corridor to limit the seabed disturbance.</li> <li>No planned temporary placement of equipment on the seabed will occur within the Montebello AMP</li> <li>Additional analysis of seabed mapping data of the outer shelf area to identify archaeological values, and conduct significance, impact and mitigation assessments required for new values identified.</li> </ul> |

| Potential Impact/<br>Risk                                       | Description of<br>Source of Potential<br>Impact/Risk  | Description of Potential Impact/Risk  | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>  |
|---|---|---|--|
| <b>Light emissions</b>  | <ul style="list-style-type: none"> <li>Project vessels will use external lighting to navigate and conduct safe operations at night.</li> <li>Vessel lighting will also be used to communicate vessels' presence to other marine users (i.e. navigation/warning lights).</li> <li>The activity may not be executed as a single campaign or in a consecutive sequence, therefore light emissions may occur at any time during the period of the EP.</li> <li>Once the activities are completed, no permanent ongoing project lighting will occur in these locations.</li> </ul> | <ul style="list-style-type: none"> <li>Light emissions can affect fauna (such as marine turtles and birds) in two main ways:               <ol style="list-style-type: none"> <li>Behaviour: artificial lighting has the potential to create a constant level of light at night that can override natural levels and cycles.</li> <li>Orientation: if an artificial light source is brighter than a natural source, the artificial light may override natural cues, leading to disorientation.</li> </ol> </li> <li>Light emissions from project vessels are unlikely to result in more than localised, behavioural disturbance to isolated transient marine turtle individuals, with no lasting effect to the species.</li> <li>The distance between turtle nesting beaches and the Operational Area at the closest point (6.6 km to Legendre Island and &gt;10 km to closest nesting beach on Legendre Island and 14 km to Rosemary Island) are greater than the zone where behavioural impacts from vessel lighting are possible. Therefore, impacts to nesting female turtles, including discouraging females from nesting, or affecting nest site selection and sea-finding behaviour, are not predicted, and females are not expected to be displaced from nesting habitat.</li> <li>Potential impacts to seabirds and migratory shorebirds are expected to be localised within the vicinity of vessels. It is highly unlikely adult nocturnal seabird foraging will be disturbed given the localised light emissions from activity vessels. Direct lighting impacts to diurnal seabirds on the islands of the Dampier Archipelago are not expected based on the maximum extent of lighting emissions from the modelling and behaviour of diurnal seabirds as they roost on islands and mainland habitat from dusk to dawn.</li> <li>For activities occurring within the Montebello Marine Park, and adjacent to the Dampier Marine Park, the short-term and transient nature of activities associated with vessel light emissions will not be inconsistent with the objectives of the management plan for the North-West Marine Park Network.</li> </ul> | <ul style="list-style-type: none"> <li>Lighting will be limited to the minimum required for navigation and safety requirements except in emergency circumstances.</li> <li>Implement the Woodside Seabird Management Plan.</li> <li>Relevant crew will be trained in light reduction measures when operating within 20 km of Islands between December and April.</li> <li>Crew transfers which require direction of floodlights outside the vessel will preferentially occur during daylight hours, when vessels are within 20 km of islands between December and April.</li> </ul>  |
| <b>Atmospheric emissions and greenhouse gas (GHG) emissions</b> | <ul style="list-style-type: none"> <li>Atmospheric Emissions and Greenhouse Gas (GHG) Emissions</li> </ul>  | <ul style="list-style-type: none"> <li>Emissions from project vessels could result in temporary, localised reductions in air quality in the immediate vicinity of the vessels.</li> <li>Although the Offshore Borrow Ground Project Area and part of the Trunkline Project Area are located closer to the shore, they remain in open ocean and well-removed from nearest residential or sensitive populations of the Western Australian coast. Given the short duration and exposed location of project vessels, low volumes of atmospheric emissions will be dispersed rapidly, therefore biodiversity, ecological integrity, social amenities and human health will not be impacted.</li> <li>Given the nature and scale of GHG emissions from vessel fuel usage for this activity, the potential GHG impact and risk from this activity is considered negligible.</li> </ul>   | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for marine air pollution and GHG emissions reporting.</li> <li>Vessel operations planned, where practicable, to minimise fuel consumption and associated GHG/air emissions.</li> <li>Fuel types will be selected to reduce expected GHG emissions. Project vessels will not use heavy fuel oil (HFO) or intermediate fuel oil (IFO)</li> <li>Contractors engaged on energy/GHG emissions efficiencies and opportunities identified and implemented where reasonably practicable.</li> <li>Track and review GHG emissions during the activity with the objective to identify further opportunities to improve efficiencies.</li> </ul> |



| Potential Impact/<br>Risk         | Description of<br>Source of Potential<br>Impact/Risk   | Description of Potential Impact/Risk  | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>   |
|-----------------------------------|--|---|---|
| <b>Routine acoustic emissions</b> | <ul style="list-style-type: none"> <li>Project vessels will generate noise in the air and underwater due to the operation of thruster engines, propellers, and on-board machinery etc.</li> <li>Underwater noise may also be generated by geophysical sources during surveys, positioning equipment (transponders), Dynamic Positioning (DP) systems on vessels, and helicopters.</li> </ul> | <ul style="list-style-type: none"> <li>Elevated underwater noise can affect marine fauna, including marine mammals, turtles and fish in three main ways: <ol style="list-style-type: none"> <li>By causing direct physical effects, including injury or hearing impairment. Hearing impairment may be temporary or permanent.</li> <li>Through disturbance leading to behavioural changes or displacement from important areas. The occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation.</li> <li>By masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey).</li> </ol> </li> <li>It is not credible that permanent and temporary thresholds would be exceeded for pygmy blue whales transiting through the Operational Area during migration seasons.</li> <li>Vessel related activities occurring within the migration Biologically Important Areas (BIAs) during migration seasons for pygmy blue whales and humpback whales, may result in a behavioral response from individuals or groups of whales transiting in proximity to vessels.</li> <li>Marine turtles within the Operational Area are expected to be transient and unlikely to remain within 150 m of the vessels for 24-hours, and therefore permanent and temporary thresholds are not expected to be reached. Behavioural impacts to marine turtles from continuous noise sources are expected to be short-term and localised.</li> <li>Potential impacts from acoustic emissions on fish, sharks and rays are likely to be restricted to localised and temporary avoidance behaviour, and individuals impacted are unlikely to represent a significant proportion of the population within the Operational Area and the region overall.</li> </ul> | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for interactions with marine megafauna to prevent adverse interactions.</li> <li>The use of trained vessel crew to carry out observations for marine megafauna on relevant primary installation vessels.</li> <li>Limit the number of pipe supply vessels using DP alongside the pipelay vessel during certain times of the year and at certain locations, based on the likelihood of pygmy blue whale encounter.</li> <li>Manage vessel speed in the humpback whale and pygmy blue whale BIAs during migratory seasons within the Operational Area to minimise vessel noise.</li> <li>Periodic inspection and/or maintenance to ensure optimal performance to minimise extraneous noise emissions of critical equipment onboard relevant primary installation vessels.</li> </ul> |

| Potential Impact/<br>Risk   | Description of<br>Source of Potential<br>Impact/Risk  | Description of Potential Impact/Risk   | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>   |
|---|---|--|---|
| <b>Routine and non-routine discharges - project vessels and seabed intervention</b> | <ul style="list-style-type: none"> <li>Sewage, greywater and macerated food waste will be discharged from project vessels.</li> <li>Bilge water, deck drainage and brine and cooling water may also be discharged.</li> <li>Cement and grout from seabed intervention activities may be discharged.</li> </ul>  | <ul style="list-style-type: none"> <li>The main impact associated with ocean disposal of sewage and other organic wastes (i.e. putrescible waste) is eutrophication. Eutrophication occurs when the addition of nutrients, such as nitrates and phosphates, causes adverse changes to the ecosystem including short-term, localised impacts to water quality.</li> <li>Impacts on water quality will have no lasting effect due to the transient nature of vessels, high level of dilution with little continuous discharge in a stationary location.</li> <li>Cement discharges can result in turbidity in the water column. Reduction in water quality will be temporary (limited to the cement operational discharges) and due to small volumes are likely to be subject to rapid dispersion and dilution by prevailing currents.</li> <li>It is possible marine fauna transiting the localised area may come in contact with vessel discharges. While the likely presence of marine fauna varies at different times of the year depending on migration, foraging and breeding patterns in the region, the potential for impact remains low due to the localised nature of discharges and rapid dilution.</li> <li>Planktonic productivity in the North-West Marine Region is low. No significant impacts from the planned routine discharges are expected because of the minor quantities involved, the expected localised mixing zone, and high level of dilution into the open water marine environment. Impacts to plankton from greywater, sewerage or brine and cooling water discharges are not expected.</li> </ul> | <ul style="list-style-type: none"> <li>Marine discharges will be managed according to regulatory requirements.</li> <li>Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process.</li> <li>Project vessels (excluding PV) operating in the Montebello Marine Park will avoid making vessel discharges of sewage, greywater and food waste, until outside the Montebello Marine Park Multiple Use Zone, unless vessel safety is compromised.</li> </ul>   |
| <b>Unplanned</b>  |   |  |   |
| <b>Unplanned hydrocarbon release – vessel collision</b>                             | <ul style="list-style-type: none"> <li>Project vessels will use marine diesel fuel, meaning a vessel collision involving a project vessel or third-party during the activity may result in the release of marine diesel.</li> <li>For a collision to result in the worst-case scenario diesel release, several factors must occur as follows: <ul style="list-style-type: none"> <li>Identified causes of vessel interaction must result in a collision.</li> <li>The collision has enough force to penetrate the vessel hull and in the exact location of the fuel tank.</li> <li>The fuel tank must be full or at least of volume which is higher than the point of penetration.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Marine diesel is a relatively volatile, non-persistent nature hydrocarbon with up to 35% evaporating within the first 24 hours.</li> <li>Potential impacts across the EMBA were assessed including receptors such as plankton, mangroves, seabirds and migratory shorebirds, saltmarshes, coral, tourism, recreation and cultural heritage (for example).</li> <li>Taking into account receptor sensitivity, the highest consequence rating for this unplanned event was ‘Major’ for potential change in coral habitat. Other receptors were rated as having a potential consequence level of ‘Minor’ or less (Slight or Negligible).</li> </ul>  | <p><b>Preventing vessel collision:</b></p> <ul style="list-style-type: none"> <li>Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements.</li> <li>Consult with relevant persons so that other marine users are informed and aware, reducing the likelihood of a collision.</li> <li>Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and on completion of activities.</li> <li>Notify the Australian Hydrographic Service (AHS) prior to commencement of the activity to enable them to update maritime charts, so that marine users are aware of the activity.</li> <li>Establish temporary exclusion zones around vessels which are communicated to marine users to reduce the likelihood of collision.</li> <li>Develop a management plan for simultaneous operations when working in vicinity of other Woodside operations/ activities.</li> </ul> <p><b>Spill response arrangements:</b></p> <ul style="list-style-type: none"> <li>Develop a project specific Oil Pollution Emergency Preparation document (OPEP) including first strike response plan.</li> <li>Arrangements supporting the Oil Pollution Emergency Preparation document (OPEP) will be tested to ensure the OPEP can be implemented as planned.</li> <li>Emergency response activities would be implemented in line with the OPEP.</li> </ul> |

| Potential Impact/<br>Risk  | Description of<br>Source of Potential<br>Impact/Risk  | Description of Potential Impact/Risk  | Preliminary Mitigation and/or<br>Management Measures <sup>1</sup>  |
|--|---|---|--|
| <b>Unplanned hydrocarbon release - bunkering</b>                                   | <ul style="list-style-type: none"> <li>Accidental loss of hydrocarbons to the marine environment during bunkering/refueling may occur, caused by partial or total failure of a bulk transfer hose, or fittings due to operational stress, or other integrity issues.</li> </ul> | <ul style="list-style-type: none"> <li>The marine diesel surface release is expected to be confined to within several kilometers of the release site, and well within the EMBA identified for the vessel collision scenario.</li> <li>An unplanned marine diesel release has the potential to result in changes in water quality and fauna behaviour. Receptors considered in the risk assessment for this unplanned event included marine mammals, marine reptiles, fish, sharks, and rays. Receptors were rated as having a potential consequence level of slight or negligible due to the low spill volume and characteristics of the fuel oil which is largely non-persistent.</li> </ul> | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements.</li> <li>Appropriate bunkering equipment kept and maintained. Comply with contractor procedures for management of bunkering/refueling operations to reduce the likelihood of a spill occurring.</li> <li>Preference for PV to avoid refueling in the Montebello Marine Park Multiple Use Zone. No other project vessels to be refueled in this zone.</li> </ul> <p><b>Spill response arrangements:</b></p> <ul style="list-style-type: none"> <li>Maintain and locate spill kits in proximity to hydrocarbon storage and deck areas for use to contain and recover deck spills.</li> </ul> <p>Arrangements supporting the Oil Pollution Emergency Preparation document (OPEP) will be tested so that the OPEP can be implemented as planned.</p> <ul style="list-style-type: none"> <li>Emergency response activities would be implemented in line with the OPEP.</li> </ul> |
| <b>Unplanned discharge – deck and subsea spills</b>                                | <ul style="list-style-type: none"> <li>Accidental discharge of hydrocarbons/chemicals from project vessels' deck activities and equipment, and from subsea ROV hydraulic leaks.</li> </ul>  | <ul style="list-style-type: none"> <li>Unplanned discharges of non-process chemicals and hydrocarbons may decrease the water quality in the immediate vicinity of the release. Only small volumes (&lt;50 L) are anticipated, resulting in very short-term impacts to water quality, and limited to the immediate release location.</li> <li>As a result of a change in water quality, further impacts to receptors may occur, however impacts to marine fauna are expected to be limited to temporary irritation of sensitive membranes to individuals and are considered negligible.</li> </ul>   | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for the prevention of marine pollution.</li> <li>Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.</li> <li>Spill kits positioned in high-risk locations around the vessel (near potential spill points such as transfer stations).</li> <li>Implement waste management procedures which provide for safe handling and transportation, segregation and storage and appropriate classification of all waste generated.</li> <li>Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process.</li> </ul>  |
| <b>Unplanned discharge of solid hazardous, non-hazardous solid waste/equipment</b> | <ul style="list-style-type: none"> <li>Accidental, unplanned loss of hazardous or non-hazardous solid wastes/equipment to the marine environment may occur if dropped or blown overboard.</li> </ul>  | <ul style="list-style-type: none"> <li>The potential impacts of hazardous or non-hazardous solid wastes and equipment accidentally discharged to the marine environment include contamination of the environment as well as secondary impacts relating to potential contact of marine fauna with wastes. The temporary or permanent loss of waste materials/equipment into the marine environment is not likely to have a significant environmental impact, based on the location of the Operational Area, the types, size and frequency of wastes that could occur, and species present.</li> </ul>  | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for the prevention of marine pollution and handling of hazardous wastes.</li> <li>Implement waste management procedures to enable the safe handling and transportation, segregation and storage and appropriate classification of waste generated.</li> <li>Solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so.</li> </ul>   |

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| <b>Unplanned seabed disturbance</b>            | <ul style="list-style-type: none"> <li>Unplanned disturbance to seabed may occur if the activities in the Operational Area are carried out outside of the design footprint i.e. trenching, spoil disposal and backfill activities outside designated areas or dredging outside of the Offshore Borrow Ground Project Area.</li> <li>Dropped objects may also result in unplanned disturbance of benthic habitat contingent activities such as trunkline abandonment and temporary mooring could also result in unplanned seabed disturbance.</li> </ul>   | <ul style="list-style-type: none"> <li>Unplanned seabed disturbance may result in localised changes to water and sediment quality or a localised temporary impact to benthic communities.</li> <li>Potential impacts to KEFs which intersect the Operational Area of the activity are limited to the footprint of a dropped object, resulting in potential highly localised and temporary change in habitat.</li> <li>The offshore borrow ground dredging will occur adjacent to the Dampier Marine Park. A planned 250 m buffer is in place. Should dredging occur outside the designated areas, it is not anticipated to be at a significant distance and impacts will remain within this buffer zone (i.e. seabed disturbance will not be within the Dampier Marine Park).</li> </ul>   | <ul style="list-style-type: none"> <li>Comply with the Sea Dumping Permit, including disposing of dredged material in the designated disposal site.</li> <li>Designated 'No dredge' out of zone alarms will be installed and used on the dredging vessel navigation system.</li> <li>Implement 250 m buffer zone between the offshore borrow ground and the Dampier AMP.</li> <li>Infrastructure placed on the seabed within the predefined design footprint using positioning technology to limit seabed disturbance. The trunkline touchdown point monitored during operations so that the trunkline is installed correctly.</li> <li>All lifts, bulk transfers and cargo loading conducted in accordance with applicable vessels' work procedures to limit potential for dropped objects, with dropped object prevention awareness provided to vessel crew.</li> <li>Different rigging designs assessed to reduce likelihood of dropped pipe from issues such as sling slippage and will consider the use of spreader bars.</li> <li>Lifting activities between vessels to be carried out in accordance with requirements of third-party crossing agreement/permitting.</li> <li>Objects dropped to the marine environment to be recovered, where safe and practicable to do so.</li> </ul>  |
| <b>Unplanned interaction with marine fauna</b> | <ul style="list-style-type: none"> <li>Vessel movements have the potential to result in collisions between the vessel (hull and propellers) and marine fauna.</li> <li>The factors contributing to the frequency and severity of impacts due to collisions vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth) and the type of animal potentially present and their behaviours. This activity presents an unlikely risk of accidental entrainment of marine fauna from pre-lay trenching and dredging in offshore borrow ground area, and accidental smothering/burial of marine fauna from spoil disposal and backfill.</li> </ul> | <ul style="list-style-type: none"> <li>The risk of vessel collision with marine mammals is present year-round but is elevated seasonally for species such as humpback whales and pygmy blue whales during migration periods and within migration BIAs. Whilst a portion of the Operational Area overlaps the humpback whale migration BIA in the NWMR, this overlap represents a very small proportion of the overall area of the BIA (0.22%). Given this limited spatial overlap with the humpback whale migration BIA, the short duration of activities within the Operational Area, and the slow speeds at which project vessels operate (required to be 10 kn or less), collisions with humpback whales are considered highly unlikely.</li> <li>It is expected marine turtles will respond to vessel presence by avoiding the immediate vicinity of the vessels, and combined with low vessel speed, this will reduce the likelihood of a vessel-turtle collision or entrainment during dredging activities. In addition, activities within sensitive turtle areas (BIAs and critical habitat) will be conducted over a period of months, further reducing the potential for impact at the individual and population level.</li> <li>It is expected whale shark presence within the Operational Area would not comprise significant numbers and their presence would be transitory and of short duration. Given the short duration of activities within the Operational Area and the slow speeds at which project vessels operate, vessel collisions with whale sharks are considered highly unlikely.</li> </ul> | <ul style="list-style-type: none"> <li>Comply with regulatory requirements for interactions with marine megafauna.</li> <li>Comply with Sea Dumping Permit to reduce the likelihood of interaction with marine megafauna during spoil disposal.</li> <li>Installation of turtle deflection chains in front of the dredge vessel drag head to reduce likelihood of entrainment.</li> <li>Use of trained vessel crew as Marine Fauna Observers on relevant vessels while operating in the pygmy blue whale migration BIA during migration periods.</li> <li>Management of vessel speed in the humpback and pygmy blue whale BIAs in migration seasons within the Operational Area (excluding Pilbara Port).</li> <li>During daylight hours, trained vessel crew onboard the dredge will visually assess marine megafauna and specified observation and exclusion zones will be adhered to during dredging and spoil disposal.</li> <li>Project vessels will not travel greater than 6 kn within 100 m of a turtle (observation zone) and not approach closer than 50 m. If a turtle shows signs of disruption, project vessels will immediately withdraw from the observation zone at a constant speed of less than 6 kn.</li> <li>At completion of dredge run (i.e. fill of hopper), stop dredge pumps as soon as practicable after the dredge drag head is lifted from the seafloor to reduce the likelihood of impact to turtles.</li> </ul> |

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|---|--|---|---|
| <b>Accidental Introduction of invasive marine species (IMS)</b> | <ul style="list-style-type: none"> <li>Vessels for the activity may be transiting to and from the Operational Area from local ports (i.e. Dampier), or from interstate or international waters.</li> <li>IMS could be present as biofouling on the vessel hull or on immersible equipment and could be translocated to the Operational Area and transferred directly to the seafloor or subsea structures where they could establish.</li> <li>Organisms can also be drawn into ballast tanks during onboarding of ballast water as cargo is loaded or to balance vessels under load.</li> </ul> | <ul style="list-style-type: none"> <li>The deeper offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS.</li> <li>The Trunkline Project Area and Offshore Borrow Ground Project Area in shallower waters (30 – 40 m) present a slightly increased risk of IMS establishment, however, IMS require hard substrate/features on the seabed to attach to, none of which is present within the Operational Area. Therefore, the risk of establishment, whilst credible, is remote.</li> <li>Given the low likelihood of IMS translocation to and colonisation within the Operational Area, project activities are unlikely to result in establishment of IMS, and as such will not adversely affect other marine user activities in the region.</li> </ul> | <ul style="list-style-type: none"> <li>Ballast water and biofouling will be managed according to regulatory requirements, including the Australian Ballast Water Management Requirements, and the Australian Biofouling Management Requirements, as applicable.</li> <li>Woodside's IMS risk assessment process will be applied to project vessels and immersible equipment entering the Operational Area.</li> </ul> |

## Feedback

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before **17 February 2023** via:

**E: [Feedback@woodside.com.au](mailto:Feedback@woodside.com.au)**  
**Toll free: 1800 442 977**

You can subscribe on our website to receive Consultation Information Sheets for proposed activities: **[www.woodside.com/sustainability/consultation-activities](http://www.woodside.com/sustainability/consultation-activities)**.

Please note that stakeholder feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) as required under legislation. Woodside will communicate any material changes to the proposed activity to affected stakeholders as they arise.

Please note that your feedback and our response will be included in our Environment Plan for the proposed activity, which will be submitted to NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)*.

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.