



Report and recommendations of the Environmental Protection Authority



Scarborough Project – Nearshore Component

Woodside Energy Ltd

Report 1664

January 2020

Environmental impact assessment process timelines

Date	Progress stages	Time (weeks)
06/02/2019	EPA decides to assess – level of assessment set	
07/02/2019	EPA issues notice for additional information (draft Dredging and Spoil Disposal Management Plan)	1 day
07/06/2019	EPA receives additional information for assessment (draft Dredging and Spoil Disposal Management Plan)	17
12/08/2019	Public review period for additional information commences	9
09/09/2019	Public review period for additional information closed	4
02/12/2019	EPA accepted Proponent Response to Submissions	4
12/12/2019	EPA board considered assessment	1
24/12/2019	EPA provided report to the Minister for Environment	2
06/01/2020	EPA report published	2
20/01/2020	Close of appeals period	2

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the Environmental Protection Authority met its timeline objective to complete its assessment and provide a report to the Minister.



Dr Tom Hatton
Chairman

23 December 2019

ISSN 1836-0483 (Print)
ISSN 1836-0491 (Online)
Assessment No. 2194

Summary

The Scarborough Project – Nearshore Component (the proposal) was referred to the Environmental Protection Authority (EPA) by Woodside Energy Ltd (the proponent) in December 2018.

The proposal involves the installation of a 32.7 kilometre trunkline, running from the State water boundary to Kilometre Point 0, which is located approximately 1.5 metres above the highest astronomical tide adjacent to the existing Pluto Liquefied Natural Gas facility, together with associated activities required to construct the trunkline.

The EPA assessed the proposal at the level of Referral Information with additional assessment information (public review required) and has concluded that the proposal may be implemented subject to conditions.

In this assessment, the EPA examined potential impacts on the key environmental factors of Benthic Communities and Habitats, Marine Environmental Quality, Marine Fauna and Social Surroundings.

The EPA has recommended conditions (Appendix 4) including finalisation and submission of a Dredging and Spoil Disposal Management Plan and a Cultural Heritage Management Plan, in consultation with the Murujuga Aboriginal Corporation.

Contents

	Page
1. Introduction	1
1.1 EPA procedures.....	1
2. The proposal	2
2.1 Proposal summary	2
2.2 Changes to the proposal during assessment.....	8
2.3 Context	8
3. Consultation	9
4. Key environmental factors	10
4.1 Benthic Communities and Habitats.....	12
4.2 Marine Environmental Quality.....	19
4.3 Marine Fauna.....	25
4.4 Social Surroundings.....	30
5. Conclusion	35
6. Recommendations	36
References.....	37
Appendix 1: List of submitters.....	39
Appendix 2: Consideration of principles	40
Appendix 3: Evaluation of other environmental factors	43
Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions.....	47

Tables

Table 1: Summary of the proposal 3
 Table 2: Location and proposed extent of physical and operational elements 3

Figures

Figure 1: Regional location..... 6
 Figure 2: Development envelope of the shore crossing site..... 7
 Figure 3: Significant benthic communities and their distribution in the Dampier Archipelago 13
 Figure 4: Levels of Ecological Protection Mermaid Sound 21
 Figure 5: Native title claim and heritage site..... 33

1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the proposal by Woodside Energy Ltd. The proposal is to develop the Scarborough Project – Nearshore Component, which includes the installation of a trunkline about 32.7 kilometres (km) long within State waters.

The EPA has prepared this report in accordance with section (s.) 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified during the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 13 December 2018. On 6 February 2019 the EPA decided to assess the proposal and set the level of assessment as Referral Information with additional assessment information (public review required). The additional assessment information was released for public review from 12 August 2019 to 9 September 2019.

1.1 EPA procedures

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* (EPA 2016a) and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016* (EPA 2016b).

2. The proposal

2.1 Proposal summary

The proponent, Woodside Energy Ltd, proposes to develop the Scarborough Project – Nearshore Component (the proposal), which is located 8 km north east of Dampier in the Pilbara region (Figure 1).

The proposal involves the installation of a 32.7 km long section trunkline running from the State water boundary to Kilometre Point 0 (KP0)¹, which is located approximately 1.5 metres (m) above the Highest Astronomical Tide (HAT) adjacent to the Pluto Liquefied Natural Gas (LNG) facility, together with associated construction activities as shown in Figure 2.

The proposal is the State waters component of the 434 km long pipeline for the Scarborough Gas Field Project, which was referred to the Commonwealth Government and the decision was deemed not a controlled action (EPBC 2018/8362). This 434 km pipeline links the Scarborough Gas Field Project to the previously approved Pluto LNG Facility on the Burrup Peninsula. Neither the Commonwealth component of the Scarborough Gas Field Project nor the Pluto LNG Facility (which is approved under Ministerial Statement 757) are the subject of this assessment.

The proposed development of the Scarborough Project – Nearshore Component includes the following activities:

- shore crossing site preparation and reinstatement, including installation of temporary facilities along the shoreline at the Pluto LNG Facility to facilitate the installation of the trunkline in shallower depths
- preparation works associated with the installation of the trunkline including dredging and associated spoil disposal at existing spoil grounds (AB and 2B)
- trunkline installation (32.7 kms within State waters)
- shore crossing site reinstatement
- rock supply and dumping/sand supply and backfilling of the trench with sand and/or rock to protect the trunkline
- pre-commissioning testing
- commissioning and operation
- decommissioning.

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in section 2.3.1 of the Referral Supplementary Report (Woodside Energy 2018).

¹ Kilometre Point (KP) is the reference system used to identify and refer to different points along the pipeline. KP0 represents the start of the pipeline.

Table 1: Summary of the proposal

Proposal title	Scarborough Project – Nearshore Component
Short description	<p>Woodside is proposing to develop the Scarborough gas field, with a target of achieving first gas production between 2023 and 2025. The Scarborough Project concept comprises subsea wells, a semi-submersible gas processing and compression floating production unit in offshore Commonwealth waters and export trunkline 434 kilometres long running to the Pluto LNG Facility on the Burrup Peninsula.</p> <p>The nearshore component subject of this referral includes the installation of the section of the trunkline running from the State waters boundary up to KP0 (approximately 1.5 m above HAT) (~32.7 kilometres long) and associated activities.</p>

Table 2: Location and proposed extent of physical and operational elements

Element	Location	Proposed extent
<i>Physical elements</i>		
Trunkline and trench	Figure 1 and 2	<p>A 32 inch carbon steel trunkline 32.7 kilometres long installed in a trench around 2–4.3 metres deep and approximately 30 m wide resulting in an indicative disturbance footprint of 1 km² for the trunkline and trench as shown in Figure 2. The trench would be backfilled with sand and/or rock material for stabilisation purposes along the trunkline as required.</p> <p>Concrete blocks backfilled with trenching material may also be required to provide reaction forces. These would be laid within the trench footprint and retained in place to maintain the reaction forces once the pipe is laid. The trench backfilling operations will cover these blocks on completion of the construction works.</p> <p>Anchoring will be required for the nearshore pipelay barge and other construction vessel activities. Piles may also be required due to the proximity to the Pluto trunkline which may prevent the use of anchors for the pipelay activities. It’s estimated that anchor spreads may be required within a distance of 750 m from the trunkline centreline resulting in a development envelope of 50 km² to include construction and dredging vessel anchoring associated with the trunkline installation and stabilisation activities.</p>

Element	Location	Proposed extent
Temporary infrastructure and laydown areas for the shore crossing	Figure 1 and 2	<p>A temporary groyne around 100 metres long would be constructed on the shoreline between the pre-excavated trench and the Pluto jetty to allow excavating equipment to access and excavate the rock berm currently covering the trench. A suitable storage location will be required for the excavated rock assuming that this rock will be used to reinstate the shore crossing rock berm following trunkline installation.</p> <p>Up to 0.03 km² would be required at the shore crossing location for temporary offices, cranes and other equipment for the shore pull of the trunkline.</p>
Spoil ground for disposal of dredged sediments	Figure 1 and 2	<p>Spoil from the trunkline dredging operations will be placed in a combination of the spoil grounds listed below. The final spoil ground locations are subject to further engineering design and consultation with relevant stakeholders. The existing Spoil Ground locations are identified in Figure 1 and are not included in the development envelope area.</p> <p>Spoil Ground A/B (restricted to backhoe works) and 2B located in State Waters.</p> <p>Spoil Ground 5A located in Commonwealth Waters¹.</p>
Rock/sediment source for backfilling	Figure 1 and 2	<p>Sand and Rock materials may be required to assist with trunkline stabilisation.</p> <p>Sand is proposed to be obtained from borrow ground locations located in either State or Commonwealth waters.</p> <p>Rocks would be obtained from domestic or international sources.</p>
<i>Operational elements</i>		
Dredging and disposal of material during the trenching	Figure 1 and 2	<p>Dredging of maximum 2,781,700 m³ during the trenching for the trunkline, of which a maximum of 1,612,600 m³ will be in State Waters² and within the development envelope described in Figure 2. Dredge spoil would be disposed of at Spoil Ground A/B, 2B and/or 5A. The volumes would be confirmed during detailed engineering design.</p>
Rock/sediment placement	Figure 1 and 2	<p>Sediment from the borrow ground and rock material would be required. The volumes would be confirmed during detailed engineering design.</p>
Pre-commissioning testing of trunkline	No figure	<p>Wet and/or dry pre-commissioning testing would need to be undertaken prior to trunkline operations. Total discharge volume for a wet pre-commissioning would be maximum 225,189, m³ based on length</p>

Element	Location	Proposed extent
		(434 km) and trunkline internal diameter (32 inch). Bulk discharge of the hydrotesting water is likely to be undertaken in Commonwealth Waters. The nearshore component of the pipeline may be tested separately to provide pipeline stability prior to back fill/rock dumping activities or if a performance test of the nearshore component of the pipeline is required prior to back fill/rock dumping operations.

¹ Provided for information only but not assessed as part of this referral (refer to section 1.1.2)

² All trenching volumes are based on 'in-situ' measurement (i.e confirmed by hydrographic survey techniques)



Figure 1: Regional location



Figure 2: Development envelope of the shore crossing site

2.2 Changes to the proposal during assessment

The proponent requested the EPA consent to a change to the proposal during assessment on 11 December 2019. The change was that the activities required in these areas (temporary infrastructure and laydown areas at the shore crossing, and nearshore anchoring and placement of backhoe dredging spuds for stabilisation during dredging) will predominantly occur in areas that were pre-disturbed during the previous installation campaign for the Pluto trunkline which is located adjacent to the proposed Scarborough trunkline route and increasing the development envelope from 25 m to 750 m. Tables 1 and 2 above include this change. The proponent requested the EPA consent to a change to the proposal during assessment on 19 December 2019. The change was wording in Table 2 from up to 30 m to approximately 30 wide and from 10 square kilometres (km²) to 1 km².

The Chairman, as a delegate of the EPA, concluded that the changes were unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under s 43A of the EP Act to the change on 11 December 2019 and 19 December 2019.

2.3 Context

The proposal is located within the Mermaid Sound, which sits between the Burrup Peninsula and the Dampier Archipelago, in the Pilbara region of Western Australia. The proposal runs from the State waters boundary offshore to onshore at KP0, located approximately 1.5 m above HAT, adjacent to the Pluto LNG facility (Figures 1 and 2).

Surrounding land uses of the proposal include the Port of Dampier on the Burrup Peninsula. The port is one of the world's largest bulk export ports by tonnage and services petrochemical, salt, iron ore and natural gas export industries. The shore crossing site for the proposal is located adjacent to the Pluto LNG facility in the industrial zone.

The Dampier Archipelago consists of 42 islands off the coast of Dampier and covers about 400 km². Twenty-five of the islands are protected and known as the Dampier Archipelago Nature Reserve.

The Burrup Peninsula to the east and west of the proposal is known to have significant cultural heritage values and the area is known as Murujuga by Traditional Owners. The significance of this area has been recognised, with the Dampier Archipelago and parts of the Burrup Peninsula being placed on the National Heritage List in 2007 and the creation of the Murujuga National Park in 2013. The area has also been nominated for World Heritage listing (Woodside Energy 2019a).

The EPA notes that potential impacts resulting from the proposal will have associated impacts on the values of the Murujuga National Park. The potential impacts are discussed further in section 4 of this report. The EPA notes the interconnected nature of the environmental factors and the recognised values of the Murujuga National Park and has referred to these values, where relevant, in the assessment.

3. Consultation

The EPA advertised the referral information for the proposal for public comment in January 2019 and received 77 submissions:

- two submissions requested ‘Assess – Referral Information’
- seventy-five submissions requested ‘Assess – Public Environmental Review’.

The proponent consulted with government agencies and key stakeholders during the preparation of the supplementary report provided with the referral. The agencies and stakeholders consulted, the issues raised and the proponent’s response are detailed in section 3 of the proponent’s supplementary report provided with the proponent’s referral (Woodside Energy 2018).

In June 2019, the proponent provided the EPA with a draft Dredging and Spoil Disposal Management Plan, which contained additional information that describes the details of consultation with Traditional Owners on heritage matters, including submerged rock art.

This documentation was released for public review for four weeks closing on 9 September 2019.

Five public submissions were received during the public review period. The key issues raised relate to:

- benthic communities and habitat impacts and assessment
- potential impacts on marine fauna from changes in water quality
- potential impacts on commercial fishing activities and the commercial fishing industry
- potential impacts to culturally significant submerged rock art
- significant residual impacts on the surrounding Dampier Archipelago Nature Reserve
- additional research and baseline data for marine fauna species
- proposed monitoring and management strategies
- offsets.

The proponent addressed the issues raised in the Response to Submissions document (Woodside Energy 2019b).

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were taken into account by the EPA during its assessment of the proposal.

4. Key environmental factors

In undertaking its assessment of this proposal and preparing this report, the EPA had regard for the object and principles contained in s. 4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- the proponent’s referral information and the additional assessment information (Woodside Energy 2018)
- public comments received on the referral, stakeholder comments received during the preparation of the proponent’s documentation and public and agency comments received on the Additional Information documentation
- the proponent’s response to submissions raised during the public review of the additional assessment information documentation (Woodside Energy 2019b)
- the draft Dredging and Spoil Disposal Management Plan (Woodside Energy 2019a)
- the EPA’s own inquiries
- the EPA’s *Statement of environmental principles, factors and objectives* (EPA 2018)
- the relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.4.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Benthic Communities and Habitats** – direct and indirect impacts to coral and seagrass due to permanent loss of communities and habitat, altered sediment, loss of water quality, water movement and flows.
- **Marine Environmental Quality** – direct and indirect impacts due to increased turbidity, pollution and the release of nutrients and contaminants in sediments.
- **Marine Fauna** – direct and indirect impacts due to turbidity, noise, artificial light, and vessel movements.
- **Social Surroundings** – direct and indirect impacts due to loss or disturbance of submerged Aboriginal archaeological/heritage sites.

The EPA considered other environmental factors during the course of its assessment of the proposal. These factors, which were not identified as key environmental factors, are discussed in the Referral Supplementary Report (Woodside Energy 2018). Appendix 3 contains an evaluation of why these other environmental factors were not identified as key environmental factors.

Having regard to the EP Act principles, the EPA considered that the following principles were particularly relevant to its assessment of the proposal:

1. **The precautionary principle** – the EPA has considered whether the proponent’s investigations into the biological and physical environment provide the means to assess risk and identify measures to avoid and minimise impacts.
2. **The principle of intergenerational equity** – the EPA notes the proponent has taken measures to avoid and minimise impacts and this (together with the recommended conditions) will ensure the quality of the environment is maintained for future generations.
3. **The principle of the conservation of biological diversity and ecological integrity** – the proponent has identified management measures, including adaptive management, to mitigate the biodiversity and ecological impacts associated with the proposal.
4. **Principles relating to improved valuation, pricing and incentive mechanisms** – the EPA notes that the proponent will bear the costs relating to management of waste and pollution, including avoidance, containment, decommissioning, rehabilitation, and closure.
5. **The principle of waste minimisation** – the EPA notes that the proponent proposes to apply the waste management hierarchy to this proposal.

Appendix 2 provides a summary of the principles and how the EPA considered these principles in its assessment.

The EPA’s assessment of the proposal’s impacts on the key environmental factors is provided in sections 4.1 to 4.4. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 5 provides the EPA’s conclusion as to whether or not the proposal as a whole is environmentally acceptable.

4.1 Benthic Communities and Habitats

EPA objective

The EPA's environmental objective for this factor is *to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Benthic Communities and Habitats* (EPA 2016a)
- *Technical Guidance – Protection of Benthic Communities and Habitats* (EPA 2016b)
- *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2016c).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Benthic Communities and Habitats* (EPA 2016a).

EPA assessment

The proponent reviewed publicly available reports and papers on the Dampier Archipelago, including the Port of Dampier (MScience 2014), and identified marine invertebrates, hard corals, macroalgae, mangroves, seagrass and mixed benthic primary producer habitats as the benthic communities and habitats (BCH) likely to be present in the area (Figure 3).

Benthic habitats

The Dampier Archipelago contains many various subtidal and intertidal habitats:

- soft sediments and sandy beaches
- rocky shores
- reefs.

Benthic communities

The significant benthic communities using these habitats are:

- mixed communities
- coral (coral recruitment and spawning)
- seagrass
- macroalgae and microphytobenthos
- mangroves.

The proponent has developed a consolidated map of significant benthic communities and their distribution within the Dampier Archipelago (Figure 3) through extensive and expert review of existing BCH data.



Figure 3: Significant benthic communities and their distribution in the Dampier Archipelago

Potential impacts

Potential impacts from the proposal on BCH include:

- direct impacts (physical removal and irreversible loss) of subtidal benthic communities and habitat associated with pipeline trenching and stabilisation activities
- indirect impacts (irreversible loss and recoverable impacts) of subtidal benthic communities and habitat caused by reduced water quality or increased sedimentation associated with pipeline trenching and stabilisation activities.

Coral

- Coral communities are the most important BCH type to be considered within the marine environment surrounding this proposal because of their high ecological and biodiversity value and sensitivity to dredging pressures. Areas of coral have therefore been used as the sensitive receptor within the Dredging and Spoil Disposal Management Plan (DSDMP) around which the dredging pressures have been modelled, assessed and managed.
- Potential impacts to coral communities due to physical removal is expected to be minor as the majority of coral occurs outside the indicative trunkline footprint. Coral at the trunkline crossing has been previously disturbed and removed as part of the Pluto LNG Facility foundation project.
- Permanent loss and reversible loss of coral as a result of indirect impacts from trenching and stabilisation activities has been quantified and reported as percentage losses for the Local Assessment Units (LAUs) following completion of dredge plume modelling.

Proponent investigations

The proponent's environmental impact assessment process for BCH was informed by the EPA technical guidance documents for the *Protection of Benthic Communities and Habitats* (EPA 2016b) and *Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2016c).

The proponent's modelling, impact predictions and the DSDMP have incorporated relevant water quality thresholds that were generated following consideration of Western Australian Marine Science Institute's (WAMSI) Dredging Science Node (DSN) research outputs. The DSN has increased the state of knowledge of benthic communities found in the proposed development area and how they respond to dredge induced pressures, such as shading and smothering. Dredging pressure thresholds have been generated through the DSN and provide for more realistic assessments of impacts from dredging proposals and also provide appropriate indicators and criteria for monitoring and managing impacts during dredging.

The EPA acknowledges the proponent's approach for assessing and managing the environmental impacts of a contemporary dredging proposal which follows the EPA technical guidance for dredging.

Consistent with the EPA's technical guidance, the proponent has undertaken the following investigations to assess the impacts of the proposal on BCH:

- the proponent’s habitat map has been used to identify the location of benthic communities and sensitive receptors to inform predictions of dredge related impacts and focus monitoring and management actions
- the assessment applied a common set of LAUs established for Mermaid Sound, identifying the benthic communities within those LAUs and assessing their historic and present distributions
- the predicted permanent loss of, or serious damage to, coral that may arise from the proposal has been characterised within the LAUs to calculate the cumulative loss in the area
- dredge plume modelling specific to this proposal has been completed and incorporated into the DSDMP
- the proponent has derived water quality thresholds using WAMSI DSN findings and applied these to the model outputs to determine zones of impact under a range of dredging scenarios
- the model and habitat mapping have informed BCH loss predictions for both irreversible and reversible impacts.

Avoid and Minimise

- The proposed trunkline route has been selected to avoid sensitive habitats as far as practicable and has utilised existing routes that were disturbed as part of the Pluto LNG Facility Project.
- Proposed monitoring and management measures have been developed to avoid and minimise impacts to coral, including a tiered monitoring and management framework.
- The proponent has considered coral spawning windows in planning its dredge management. Controls have been put in place to reduce turbidity-generating activities in Mermaid Sound during confirmed coral spawning windows. Avoiding dredging, spoil disposal and backfill activities within Mermaid Sound during confirmed coral spawning windows.
- To minimise impact of vessel discharges the construction activities have been located away from high density coral communities.

The EPA considers that the proponent’s assessment approach and LAUs used for the BCH loss assessment are acceptable.

Predicted impacts

The proponent’s dredge modelling and impact predictions incorporated relevant water quality thresholds following consideration of the WAMSI DSN research outputs.

The proponent derived water quality thresholds for three zones of impact (zone of high impact, zone of moderate impact and zone of influence) across three ecological zones which are defined based on background water quality and the sensitivity of benthic receptors. These thresholds have also been applied as trigger level criteria in the tiered monitoring and management framework within the DSDMP.

The proponent's assessment has been supported by a large amount of information from the previous Pluto LNG Foundation Project dredging campaign. The Pluto LNG Foundation Project dredging campaign water quality data was assessed against the same thresholds applied for the proposal. Zone of influence and zone of moderate impact thresholds (as applied for the Scarborough Project – Nearshore Component modelling) were breached when applied to the Pluto LNG Foundation Project data. However, coral monitoring undertaken by the proponent at established monitoring sites, during and after the Pluto LNG Foundation Project, showed no impact to coral as a result of dredging activities.

Additionally, the dredging for this proposal is approximately 20 per cent of the total volume dredged for the Pluto LNG Foundation Project and shorter in duration, so the spatial extent and severity of plumes is also expected to be less. Therefore, the proponent considers that the water quality thresholds applied within the Scarborough modelling and used as trigger levels in the DSDMP can be considered conservative when compared with empirical evidence from the Pluto LNG Foundation Project.

The proponent's modelling predicts that the zone of high impact and zone of medium impact threshold exceedances are generally limited to the footprint of the proposed infrastructure and the area immediately adjacent. There is a small amount of indirect permanent loss of coral predicted at Conzinc Island and Conzinc Bay within the ZoHI as well as some recoverable impacts to BCH within the ZoMI from the trenching and stabilisation activities. However, the proponent has committed to achieving an objective of no impact to coral communities and to implementing management measures that will ensure that objective is met.

Proposed monitoring and management

The proponent has drafted a DSDMP to outline the proposed dredging, spoil disposal and backfilling activities required for the project and to identify and manage potential environmental impacts associated with these works. The DSDMP has also been developed in consideration of information from the DSN.

To manage impacts to BCH, the DSDMP includes the following:

- impact zonation scheme including environmental protection outcomes and management targets
- water quality monitoring program to be implemented prior to, during and post dredging to give early warning before potential impacts occur to the coral communities, ensuring that the environmental protection outcomes and management targets are achieved
- a risk-based management trigger hierarchy based on indicators along the pressure response pathways and proposed adaptive management actions
- plume extent monitoring, such as MODIS imagery analysis to inform dredge monitoring and management.

The EPA notes that routine coral monitoring is not proposed during trenching and stabilisation activities. However, the trigger levels provided in the DSDMP involve in-

situ measurement of turbidity and daily light intensity (light quantity), which has been determined by the DSN to provide an appropriate proxy measurement for coral.

The proponent's DSDMP focusses water quality monitoring and adaptive management on defined management triggers, based on best contemporary understanding of pressure-response pathways on local coral communities. The management strategy has been designed to provide early warning of adverse impacts/trends and trigger pre-emptive management well before the environmental protection outcomes are compromised.

Specifically, the management strategy is designed to prevent water quality levels exceeding the applied zone of medium impact threshold. If this is achieved then no reversible or irreversible impacts to coral are expected. Given these thresholds and criteria appear to be conservative, the proponent is confident that implementation of the DSDMP ensures no loss of coral as a result of trenching and stabilisation activities. The EPA notes the prediction that no coral would be lost due to trenching and stabilisation.

The EPA notes the proposed trunkline has been positioned parallel to an existing trunkline and the shore crossing site has been located at the Pluto LNG Facility in a previously disturbed area. The EPA notes that the material encountered while dredging the trenches during the Pluto LNG Foundation Project was predominantly calcareous marine sediments and clays. Dredging will not involve any blasting or cutter suction dredging and will be confined to soft sediments composed of sand and silt, which is the dominant subtidal habitat within the development envelope.

The EPA considers that procedures should also be implemented, in the finalisation of the DSDMP, to minimise the environmental impact of trunkline installation vessel operations, including vessel anchoring. This requirement is contained within the recommended conditions (condition 6).

The EPA notes that existing approved spoil grounds will be used, and are managed by the Pilbara Ports Authority.

The EPA considers that the proposed monitoring and management of impacts to BCH from the proposed trenching and stabilisation activities is appropriate and reflects contemporary knowledge of dredge impacts to coral as well as being consistent with EPA technical guidance.

Based on the proponent's investigations, modelling, the lack of impacts to coral communities during the Pluto LNG Foundation Project and the predictions of no impact to coral once the tiered monitoring and management framework is applied, the EPA considers this proposal will not result in significant impacts to BCH.

Summary

The EPA has paid particular attention to:

- *Technical Guidance – Protection of Benthic Communities and Habitat* (EPA 2016b)

- *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2016c)
- the proponent's application of the WAMSI DSN research to modelling the predicted impacts to BCH as well as inform the monitoring and management of dredging activities within the DSDMP
- the extent and duration of potential impacts from dredging
- the use of a previously dredged corridor and the use of existing spoil grounds
- the proponent's plans for the application of avoidance and mitigation measures to manage impacts to an acceptable level in the context of the surrounding marine environment and its values.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for benthic communities and habitat that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through authorised extent in Table 1 of schedule (Appendix 4)
- implementation of condition 6 which specifies the relevant environmental protection outcome to be met through the finalisation and submission of the Dredging and Spoil Disposal Management Plan, in consultation with the Murujuga Aboriginal Corporation.

4.2 Marine Environmental Quality

EPA objective

The EPA's environmental objective for this factor is *to maintain the quality of water, sediment and biota so that environmental values are protected.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Marine Environmental Quality* (EPA 2016d)
- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA 2016e)
- *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2016c).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Marine Environmental Quality* (EPA 2016d).

EPA assessment

Surrounding environment

Studies conducted within the Dampier Archipelago have identified the following key features related to marine environmental quality for this proposal:

- Waters in the inner archipelago, closer to the mainland, have naturally higher levels of turbidity than the offshore environment which is predominantly caused by natural inputs such as winds, tidal current and wave energy. Periodically, cyclones cause major sediment transportation/turbidity.
- No detectable levels of organics have been detected in the waters of the Dampier Archipelago and trace metals have historically been low.
- Waters of the Dampier Archipelago are considered to be oligotrophic (poor in plant nutrients).
- Contaminants such as Tributyltin (TBT) were found in the upper layer of sediments in shipping channels. TBT was used as an anti-foulant and is expected to continue to reduce in the environment as a result of its ban in 2008. Recent studies (Advisian 2017; Jacobs 2015; GHD 2016) undertaken throughout the archipelago, within port limits, have indicated that the upper layer of sediments (1 metre) were considered generally 'clean'.

Potential impacts to marine environmental quality

Potential impacts to marine environmental quality include:

- dredging and trunkline installation are likely to increase turbidity and impact water quality, sediments and biota
- project vessel discharges
- unplanned hydrocarbon spills.

Proponent investigations

To inform its assessment, the EPA considered the proponent's investigations to characterise the existing environment and potential impacts from the proposal. These included:

- Scarborough Development Dredged Sediment Dispersion Modelling Report, (RPS 2019) had identified zones of impact from turbidity. See section 4.1 for a more detailed discussion on the impacts from this turbidity.
- The Dredging and Spoil Disposal Management Plan (DSDMP) which was developed from the baseline monitoring and modelling outputs. This plan identifies the environmental values to be protected and spatially defines the environmental quality objectives and levels of ecological protection the proponent aims to achieve in implementing the proposal.

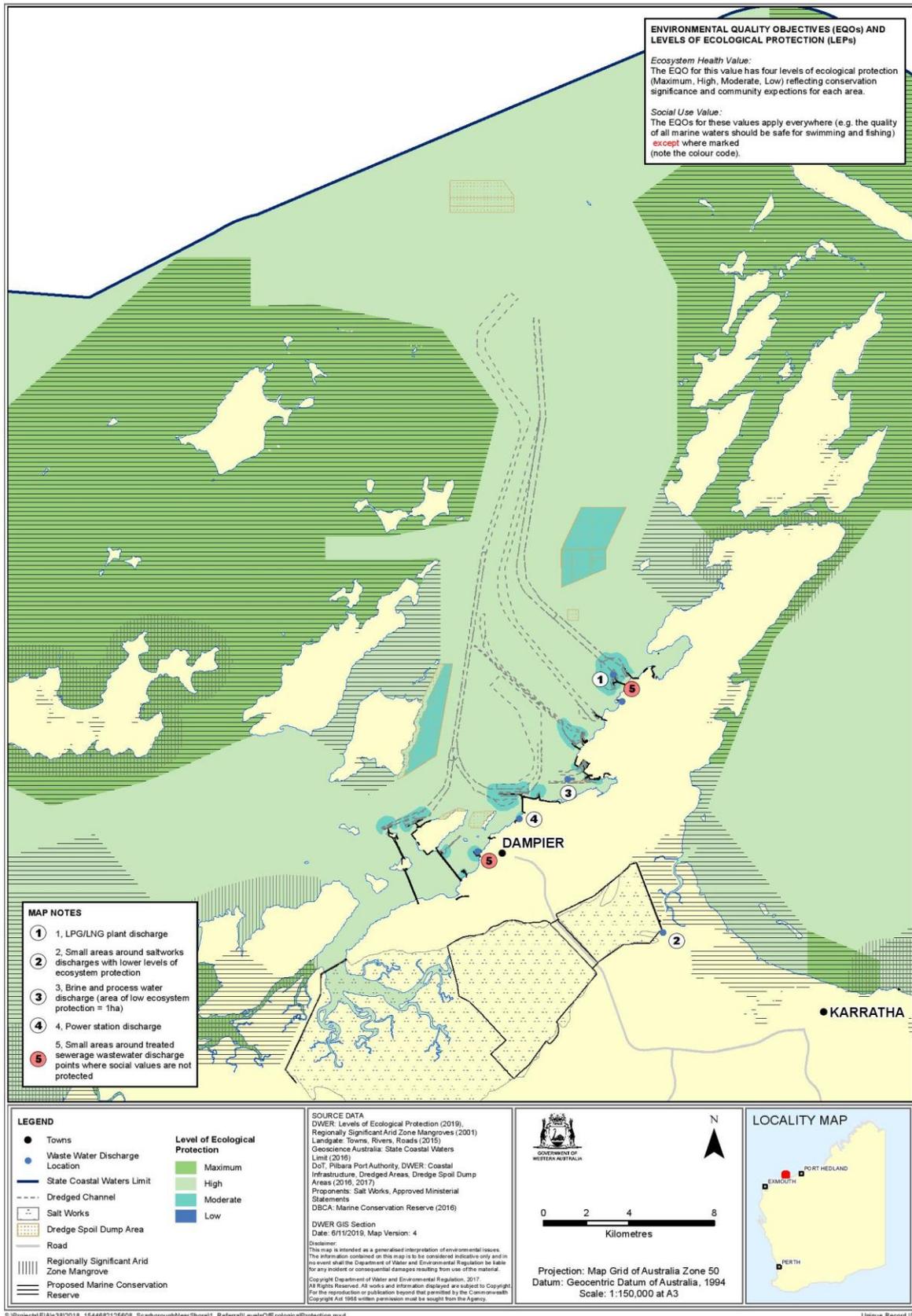


Figure 4: Levels of Ecological Protection Mermaid Sound

Proponent's application of the mitigation hierarchy

The DSDMP includes the following measures:

- a water quality monitoring program and tiered monitoring and management framework to manage dredging spoil disposal and backfill operations
- no dredging, spoil disposal placement or construction activities to occur outside of the approved project footprint
- sea dumping permit approved prior to operations
- vessels compliant with Marine Orders 91, 95 and 96 to prevent pollution from garbage, sewage and oily water
- no significant spills of hydrocarbons to the marine environment through the implementation of standard hydrocarbon management practices including Shipboard Oil Pollution Emergency Plan.

The proponent considers that potential impacts to Marine Environmental Quality from the proposal would be temporary at any one location as dredging continues along the trunkline and the duration of the construction period for the installation of the trunkline is approximately 12 months. The receiving environment has a degree of resilience to turbidity as the waters are naturally turbid. The dredge material is also likely to be clean due to the low levels of contaminants historically recorded in surveys.

The EPA notes that the proponent has recognised the environmental values and environmental quality objectives that apply to this proposal and that these are consistent with the established Environmental Quality Plan (EQP) for Mermaid Sound (Figure 4). The environmental values identified by the proponent as relevant to the proposed activities are: ecosystem health, fishing and aquaculture, recreation and aesthetics and cultural and spiritual.

The proponent considers that by protecting the environmental values of ecosystem health, then the cultural and spiritual environmental values should also be protected. This assumption is not consistent with EPA Technical Guidance which states that if water quality is managed to protect ecosystem integrity, primary contact recreation, seafood quality and aesthetic values then this may go some way toward the maintenance of cultural values, but not necessarily spiritual value. Nevertheless, the proponent has predicted that there will be no impact on any of these values and hence indigenous cultural value should be protected.

Environmental quality criteria for fishing and aquaculture, and recreation and aesthetics have not been provided in the DSDMP as dredging, spoil disposal and backfill operations are not predicted by the proponent to impact on these environmental values. However, the EPA notes that the predicted zones of impact within the DSDMP overlap with locations, such as Conzinc Island, that have high recreational values. Based on this uncertainty, the EPA recommends that the proponent have clear procedures in place to notify the public should recreational values be impacted by the proposal, such as through reduced water clarity from the dredge plume.

As noted in section 4.1, the DSDMP is designed to manage dredging activities to protect water quality and coral since they are particularly sensitive to dredging pressures. The water quality trigger levels within the tiered monitoring and management framework are considered conservative and should provide an early warning indication of changes in water quality (i.e. increases in turbidity) as a result of dredging activities to ensure protection of coral.

The proponent has committed to maintaining ecosystem integrity as per the existing Mermaid Sound EQP. The EPA considers there is a high level of confidence that the proposed water quality monitoring program and contingency management measures within the DSDMP will achieve this. However, to increase community confidence that the marine environmental quality of Mermaid Sound is being protected the EPA recommends the water quality monitoring results from the DSDMP, including remote sensing data of the spatial and temporal extent of the dredge plume, are made publicly available and easily accessible (e.g. on the proponent's website) as soon as practicable after the data has been collected.

The EPA considers that the DSDMP will protect the established environmental values and maintain ecosystem integrity and levels of ecological protection subject to the inclusion of environmental quality criteria, monitoring and reporting for recreation. The EPA has recommended the implementation of condition 6 to ensure the EPA's objective for Marine Environmental Quality will be met.

Summary

The EPA has paid particular attention to the:

- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA 2016e)
- *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2016c)
- high level of confidence that the environmental quality objective and levels of ecological protection that apply to this proposal are consistent with the established EQP for Mermaid Sound
- proponent's commitment to maintaining ecosystem integrity as per the existing Mermaid Sound EQP and that the proposed water quality monitoring program and contingency management measures within the DSDMP will achieve this
- proponent's plans for the application of avoidance and mitigation measures to manage impacts to an acceptable level in the context of the surrounding marine environment and its values.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Marine Environmental Quality that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in Table 1 of Schedule 1 of the Recommended Environmental Conditions (Appendix 4)

- finalisation and submission of a DSDMP prior to construction as required by condition 6, in consultation with the Murujuga Aboriginal Corporation.

4.3 Marine Fauna

EPA objective

The EPA’s environmental objective for this factor is *to protect marine fauna so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Marine Fauna* (EPA 2016f).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Marine Fauna* (EPA 2016f).

EPA assessment

Surrounding environment

Protected species

The proposal is situated in the Dampier Archipelago and is an important area for protected species listed under the *Biodiversity Conservation Act 2016*. Table 5-1 of the DSDMP (Woodside Energy Ltd 2019a) identifies marine fauna species listed under the *Biodiversity Conservation Act 2016* that may occur within the vicinity of the development envelope, these species include:

Marine Mammals

- dugong (*Dugong dugon*, Other protected fauna)
- humpback whale (*Megaptera novaeanglia*, Conservation Dependent)
- spinner dolphin (*Stenella longirostris*, Priority 4).

Marine Reptiles

- short-nosed seasnake (*Aipysurus apraefrontalis*, Critically Endangered)
- loggerhead Turtle (*Caretta caretta*, Endangered)
- green turtle (*Chelonia mydas*, Vulnerable)
- leatherback turtle (*Dermochelys coriacea*, Vulnerable)
- hawksbill turtle (*Eretmochelys imbricate*, Vulnerable)
- flatback turtle (*Natator depressus*, Vulnerable).

Fish

- grey nurse shark (*Carcharias Taurus*, Vulnerable);
- white shark, great white shark (*Carcharodon Carcharias*, Vulnerable)
- green sawfish (*Pristis zijsron*, Vulnerable).

Potential impacts to marine fauna

In its assessment, the EPA identified the following potential impacts from the proposal on Marine Fauna during construction:

- Direct impacts to marine mammals and reptiles may occur as a result of:
 - vessel collisions
 - entrainment of turtles (turtles caught in the dredge)
 - smothering of fauna during spoil disposal operations.
- Indirect impacts to marine mammals and reptiles may occur as a result of:
 - marine noise from construction activities including piling. Marine noise has the potential to result in some disturbance to movements of marine mammals and reptiles such as migrating whales, dugongs and dolphins and turtles
 - light emissions from vessels and at the shore crossing site and the waters of the Dampier Archipelago which may alter turtle hatching
 - changes to marine water quality, such as increased turbidity from dredging activities, routine discharges from construction vessels and pollution from incidents such as accidental hydrocarbon spills and leakages may change marine water quality.
- Introduced Marine Species being introduced to Dampier Archipelago from the use of interstate or overseas vessels with contaminated hulls and/or ballast waters.

Changes in water quality are discussed in section 4.2 above and will not be discussed further in this section.

Proponent investigations

To inform its assessment, the EPA considered the proponent's investigations to characterise the existing environment and potential impacts from the proposed activities. These include:

- EPBC Act Protected Matters Search Tool for the development envelope (with a 10 km buffer) (Woodside Energy Ltd 2018)
- Western Australian Department of Biodiversity, Conservation and Attractions NatureMap tool for the development envelope (with a 20 km buffer) within State waters (Woodside Energy Ltd 2018)
- Scarborough Mermaid Sound Pile Driving Modelling Study, Acoustic Modelling for Assessing Marine Fauna Sound Exposures (Jasco 2019)
- systematic turtle monitoring undertaken on Holden Beach adjacent to Site A of the Pluto LNG Plant throughout the construction and operational phases between 2007 and 2017 (Woodside Energy Ltd 2019a)
- draft Scarborough Dredging and Spoil Disposal Management Plan (Woodside Energy Ltd 2019a).

Noise modelling (Jasco 2019) considered the following impacts:

- temporary threshold shift, which is a temporary impact to hearing sensitivity
- permanent threshold shift, which is physical injury to an animal's hearing organs
- behaviour response for example avoidance of noise.

The modelling concluded that behavioural responses of avoidance are expected for marine mega fauna before temporary threshold shift was experienced. These marine mega fauna include the humpback whale, dolphins, marine reptiles, sharks and rays. Modelling for fish assumed that they would remain in place and predicted that fish without swim bladders such as sawfish may be subject to mortality and injury within 112 m and temporary threshold shift could extend to approximately 1 km. Turtles would experience impacts from temporary threshold shift and permanent threshold shift within 20 m of pile driving.

The systematic turtle monitoring (Woodside Energy Ltd 2019a) of Holden Beach over the 2007–2019 nesting periods concludes:

- multiple existing and external sources of light are located within close proximity to Holden Beach, including lighting from the Pluto LNG jetty, Pluto LNG Site A infrastructure and other nearby facilities
- the frequency of turtle nesting is highly variable on an annual basis (pre, during and post construction)
- Holden Beach is not a major sea turtle rookery and that key sea turtle nesting locations are located towards the outer Dampier Archipelago on Rosemary and Legendre Islands
- evidence of continued nesting effort and successful emergence suggests that there has been no observable negative impact from the Pluto LNG construction and operations.

Proposed monitoring and management

The proponent has committed to implementing the DSDMP to minimise the potential for impacts to Marine Fauna. The DSDMP includes the following mitigation measures:

- measures to avoid direct vessel strikes with marine fauna, including operation in accordance with *EPBC Regulations 2000 – Part 8 Division 8.1* which determines vessel speed when within defined distance of whales, dolphins and turtles
- measures to minimise direct entrainment impacts on turtles, including not operating dredge pumps during transit
- exclusion zones and observation zones for dredging, spoil disposal and backfilling to minimise risk of smothering marine fauna
- noise management procedures to avoid temporary and permanent changes to hearing sensitivity in marine fauna and minimise behavioural responses, particularly during any pile driving activities. These procedures include implementing soft start procedures, exclusion zones and trained fauna observers

- measures to minimise indirect impacts on turtles from lighting by minimising lighting use on vessels and during on shore construction
- sightings and locations of marine fauna must be recorded in the vessels daily log book
- any incidents relating to marine fauna injury/mortality must be documented and reported to relevant regulators
- introduced marine species assessment process applied to project vessels. Based on the outcomes of each assessment, management measures commensurate with the risk (such as the treatment of internal systems, introduced marine species inspections or cleaning) will be implemented to minimise the likelihood of introduced marine species being introduced.

Assessment of impacts

The EPA notes that mega marine mammal behaviour responses predicted by the noise modelling are likely to be localised and temporary as piling operations will take place for 20 minutes per day. With regard to turtles, the EPA notes the small impact zone (20 m) and the commitment in the DSDMP to undertake visual observations that will be completed prior to and during piling noise impacts. The EPA notes the potential mortality and temporary threshold shift impact zones for fish were based on a worst case scenario where fish would stay in one location. The EPA considers that the soft start procedures committed to in the DSDMP are likely to ensure marine fauna, including fish, would move to avoid impact.

With regard to impacts to turtles from light spill, the EPA notes the small number of additional vessels as a result of construction activities, the proposed light mitigation measures in the DSDMP and the results of previous turtle monitoring which indicates previous construction activities did not impact the use of Holden Beach in the long-term. Given this, the EPA considers that light impacts from the construction should not significantly impact turtles.

The EPA notes that impacts from the construction of the pipeline would be undertaken within twelve months and dredging activities would progress along the proposed offshore development envelope during this time. These impacts would therefore be localised and short term.

The EPA considers that the potential impact of introduced marine species can be adequately managed under the DSDMP.

The EPA considers that the long-term impacts from the physical presence of a trunkline within Mermaid Sound are likely to be minor and the implementation of the DSDMP will ensure that impacts to marine fauna are minimised and the EPA's objective for Marine Fauna is met.

Summary

The EPA has paid particular attention to the:

- population and distribution of marine fauna in the area of the proposal, including the regional significance elsewhere in the Pilbara
- short-term nature of the construction activities
- mitigation and management measures proposed by the proponent.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Marine Fauna that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through authorised extent in Table 1 of Schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- finalisation and submission of a DSDMP prior to dredging activities as required by condition 6-2.

4.4 Social Surroundings

EPA objective

The EPA's environmental objective for this factor is *to protect social surroundings from significant harm*.

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016g).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Social Surroundings* (EPA 2016g).

EPA assessment

Surrounding environment

The Dampier Archipelago is a national heritage listed place due to its indigenous heritage values. It also has social values which are attributed to commercial shipping, tourism and fisheries.

The EPA recognises that Murujuga is the traditional Aboriginal name for the Dampier Archipelago and surrounds including the Burrup Peninsula and the Murujuga National Park. The Murujuga is home to the Ngarda-Ngarli people, a collective of five traditional groups including Ngarluma, Yindjibarndi, Yaburara, Mardudhunera and Wong-Goo-Tt-Oo people, who have a cultural connection to the area.

The Native Title Claim (WC 1996/089) of the Yaburara and Mardudhunera people covers an area approximately 9,529 km². The area partially extends into waters through which the proposed trunkline would traverse near the State water boundary (Figure 5).

The shoreline crossing component of the project is in an industrial zone that has been previously disturbed by the Pluto LNG Project's trenching for its trunkline and construction of its jetty. The proponent considers that due to this previous disturbance the shoreline crossing component is unlikely to directly impact any Aboriginal heritage sites. State Heritage Office records and previous surveys undertaken for Woodside show that one Registered Aboriginal Heritage Site, 19675 Holden Point Quarry A and accompanying conservation zone (known as 'Tool Shed'), is located north of the shore crossing location (Figure 5).

Proponent investigations

A literature review and ethnographic survey (Mott 2019) relating to the potential for submerged Aboriginal heritage was commissioned by Woodside. This review determined that the types of archaeological sites to survive inundation are likely to be more robust forms such as middens and artefacts within cemented dunes, quarry outcrops, curvilinear stone structures and standing stones on volcanic pavement. Geotechnical sampling along the proposed trunkline has shown that sediments are

predominantly comprised of soft silty sands. Therefore, impacts to submerged rock and Aboriginal heritage are unlikely. The EPA notes that the proponent will further engage with current researchers undertaking submerged landscape studies to discuss options for identifying potential submerged Aboriginal heritage sites and mitigating potential risks, to be completed prior to Front End Engineering Design.

The EPA notes the proposal is also located within the Port of Dampier boundary which is managed by the Pilbara Ports Authority. The Port of Dampier is a major industrial port supporting commercial shipping. The proponent will continue to consult with the Pilbara Ports Authority regarding construction methodology and timing of construction in shipping lanes and the spoil ground allocation. The Dampier Technical Advisory Consultative Committee will also be consulted regarding the spoil ground allocation. The EPA does not consider potential impacts to commercial shipping to be significant and this is not discussed further.

Tourism, fisheries and aquaculture may be impacted by the proposal. Potential impacts from dredging are discussed in section 4.2, Marine Environmental Quality. Visual impacts and displacement of commercial and recreational vessels from the presence of construction vessels during trunkline installation are considered to be minor due to the short (12 month) construction time period and the location away from popular tourist destinations and will not be considered further.

The EPA considers the following aspects of the proposal's social surroundings comprise the significant receptors likely to be physically impacted and which therefore require assessment under the EP Act:

- direct and indirect impacts to Aboriginal heritage site 19675 (Holden Point Quarry A and accompanying conservation zone)
- submerged heritage and archeological sites.

Potential impacts

The EPA considers that impacts to heritage values may occur through activities during construction and operation of the pipeline. The proposal may impact heritage values through:

- direct impacts to heritage and archeological sites from dredging
- direct disturbance of site 19675 due to unauthorised access
- indirect impacts to site 19675 from dust by excavations at existing rock quarries for the supply of rock material and at the location of the shore crossing to remove rocks from the pre-excavated trench. Loaded trucks if uncovered and rock/sediment stockpiles would be a potential dust source.

Proponent's application of the mitigation hierarchy

The proponent has proposed mitigation measures to avoid direct impacts to Aboriginal heritage. To ensure the environmental objectives are met, impacts will be minimised through the proponent's DSDMP. The management plan includes the following commitments in relation to significant heritage sites:

- Aboriginal heritage site 19675 (Holden Point Quarry A and accompanying conservation zone) adjacent to the shore crossing site will be appropriately fenced and designated as a ‘no access’ area during construction. Additionally, the fence will be covered with a dust-suppression barrier and signage clearly delineating the heritage no-go area.
- Regular audits of site 19675 and effectiveness of the barrier fencing will be conducted on at least a quarterly basis and a final inspection, with traditional owners and a qualified archaeologist, will be conducted at the end of the civil works phase to detail all heritage protection works, interim audits and final condition audit.

Heritage sites including the Dampier Archipelago and Burrup Peninsula, are proposed to be identified in the draft Scarborough Cultural Heritage Management Plan (CHMP) and construction personnel will be informed during onsite inductions of the sites and their heritage values and requirement to avoid impacts.

Assessment of impacts

The EPA notes that the proponent has designed the proposal to minimise impacts to Aboriginal heritage by locating the pipeline along previously disturbed areas onshore and parallel to the existing Pluto trunkline in coastal waters. The EPA is aware of a commitment by the proponent to avoid dredging of igneous (volcanic) rock offshore, which is the predominant rock type where Murujuga rock art is found. Proposed dredging activity will affect calcarenite rock, not associated with Murujuga rock art. Geophysical and geotechnical investigations along the pipeline route identified no igneous rock within the dredging profile. Therefore potential impacts to heritage and submerged archaeological sites are unlikely.

Proposed mitigation measures have been recommended to avoid and/or minimise expected impacts and there is unlikely to be significant residual impacts. The proponent has updated this plan to include the proposal management measures during the development of the draft CHMP (Woodside 2019c) and consultation with Murujuga Aboriginal Corporation.

The EPA considers that, given the proponent’s commitment to avoid site 19675, the previous disturbed areas in which the pipeline will be located and the proposed management measures, the proposal is unlikely to result in the significant harm to Aboriginal heritage and that mitigation measures proposed meet the EPA objectives.

The EPA supports the proponent’s intention to avoid site 19675 and has recommended condition 7 to ensure there is no impact to this site. The DSDMP and CHMP are required so that the proposal does not have long-term impact on Aboriginal heritage values.

The EPA notes that the Murujuga Aboriginal Corporation would not, in principle, object to the works being undertaken, but has outstanding concerns with the management plans for the proposal. The Murujuga Aboriginal Corporation indicated it expected its outstanding concerns to be addressed prior to the commencement of onsite works.



Figure 5: Native title claim and heritage site

Summary

The EPA has paid particular attention to the:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016g)
- proponent's application of the mitigation hierarchy to avoid or minimise impacts on social surroundings
- ongoing consultation with the Murujuga Aboriginal Corporation in preparing management plans for the proposal
- location of the Scarborough trunkline in previously disturbed areas adjacent to the existing Pluto trunkline which will avoid potential areas of significant cultural significance, including submerged rock art
- physical and environmental values associated with the proposal as they may relate to cultural and heritage values.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Social Surroundings that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through authorised extent in schedule 1 of the Recommended Environmental Conditions.
- implementation of conditions 6 and 7, so that the proposal does not have long-term impact on Aboriginal heritage values, through the finalisation and submission of a DSDMP and CHMP, in consultation with the Murujuga Aboriginal Corporation.

5. Conclusion

The EPA has considered the proponent's proposal to develop the Scarborough Project – Nearshore Component, located 8 km north east of Dampier in the Pilbara region.

Application of mitigation hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid and minimise environmental impacts including:

- the proposed trunkline has been positioned parallel and close to an existing trunkline, and the shore crossing site has been located at the Pluto LNG Facility in a previously disturbed area, to minimise disturbance to sensitive areas
- proposed monitoring and management measures have been developed to avoid and minimise impacts to coral, including a tiered monitoring and management framework
- the impact of vessel discharges with construction activities located away from high density coral communities
- finalisation and submission of a draft Scarborough Cultural Heritage Management Plan including consultation with the Murujuga Aboriginal Corporation, to minimise impacts to Social Surroundings
- finalisation and submission of a Dredging and Spoil Disposal Management Plan to minimise impacts to Benthic Communities and Habitats, Marine Environmental Quality, Marine Fauna and Social Surroundings.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole, including the:

- impacts to all key environmental factors
- relevant EP Act principles
- EPA's environmental objectives for Marine Environmental Quality, Benthic Communities and Habitat, Marine Fauna and Social Surroundings
- EPA's confidence in the proponent's proposed mitigation and management measures
- EPA's view that the impacts to Marine Environmental Quality, Benthic Communities and Habitat, Marine Fauna and Social Surroundings are manageable, provided the recommended conditions are imposed.

Given the above, the EPA has concluded that the proposal may be implemented subject to the conditions recommended in Appendix 4.

6. Recommendations

That the Minister for Environment notes:

1. That the proposal assessed is for the Scarborough Project – Nearshore Component with dredging of up to 1,612,600 cubic metres of sediment to install a section of the Scarborough trunkline, which is 32.7 km long, running from the State water boundary to the shore crossing site at Kilometre Point 0.
2. The key environmental factors identified by the EPA in the course of its assessment, as set out in section 4, are:
 - a) Benthic Communities and Habitats
 - b) Marine Environmental Quality
 - c) Marine Fauna
 - d) Social Surroundings.
3. The EPA has concluded that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include the following:
 - a) finalisation and implementation of the Dredging and Spoil Disposal Management Plan (condition 6), that contains water quality monitoring and adaptive management to achieve the Environmental Protection Outcomes and further minimise impacts to Benthic Communities and Habitats, in consultation with the Murujuga Aboriginal Corporation.
 - b) finalisation and implementation of the Cultural Heritage and Management Plan (condition 7) to protect cultural values, in consultation with the Murujuga Aboriginal Corporation.

References

- Advisian 2017, *Chemical and Ecological Monitoring of Mermaid Sound: 2017 Compliance Report*, prepared for Woodside Energy Ltd.
- EPA 2016a, *Environmental Factor Guideline – Benthic Communities and Habitats*, Environmental Protection Authority, Perth, WA.
- EPA 2016b, *Technical Guidance – Protection of Benthic Communities and Habitats*, Environmental Protection Authority, Perth, WA.
- EPA 2016c, *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals*, Environmental Protection Authority, Perth, WA.
- EPA 2016d, *Environmental Factor Guideline – Marine Environmental Quality*, Environmental Protection Authority, Perth, WA.
- EPA 2016e, *Technical Guidance – Protecting the Quality of Western Australia’s Marine Environment*, Environmental Protection Authority, Perth, WA.
- EPA 2016d, *Environmental Factor Guideline – Marine Fauna*, Environmental Protection Authority, Perth, WA.
- EPA 2016g, *Environmental Factor Guideline – Social Surroundings*, Environmental Protection Authority, Perth, WA.
- EPA 2018, *Statement of Environmental Principles, Factors and Objectives*, Environmental Protection Authority, Perth, WA.
- GHD 2016, *Port of Dampier Sediment Sampling and Analysis: Chemical Analysis Report*, prepared for the Pilbara Ports Authority.
- Jasco 2019, *Scarborough Mermaid Sound Pile Driving Modelling Study, Acoustic Modelling for Assessing Marine Fauna Sound Exposures*, Jasco Applied Sciences (Australia) Pty Ltd.
- MScience 2014, *Dampier Port Authority Marine Environment: Distribution of Benthic Primary Producer Habitats within Port Waters*. Report prepared for Dampier Port Authority.
- RPS 2019, *Scarborough Development Dredged Sediment Dispersion Modelling Report, Revision 4, June 2019*.
- Woodside Energy Ltd 2018, *Scarborough Project Nearshore Component, Referral Supplementary Report, Revision 1, December 2018*.
- Woodside Energy Ltd 2019a, *Scarborough Dredging and Spoil Disposal Management Plan, Additional Information, Revision 2, November 2019*.

Woodside Energy Ltd 2019b, *Scarborough Project Nearshore Component, Summarised Table of Public Submissions, Attachment 1, October 2019.*

Woodside Energy Ltd 2019c, *Scarborough Cultural Heritage Management Plan, Revision A, December 2019.*

Appendix 1: List of submitters

Organisations:

Western Australian Fishing Industry Council
Pilbara Ports Authority
The Wilderness Society
Murujuga Aboriginal Corporation
Conservation Council of Western Australia

Appendix 2: Consideration of principles

EP Act Principle	Consideration
<p>1. The precautionary principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –</i></p> <p><i>a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment</i></p> <p><i>b) an assessment of the risk-weighted consequences of various options.</i></p>	<p>In considering this principle, the EPA notes Benthic Communities and Habitats, Marine Environmental Quality, and Marine Fauna could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>The EPA notes that the proponent undertook investigations to predict the impacts of the proposal on Benthic Communities and Habitats, Marine Environmental Quality, and Marine Fauna. The proponent has undertaken investigations on the biological and physical environment to assess risks and identify measures to avoid and minimise impacts.</p> <p>To provide further confidence to minimise the potential for impacts to Benthic Communities and Habitats, Marine Fauna, and Marine Environmental Quality the proponent has developed a draft Dredging and Spoil Disposal Management Plan and a Scarborough Cultural Heritage Management Plan. These plans identify the Environmental Values to be protected and spatially define the Environmental Quality Objective and levels of ecological protection the proponent aims to achieve.</p> <p>The EPA has recommended conditions to ensure that environmental protection outcome is achieved, the plans are finalised (in consultation with relevant agencies) to the satisfaction of the CEO of the Department of Water and Environmental Regulation and effective long-term monitoring is undertaken for the coral communities.</p> <p>From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.</p>
<p>2. The principle of intergenerational equity</p>	<p>In considering this principle, the EPA notes that the proponent has taken measures to avoid and minimise impacts. In assessing this proposal, the</p>

<p align="center">EP Act Principle</p>	<p align="center">Consideration</p>
<p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	<p>EPA has recommended conditions to manage impacts to the key environmental factors identified during this assessment. From its assessment of this proposal the EPA has concluded that that the environmental values will be protected and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations.</p>
<p>3. The principle of the conservation of biological diversity and ecological integrity</p> <p><i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	<p>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on Benthic Communities and Habitats, and Marine Environmental Quality.</p> <p>In assessing the proposal, the EPA has considered these impacts and has taken into account measures proposed by the proponent to minimise impacts to the affected species, communities and habitat in the marine and terrestrial environments.</p> <p>The EPA has concluded that the proposal would not compromise the biological diversity or ecological integrity within the proposal area and surrounds if the proposed and recommended management measures are implemented.</p> <p>Through this assessment, the EPA has demonstrated that the conservation of biological diversity and ecological integrity was a fundamental consideration.</p>
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services,</i></p>	<p>In considering this principle, the EPA notes that the proponent would bear the cost relating to waste and pollution, including avoidance and containment. The proposal is not expected to generate any significant pollution or waste.</p> <p>The EPA had regard to this principle during the assessment of the proposal.</p>

EP Act Principle	Consideration
<p><i>including the use of natural resources and assets and the ultimate disposal of any waste.</i></p> <p><i>(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.</i></p>	
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>	<p>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on Benthic Communities and Habitats, Marine Environmental Quality, Marine Fauna and Social Surroundings.</p> <p>The proponent has evaluated options for the location, where Scarborough gas would be processed through a brownfield expansion of Pluto LNG, where additional LNG processing capacity and domestic gas infrastructure will be installed. This will maximise the use of existing infrastructure, lowering the environmental impact as the area has previously been developed and no additional onshore clearing or significant dredging is required.</p> <p>In considering this principle, the EPA notes that the proponent’s Dredging and Spoil Disposal Management Plan focusses on design measures and adaptive management and is aimed at minimising the amount of waste generated and discharged into the environment.</p> <p>The EPA has demonstrated due regard to this principle during the assessment of this proposal.</p>

Appendix 3: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
SEA			
Coastal Processes	<ul style="list-style-type: none"> • Temporary rock groyne may alter wave energy and current patterns, potential to cause change in the structure of marine communities, interruption of longshore sediment transport and changes in erosion/deposition patterns. • Groyne and boat launching facility may interrupt tidal flows or cause a reduction in water exchange, causing retention of nutrient and other contaminants. • Dredging activities may alter the morphology of the coastal zone resulting in changes to sediment sources, causing changes in 	<p>Agency comments</p> <ul style="list-style-type: none"> • Pilbara Ports Authority (PPA) requests that proponent liaise directly with PPA to obtain the required port related approvals and permits for those works defined within the Dredging and Spoil Disposal Management Plan (DSDMP) which are within the port waters. <p>Public comments</p> <ul style="list-style-type: none"> • A risk assessment be undertaken that takes into consideration the World Heritage Listing criteria and informs adequate management measures that demonstrate the values are protected and not diminished during implementation of the proposal. 	<p>Coastal Processes was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • the small onshore footprint and temporary use of facilities, the substantial impacts to geophysical processes that shape the coastal morphology are unlikely • the proposed monitoring and management strategies • negligible predicted changes to hydrodynamics, tidal flows, sedimentation patterns and sediment transport within the development area • the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i> <p>the EPA considers it is unlikely that the proposal would have a significant impact on Coastal Processes and that the impacts to this factor are manageable.</p>

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
	<p>erosion and deposition patterns.</p> <ul style="list-style-type: none"> Removal of existing rock covering the trench at the trunkline shore crossing site resulting in sediment change. 		<p>Accordingly, the EPA did not consider Coastal Processes to be a key environmental factor at the conclusion of its assessment.</p>
LAND			
Terrestrial Environmental Quality	<ul style="list-style-type: none"> The onshore crossing of the trunkline may impact a small area along the coast. Erosion and sedimentation from loss of topsoil and disturbed soils. Accidental spills or loss of hydrocarbons and other chemicals. 	<p>Public comments</p> <ul style="list-style-type: none"> consider the overall and cumulative impacts of the proposal and the broader Burrup Hub and does not adequately address its long-term environmental impacts and therefore does not consider the principle intergenerational equity the DSDMP does not set out adequate criteria for cessation of operations during cyclone season. 	<p>Terrestrial Environmental Quality was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> the application of the mitigation hierarchy to avoid or minimise impacts to terrestrial environmental quality, where possible the significance of the potential impacts in the context of the location and regional cumulative impacts the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i> <p>the EPA considers it is unlikely that the proposal would have a significant impact on Terrestrial Environmental Quality and that the impacts to this factor are manageable.</p>

Environmental factor	Description of the proposal’s likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			Accordingly, the EPA did not consider Terrestrial Environmental Quality to be a key environmental factor at the conclusion of its assessment.
AIR			
Air Quality	<ul style="list-style-type: none"> • Some temporary and localised impacts to air quality during dredging and installation of the trunkline may occur. Emissions from particulates, principally dust from vehicle and construction activities. • Dust emissions from the removal of the existing rock covering the trench at the trunkline shore crossing. • Loaded trucks if uncovered and rock/sediment stockpiles would be a potential dust source. 	<p>Public comments</p> <ul style="list-style-type: none"> • On-shore dust suppression measures during trunkline construction activities set out in the DSDMP are generally of limited effectiveness, and that additional dust suppression measures should be included in the DSDMP. 	<p>Air Quality was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal or in the environmental scoping document.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • application of the mitigation hierarchy to avoid and minimise emissions, including management action to adopt mitigation measures including dust suppression • greenhouse gas emissions are expected to be minimal as this is a short-term trunkline construction project. • the processing of gas is approved under Ministerial Statement 757 for Pluto and is being considered for the North West Shelf Project Extension proposal (Karratha Gas Plant). The Environmental Review Document for the Karratha Gas Plant is available for

Environmental factor	Description of the proposal’s likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			<p>public comment until 12 February 2020</p> <ul style="list-style-type: none"> • sensitive receivers such as residential areas are located away from any construction activities that may lead to substantial air quality impacts • rock quarries would be required to comply with their approval conditions in terms of dust emissions • the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i> <p>the EPA considers it is unlikely that the proposal would have a significant impact on Air Quality and that the impacts to this factor are manageable.</p> <p>Accordingly, the EPA did not consider Air Quality to be a key environmental factor at the conclusion of its assessment.</p>

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of the EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

Decision-making Authority	Legislation (and Approval)
1. Minister for Mines and Petroleum	<i>Petroleum (Submerged Lands) Act 1982</i> <i>Petroleum (Submerged Lands) Regulations 1990</i>
2. Minister for Aboriginal Affairs	<i>Aboriginal Heritage Act 1972</i> (section 18 clearances)
3. Chief Dangerous Goods Officer Department of Mines, Industry Regulation and Safety	<i>Dangerous Goods Safety Act 2004</i> (Dangerous goods) <i>Dangerous Goods Safety Regulations 2007</i> (Approvals for the handling and transport of dangerous goods)
4. Chief Executive Officer Pilbara Ports Authority	<i>Port Authorities Act 1999 WA</i> (Seabed lease, construction and operational approvals, and dredging licence)

Note: In this instance, agreement is only required with DMAs 1 and 2 since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (*Environmental Protection Act 1986*)

SCARBOROUGH PROJECT – NEARSHORE COMPONENT

Proposal: Woodside is proposing to develop the Scarborough gas field, with a target of achieving first gas production between 2023 and 2025. The Scarborough Project concept comprises subsea wells, a semi-submersible gas processing and compression floating production unit in offshore Commonwealth waters and export trunkline 434 kilometres long running to the Pluto LNG Facility on the Burrup Peninsula.

The nearshore component subject of this referral includes the installation of the section of the trunkline running from the State waters boundary up to KP0 (about 1.5 m above HAT) (about 32.7 kilometres long) and associated activities.

Proponent: Woodside Energy Ltd
Australian Company Number 005 482 986

Proponent Address: 11 Mount Street Perth WA 6000

Assessment Number: 2194

Report of the Environmental Protection Authority: 1664

Pursuant to section 45 of the *Environmental Protection Act 1986*, it has been agreed that the proposal described and documented in Table 1 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent must not exceed the authorised extent of the proposal as defined in Table 2 of Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent must notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an

association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

- 3-1 The proponent must not commence implementation of the proposal after five (5) years from the date of this Statement, and any commencement, prior to this date, must be substantial.
- 3-2 Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.

4 Compliance Reporting

- 4-1 The proponent must prepare, and maintain a Compliance Assessment Plan which is submitted to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation of the proposal, whichever is sooner.
- 4-2 The Compliance Assessment Plan must indicate:
- (1) the frequency of compliance reporting;
 - (2) the approach and timing of compliance assessments;
 - (3) the retention of compliance assessments;
 - (4) the method of reporting of potential non-compliances and corrective actions taken;
 - (5) the table of contents of Compliance Assessment Reports; and
 - (6) public availability of Compliance Assessment Reports.
- 4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent must assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.
- 4-4 The proponent must retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.
- 4-5 The proponent must advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.
- 4-6 The proponent must submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve

(12) month period from the date of issue of this Statement and then annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report must:

- (1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;
- (2) include a statement as to whether the proponent has complied with the conditions;
- (3) identify all potential non-compliances and describe corrective and preventative actions taken;
- (4) be made publicly available in accordance with the approved Compliance Assessment Plan; and
- (5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent must make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

- (1) a secret formula or process; or
- (2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent must provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Benthic Communities and Habitats

6-1 The proponent must ensure implementation of the proposal achieves the following environmental protection outcome:

- (1) no detectable reduction of net live coral cover at any of the coral monitoring locations attributable to the proposal.

- 6-2 Prior to dredging activities, the proponent shall finalise and submit a further revision of the Dredging and Spoil Disposal Management Plan (SA0006AH0000002, Rev 2, November 2019), in consultation with the Murujuga Aboriginal Corporation, to meet the outcomes specified in condition 6-1.
- 6-3 The Dredging and Spoil Disposal Management Plan shall be prepared and submitted prior to construction and include:
- (1) a requirement for all dredging and spoil disposal activities to be managed with the objective of achieving the Environmental Protection Outcome required by condition 6-1;
 - (2) a benthic habitat map showing the extent and distribution of benthic communities and habitats;
 - (3) sediment plume modelling outputs to inform predicted impacts and losses of benthic communities and habitat, including a cumulative loss assessment;
 - (4) presentation of the sediment plume outputs in an impact zonation scheme;
 - (5) management trigger indicators based on pressure response pathways and proposed adaptive management actions;
 - (6) monitoring program including site locations and methods (including timing) to provide data to allow assessment against the management trigger indicators and Environmental Protection Outcome required by condition 6-1, and to inform adaptive management actions;
 - (7) a tiered monitoring/management feedback loop to manage dredging, spoil disposal and backfill operations to achieve the Environmental Protection Outcome required by condition 6-1;
 - (8) procedures to be implemented to minimise the environmental impact of trunkline installation vessel operations, including vessel anchoring
 - (9) procedures for determining whether any management trigger exceedances are attributable to the implementation of the proposal;
 - (10) contingency management strategies to be employed if management triggers are reached as a result of the proposal;
 - (11) clear reporting procedures if management triggers are reached;
 - (12) mechanisms to provide the public with details of exceedances of management triggers and contingency actions as soon as practicable;
 - (13) mechanisms to notify the public if marine recreational values are likely to be impacted as a result of the dredging, spoil disposal and/or backfill activities; and

-
- (14) provide evidence of the consultation required and the outcomes of this consultation.
- 6-4 Dredging activities may not commence until the proponent has received notice in writing from the CEO that the Dredging and Spoil Disposal Management Plan meets the relevant Environmental Protection Outcomes required by condition 6-1.
- 6-5 The proponent:
- (1) may review and revise the Dredging and Spoil Disposal Management Plan; or
 - (2) must review and revise the Dredging and Spoil Disposal Management Plan as and when directed by the CEO.
- 6-6 The proponent shall implement the latest revision of the Dredging and Spoil Disposal Management Plan required by condition 6-2, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 6-3.
- 6-7 In the event that monitoring carried out under the Dredging and Spoil Disposal Management Plan determines that the relevant Environmental Protection Outcome required by condition 6-1 are not being achieved the proponent shall:
- (1) immediately implement the relevant contingency management actions specified in the Dredging and Spoil Disposal Management Plan, and continue implementation of those actions until it is demonstrated that the Environmental Protection Outcome required by condition 6-1 are being achieved and will continue to be achieved;
 - (2) investigate the likely cause of the Environmental Protection Outcome required by condition 6-1 not being achieved;
 - (3) within twenty-four (24) hours of determining that any of the Environmental Protection Outcome required by condition 6-1 are not being achieved, report the nonachievement to the CEO;
 - (4) within seven (7) days of determining that any of the Environmental Protection Outcome required by condition 6-1 are not being achieved submit to the CEO a report detailing the following:
 - (a) the results of the monitoring that led to the determination that any of the Environmental Protection Outcome required by condition 6-1 are not being achieved;
 - (b) the investigation being undertaken as required by condition 6-8(2); and

- (c) any notifications and contingency management actions implemented by the proponent following determination that any of the Environmental Protection Outcome required by condition 6-1 are not being achieved;
- (d) provide a report detailing the findings of the investigation required by condition 6-7 (2) to the CEO within twenty-one (21) days of first determining that any of the Environmental Protection Outcome set in condition 6-1 are not being achieved.

6-8 The proponent shall submit to the CEO annual compliance assessment reports in accordance with condition 4-6 which includes:

- (1) all monitoring data and reportable incidents required by conditions 6-3 and 6-4;
- (2) an analysis and interpretation of monitoring data to demonstrate compliance with the requirements of condition 6-1; and
- (3) an assessment of the effectiveness of monitoring, management and contingency measures implemented to ensure compliance with the requirements of conditions 6-1.

7 Cultural Heritage Management Plan

7-1 The proponent must implement the proposal to meet the following objectives:

- (1) Minimise direct and indirect impacts to social, cultural, heritage and archaeological values within and surrounding the Development Envelope, including from, but not limited to:
 - (a) disturbance of the ground that may impact Aboriginal Heritage Site, 19675 Holden Point Quarry A and accompanying conservation zone (known as 'Tool Shed') registered under the *Aboriginal Heritage Act 1972*;
 - (b) potential loss of access to areas to undertake traditional activities;
 - (c) indirect impacts, including visual and dust impacts to social and cultural places and activities; and
 - (d) disturbance of areas of volcanic rock in the sea bed.

7-2 Prior to ground disturbing activities, the proponent shall finalise and submit a further version of the Cultural Heritage Management Plan (SA0006GH1401311448, Rev A, November 2019), in consultation with the Murujuga Aboriginal Corporation, to meet the objectives specified in condition 7-1.

7-3 The Cultural Heritage Management Plan required by condition 7-2 must:

- (1) specify the objectives to be achieved, as specified in condition 7-1;
 - (2) specify risk-based management actions that will be implemented to demonstrate compliance with the objectives specified in condition 7-1;
 - (3) specify measurable management target(s) to determine the effectiveness of the risk-based management actions;
 - (4) specify monitoring to measure the effectiveness of management actions against management targets;
 - (5) specify a process for revision of management actions and changes to proposal activities, in the event that the management targets are not achieved. The process must include an investigation to determine the cause of the management target(s) not being met;
 - (6) provide the format and timing to demonstrate that condition 7-1 has been met for the reporting period in the Compliance Assessment Report required by condition 4-6 including, but not limited to:
 - (a) verification of the implementation of management actions; and
 - (b) reporting on the effectiveness of management actions against management target(s); and
 - (7) provide evidence of consultation required by condition 7-2 and the outcomes of this consultation.
- 7-4 Ground disturbing activities may not commence until the proponent has received notice in writing from the CEO that the Cultural Heritage Management Plan satisfies the requirements of condition 7-3.
- 7-5 After receiving notice in writing from the CEO that the Cultural Heritage Management Plan satisfies the requirements of condition 7-3, the proponent must:
- (1) implement the provisions of the Cultural Heritage Management Plan; and
 - (2) continue to implement the Cultural Heritage Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated the objectives specified in condition 7-1 have been met.
- 7-6 In the event that monitoring, tests, surveys or investigations indicate non-achievement of management target(s) specified in the Cultural Heritage Management Plan, the proponent must:
- (1) report the non-achievement in writing to the CEO within twenty-one (21) days of the non-achievement being identified;
 - (2) investigate to determine the cause of the management target(s) not being achieved;

- (3) provide a report to the CEO within ninety (90) days of the non-achievement being reported as required by condition 7-7(1). The report must include:
 - (a) cause of management target(s) being exceeded;
 - (b) the findings of the investigation required by condition 7-7(2);
 - (c) details of revised and/or additional management actions to be implemented to prevent non-achievement of the management target(s); and
 - (d) relevant changes to proposal activities.

7-7 In the event that monitoring, tests, surveys or investigations indicate that one or more management action(s) specified in the Cultural Heritage Management Plan have not been implemented, the proponent must:

- (1) investigate to determine the cause of the management action(s) not being implemented;
- (2) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to the failure to implement management action(s);
- (3) provide a report to the CEO within twenty-eight (28) days of the non-compliance being identified. The report must include:
 - (a) cause for failure to implement management action(s);
 - (b) the findings of the investigation required by condition 7-8(2);
 - (c) relevant changes to proposal activities; and
 - (d) measures to prevent, control or abate the environmental harm which may have occurred.

7-8 The proponent:

- (1) may review and revise the Cultural Heritage Management Plan; or
- (2) must review and revise the Cultural Heritage Management Plan as and when directed by the CEO.

7-9 The proponent must implement the latest revision of the Cultural Heritage Management Plan required by condition 7-2, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 7-3.

Schedule 1

Table 1: Summary of the Proposal

Proposal Title	Scarborough Project – Nearshore Component
Short Description	<p>Woodside is proposing to develop the Scarborough gas field, with a target of achieving first gas production between 2023 and 2025. The Scarborough Project concept comprises subsea wells, a semi-submersible gas processing and compression floating production unit in offshore Commonwealth waters and export trunkline 434 kilometres long running to the Pluto LNG Facility on the Burrup Peninsula.</p> <p>The nearshore component subject of this referral includes the installation of the section of the trunkline running from the State waters boundary up to KP0 (approximately 1.5 m above HAT) (~32.7 kilometres long) and associated activities.</p>

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	Location	Authorised Extent
<i>Physical elements</i>		
Trunkline and trench	Figures 1 and 2	<p>A 32 inch carbon steel trunkline 32.7 kilometres long installed in a trench around 2–4.3 metres deep and approximately 30 m wide resulting in an indicative disturbance footprint of 1 km² for the trunkline and trench as shown in Figure 2. The trench would be backfilled with sand and/or rock material for stabilisation purposes along the trunkline as required.</p> <p>Concrete blocks backfilled with trenching material may also be required to provide reaction forces. These would be laid within the trench footprint and retained in place to maintain the reaction forces once the pipe is laid. The trench backfilling operations will cover these blocks on completion of the construction works.</p> <p>Anchoring will be required for the nearshore pipelay barge and other construction vessel activities. Piles may also be required due to the proximity to the Pluto trunkline which may prevent the use of anchors for the pipelay activities. It’s estimated that anchor spreads may be required within a distance of 750 m from the trunkline centreline resulting in a development envelope of 50 km² to include construction and dredging vessel anchoring associated with the trunkline installation and stabilisation activities.</p>
Temporary infrastructure and laydown	Figure 1	<p>A temporary groyne around 100 metres long would be constructed on the shoreline between the pre-excavated trench and the Pluto jetty to allow excavating equipment to access and excavate the rock berm currently covering the</p>

areas for the shore crossing		trench. A suitable storage location will be required for the excavated rock assuming that this rock will be used to reinstate the shore crossing rock berm following trunkline installation. Up to 0.03 km ² would be required at the shore crossing location for temporary offices, cranes and other equipment for the shore pull of the trunkline.
Spoil ground for disposal of dredged sediments	Figure 2	Spoil from the trunkline dredging operations will be placed in a combination of the spoil grounds listed below. The final spoil ground locations are subject to further engineering design and consultation with relevant stakeholders. The existing Spoil Ground locations are identified in Figure 2 and are not included in the development envelope area. Spoil Ground A/B (restricted to backhoe works) and 2B located in State Waters. Spoil Ground 5A located in Commonwealth Waters ¹ .
Rock/sediment source for backfilling	Figure 2	Sand and Rock materials may be required to assist with trunkline stabilisation. Sand is proposed to be obtained from borrow ground locations located in either State or Commonwealth waters. Rocks would be obtained from domestic or international sources.
Operational elements		
Dredging and disposal of material during the trenching	Figure 2	Dredging of maximum 2,781,700 m ³ during the trenching for the trunkline, of which a maximum of 1,612,600 m ³ will be in State Waters ² and within the development envelope described in Figure 2. Dredge spoil would be disposed of at Spoil Ground A/B, 2B and/or 5A. The volumes would be confirmed during detailed engineering design.
Rock/sediment placement	Figure 2	Sediment from the borrow ground and rock material would be required. The volumes would be confirmed during detailed engineering design.
Pre-commissioning testing of trunkline	No figure	Wet and/or dry pre-commissioning testing would need to be undertaken prior to trunkline operations. Total discharge volume for a wet pre-commissioning would be maximum 225,189, m ³ based on length (434 km) and trunkline internal diameter (32 inch). Bulk discharge of the hydrotesting water is likely to be undertaken in Commonwealth Waters. The nearshore component of the pipeline may be tested separately to provide pipeline stability prior to back fill/rock dumping activities or if a performance test of the nearshore component of the pipeline is required prior to back fill/rock dumping operations.

¹ Provided for information only but not assessed as part of this referral.

² All trenching volumes are based on 'in-situ' measurement (i.e. confirmed by hydrographic survey techniques).

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate.
EP Act	<i>Environmental Protection Act 1986</i>
ha	hectare
km	kilometre
km ²	Square kilometre
m ³	cubic metre

Attachments:

Figure 1. Development envelope and indicative footprint of the shore crossing site

Figure 2. Development envelope and indicative footprint



Figure 1: Development envelope and indicative footprint of the shore crossing site



Figure 2: Development envelope and indicative footprint

Schedule 2

Coordinates defining the areas shown in Figures 1 and 2 are held by the Department of Water and Environmental Regulation under the following reference number:

- Development Envelope DWERDT238579.

All coordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geocentric Datum of Australia 1994 (GDA94).