



Environmental
Protection
Authority

North West Shelf Project Extension Proposal

Woodside Energy Ltd.

Report 1727

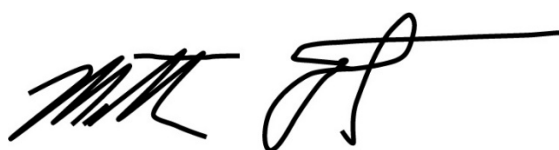
June 2022

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA) (EP Act). It describes the outcomes of the EPA's assessment of the North West Shelf Project Extension Proposal proposed by Woodside Energy Ltd.

The North West Shelf Project Extension Proposal was determined under the *Environment Protection and Biodiversity Conservation Act 1999* to be a controlled action and to be assessed by an accredited process. This document is also the result of that accredited process.

This assessment report is for the Western Australian and Commonwealth Ministers for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- an assessment of the matters of national environmental significance
- the EPA's recommendations as to whether or not the Extension Proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject
- other information, advice and recommendations as the Authority thinks fit.



Prof. Matthew Tonts
Chair
Environmental Protection Authority

27 June 2022

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Summary

Existing North West Shelf Project and Extension Proposal

The existing North West Shelf Project currently processes natural gas and fluids from the North West Shelf Joint Venture (NWSJV) field resources to produce up to 18.5 million tonnes per annum (Mtpa) of liquefied natural gas (LNG) at the North West Shelf Project. The existing North West Shelf Project includes key processing, storage and offloading facilities. These onshore and offshore facilities will be used for continued operation as set out in the North West Shelf Project Extension (Extension Proposal), and include:

- five LNG processing trains
- two domestic gas trains
- six condensate stabilization units
- three liquefied petroleum gas (LPG) fractionation units
- LPG, LNG and condensate storage facilities
- two jetties for export of LPG, LNG and condensate
- power generation and supporting utilities
- emergency, operational and storage and loading flares
- two subsea pipelines/trunklines (TL1 and TL2) within State waters crossing onshore to the project facilities
- the King Bay Supply Facility used for activities such as diesel storage, refueling, piloting and logistics
- associated infrastructure (Woodside 2018).

The Extension Proposal is a proposal to allow the continued future operation of the North West Shelf Project and the ongoing supply of gas and fluids. The proponent is seeking approval to continue to use the existing North West Shelf Project facilities for the:

- long-term processing of third-party gas and fluids and NWSJV field resources through the existing facilities described above, involves:
 - potential changes to feed gas composition
 - potential changes to composition of environmental discharge and emissions
 - potential construction of additional operational equipment to accommodate potential changes to feed gas composition or management of environmental discharge and emissions
- ongoing operation of the North West Shelf Project to enable long-term processing at the project facilities, up to 2070 which includes:
 - ongoing use of the existing facilities to process third party gas and fluids and NWSJV field resources
 - continued inspection, maintenance, repair and improvement programs

- continued maintenance dredging associated with jetties and berthing pockets
- replacement of equipment, plant and machinery as required
- continued emissions and discharges to the environment (the proponent will continue to assess emissions reduction opportunities (including NO_x, CO₂ and VOCs) that could result in a staged decrease in emissions over time
- continued monitoring and management of environmental impacts (Woodside 2019).

Context

Murujuga is the traditional Aboriginal name for the Dampier Archipelago and surrounds, including the Burrup Peninsula and Murujuga National Park. Murujuga has been listed on Australia's National Heritage List under the Dampier Archipelago (including Burrup Peninsula) by the Australian Government since 2007¹. Portions of the National Heritage Listing Area and the Murujuga National Park overlap (see Figure 5).

On 23 January 2020, the Murujuga Cultural Landscape was added to Australia's World Heritage Tentative List by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre.²

Murujuga has numerous important values including more than one million petroglyphs (rock art) in an area of more than 37,000 hectares, representing one of the most dense and diverse collections of rock art in the world. In addition, the Dampier Archipelago comprises 42 islands, islets and rocks, all within a 45-kilometre radius of Dampier having exceptional natural beauty, high conservation values and outstanding heritage.³

Consultation

The EPA published the proponent's referral information for the Extension Proposal (Woodside 2018) on its website for 7 days public comment (from 21 November 2018 to 27 November 2018). The EPA also published the proponent's environmental review document (ERD) (Woodside 2019a) on its website for public review for 8 weeks (from 18 December 2019 to 12 February 2020). The EPA considered the comments received during these public consultation periods in its assessment.

The large number of public submissions (133 submissions on the referral information and 19,869 submissions on the ERD) demonstrates the high level of public interest in the Extension Proposal.

¹ Commonwealth of Australia (2007). Gazette Special No. S127, Tuesday, 3 July 2007.

² Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environment and Energy)

³ Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environment and Energy).

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts and emissions. The sequence commences with avoidance, then moves to minimisation/ reduction/ rehabilitation, and offsets are considered as the last step in the hierarchy.

The proponent has considered the mitigation hierarchy in the development and assessment of its Extension Proposal, and as a result has:

- provided a greenhouse gas emissions trajectory to achieve net-zero emissions by 2050 (Woodside 2021b)
- committed to reducing oxides of nitrogen (NO_x) and volatile organic compound (VOC) emissions by 40% by the end of 2030 (Woodside 2022)
- produced an Air Quality Management Plan to monitor and manage emissions including NO_x, VOCs, sulfur dioxide (SO₂), and ozone (O₃), and support the implementation of the Murujuga Rock Art Strategy and Murujuga Rock Art Monitoring Program (Woodside 2021c)
- committed to avoiding and minimising direct impacts to Aboriginal heritage features through a number of measures including maintaining disturbance zones (areas within which operational activities take place), permits required for work outside these areas and cultural awareness training (Woodside 2019a)
- committed to continue the annual heritage audits with traditional owners and a qualified archaeologist within the onshore development envelope (Woodside 2021d)
- committed to continue access for traditional owners to the sites within the onshore development envelope (Woodside 2021d)
- minimised impacts to the marine environment through the implementation of the monitoring program and contingency management measures within the Marine Environmental Quality Management Plan (Woodside 2021e).

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment. The EPA has assessed the ongoing operation of the existing North West Shelf Project (including those elements approved under Ministerial statements 320, 334, 482 and 536). The EPA has regard to the combined and cumulative effects on the environment.

Greenhouse gas (GHG) emissions

- With no mitigation, scope 1 GHG emissions are estimated to be up to 7.7 Mtpa of carbon dioxide equivalent (CO₂-e) (Woodside 2019a and 2021b).
- With no mitigation, over the 50-year life of the Extension Proposal, total scope 1 GHG emissions are estimated to be up to 385 million tonnes (Mt) of CO₂-e (Woodside 2021b).

- With mitigation presented in the proponent's greenhouse gas management plan (GHGMP) (Woodside 2021b), GHG emissions from the Extension Proposal are estimated to:
 - a) commence at 7.7 Mtpa of CO₂-e
 - b) achieve net-zero GHG emissions by 2050 by reducing life of Extension Proposal emissions by 246.15 Mt of CO₂-e
 - c) be partially offset through the purchase and surrender of offsets to make-up any shortfall in achieving the net scope 1 GHG emissions reduction targets through avoidance and reduction actions
 - d) result in net scope 1 GHG emissions over the 50-year life of the Extension Proposal of up to 138.85 Mt of CO₂-e.
- The proponent estimates that the Extension Proposal's scope 3 GHG emissions from the third-party consumption of LNG, LPG, Domgas and condensate, will be approximately 80.19 Mtpa of CO₂-e based on currently available and quantifiable information (Woodside 2021b).
- The scope 2 GHG emissions associated with the Extension Proposal are considered to be minimal (0.002 Mtpa) as the vast majority of the power and energy requirements and their resulting GHG emissions will be generated on-site (Woodside 2021b).
- The EPA considers it reasonable to recommend a condition requiring the proponent to avoid, reduce and/or offset the total quantity of reservoir carbon dioxide released to the atmosphere from the date the Ministerial statement for the Extension Proposal is issued to 2029. From 2030 the proponent's proposed emissions reduction targets will exceed the equivalent amount of the estimated reservoir carbon dioxide in the gas feed. The recommended conditions to 2029 will reduce net scope 1 GHG emissions over the 50-year life from 138.85 Mt of CO₂-e to 128.2 Mt of CO₂-e.
- The EPA considers it is reasonable to recommend a condition which requires the Extension Proposal to achieve GHG emissions limits along a trajectory to net zero by 2050.
- The EPA recommends the GHGMP is implemented subject to the emissions reduction limits and continuous improvement through ongoing 5 yearly reviews.

Air quality

- The EPA has assessed the residual impact to human health and amenity from the Extension Proposal's predicted nitrogen dioxide (NO₂), sulphur dioxide (SO₂), ozone (O₃) and benzene emissions at sensitive receptors (Dampier, Karratha, Hearson Cove and Deep Gorge (Ngajarli) in a cumulative context with other existing and future emission sources. The EPA notes the proponent's commitments regarding air emissions reduction (including a commitment to reduce oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) by 40% by 2030).

- Predicted GLCs at all sensitive receptors remain below applicable criteria for current, future proposed, and worst case 'FBSIA' cumulative impact scenarios in the proponent's air quality impact assessment (Jacobs 2019b) and for scenario 3 in the DWER Study (Ramboll 2022).
- The EPA notes that the predicted increase in NO₂ deposition under the 'long-term, possible' scenario (KBSIA-KIO) is due to other future industry sources in the region as emissions of NO_x from the Extension Proposal are to be reduced by 40% by 2030.
- The EPA considers that the SO₂ deposition predictions are likely to be overestimated. Sulphur deposition is expected to have already decreased due to the International Maritime Organization (IMO) regulations mandating a maximum sulphur content in marine fuels (0.5%) (IMO 2020).
- The EPA considers that there may be a threat of serious or irreversible damage to rock art from industrial air emissions (in particular NO_x from the Extension Proposal) accelerating the natural weathering. The EPA considers that there is lack of full scientific consensus about potential residual cumulative impacts on the significant environmental values (including social surroundings values) associated with rock art within Murujuga. Therefore, after consideration of the precautionary principle and principle of intergenerational equity in particular, the EPA recommends that a cautious, preventative approach be taken, and the proponent be required to ensure no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates. Other recommended conditions include the reduction of oxides of nitrogen by 40% by 31 December 2030 and progressive minimisation of air emissions.
- The EPA also recommends that the Extension Proposal be required to meet future detailed air quality objectives and criteria which are developed for cumulative emissions sources when there is adequate certainty about these. Adequate certainty is expected to be available with the definition of criteria standards available from the Murujuga Rock Art Monitoring Program (DWER 2019), expected in 2023, and the EPA recommends that the Extension Proposal be required to comply with these at that time. If the recommendations are adopted, the EPA considers that the Extension Proposal (if implemented) is not expected to be inconsistent with the EPA's environmental factor objectives and principles of the *Environmental Protection Act 1986* (EP Act) which are relevant to rock art.

Social surroundings

- The EPA advises that, subject to appropriate objectives and the implementation of appropriate management measures, the likely residual impacts of the Extension Proposal on cultural heritage are:
 - a) unlikely to be a material impact as there are no planned impacts to 134 Aboriginal heritage sites and associated intangible heritage values within the onshore development envelope. Accidental impacts will be avoided and

minimised through a recommended condition requiring the implementation of the Cultural Heritage Management Plan (CHMP)

- b) sufficient to maintain traditional owner and custodian access to Aboriginal heritage sites and culturally significant areas within the development envelope during operation through the implementation of the CHMP
 - c) sufficient to maintain traditional owner and custodian access to Aboriginal cultural heritage sites within the development envelope following decommissioning subject to the implementation of recommended condition 4 which includes an objective to this effect
 - d) sufficient to maintain adequate consultation with traditional owners and custodians during the life of the Extension Proposal subject to the implementation of recommended condition 4 which requires a framework for consultation
 - e) sufficient to minimise odour impacts to traditional owners and custodians undertaking activities within the development envelope subject to the implementation of condition 3 requiring the proponent to adopt practicable and efficient technologies to minimise VOC emissions.
- The EPA considers that the Extension Proposal is likely to be consistent with the principles of the EP Act and EPA objective for social surroundings subject to the EPA's recommended conditions.

Marine environmental quality

- The EPA advises that the likely residual impact of the Extension Proposal on marine environmental quality are:
 - a) potential impacts to marine water quality from ongoing wastewater discharge to Mermaid Sound (including potential change to wastewater composition) are unlikely to be material, provided those emissions are subject to a condition requiring the implementation (and subsequent revision of) the Marine Environmental Quality Management Plan (MEQMP) (Woodside 2021d). The revision of the MEQMP will be conducted in consultation with the Murujuga Aboriginal Corporation (MAC) and Ngarluma Yindjibarndi Foundation Ltd (NYFL)
 - b) potential impacts to sediment from the migration of onshore contamination is unlikely to be material as per-and poly-fluoroalkyl substances (PFAS) levels are currently not detected or are well below limits, the proponent is phasing out the use of PFAS and implementing management measures. The EPA has recommended conditions requiring the MEQMP is updated to require monitoring of PFAS in sediments. A detailed investigation of the site is required under the *Contaminated Sites Act 2003*
 - c) unlikely to be material impacts to marine turbidity from short term maintenance dredging (for about two weeks every five to ten years). Dredging is licensed by Pilbara Port Authority and dumping of dredge spoil is regulated under the *Environmental Protection (Sea Dumping) Act 1981*.
- The EPA considers that the Extension Proposal is likely to be consistent with the principles of the EP Act and the EPA objective for marine environmental quality.

Holistic assessment

The EPA recognises that Murujuga is an area of outstanding conservation and heritage value, with one of the most dense and diverse collections of rock art in the world. The EPA is also aware of the potential for industry and other activities located within Murujuga to influence the complex interactions between environmental factors. These interactions have the potential to influence the environment in a holistic and non-linear nature, affecting all environmental values which are physically and intrinsically linked to social surroundings, specifically cultural heritage.

The EPA advises that there is a lack of full scientific consensus about potential residual cumulative impacts on the significant environmental values associated with rock art within Murujuga. Therefore, after consideration of the precautionary principle and principle of intergenerational equity, in particular, the EPA recommends that a cautious, preventative approach be taken, and the Extension Proposal be required to ensure no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates.

To ensure heritage and cultural values which may be affected by impacts on other key environmental factors continue to be considered in a holistic way, the EPA has recommended that the NYFL and MAC be consulted by the proponent when it submits and reviews management plans for key environmental factors.

The EPA has also recommended five yearly environmental performance reporting on trends in air emissions (that have the potential to impact on rock art and human health) and trends in the quality of discharges to the marine environment, for the duration of the Extension Proposal.

When the separate environmental factors of the Extension Proposal were considered together as part of the EPA's holistic assessment, the EPA formed the view that the impacts from the Extension Proposal would not alter the EPA's conclusions about consistency with the EPA factor objectives.

Conclusion and recommendations

The EPA has taken the following into account in its assessment of the Extension Proposal:

- environmental values which may be affected by the Extension Proposal
- residual impacts, emissions and effects in relation to key environmental factors, separately and holistically. This has included considering cumulative impacts of greenhouse gas emissions on the WA environment, and cumulative air quality impacts in the Burrup region (Murujuga)
- likely environmental outcomes (taking into account the EPA's recommended conditions) and the consistency of these with the EPA's objectives for the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the Extension Proposal on the environment

- the EP Act principles.

The EPA recommends that the Extension Proposal may be implemented subject to the conditions recommended in Appendix A.

Other advice

To support the existing measures to manage impacts to Murujuga, the EPA considers that there is a need for the Government of Western Australia to establish an overarching and strategic environmental management framework (e.g. an Environmental Protection Policy under Part III of the EP Act or other relevant policy and guidance instruments) to strategically manage the potential for cumulative effects on the sea, country and airshed of Murujuga. In the meantime, the EPA recommends that when the opportunity arises to review the ministerial conditions of other existing industrial facilities within Murujuga, the review should consider whether the conditions should include additional requirements to reduce the cumulative risk of impacts to rock art from air emissions.

The EPA considers that the values of the sea and land environments of Murujuga and its surrounds are unique environmental assets of global significance that require a cautious approach. The EPA notes that future activities and developments should assess compatibility with the protection of values within Murujuga and its surrounds. The EPA considers that there is an opportunity to strengthen the protection of Murujuga through avoidance of activities and development proposals that could use alternative locations, for example, the Maitland Industrial Estate. The EPA will scrutinise activities and developments that impact upon key values of significance.

The EPA has undertaken consultation with MAC throughout the assessment of the Extension Proposal. The EPA highlights the following issues which have been raised by MAC in relation to development in Murujuga and address matters which are outside the assessment scope of this Extension Proposal:

- MAC supports the implementation of a strategic environmental management framework to manage the potential for cumulative effects on the sea, country and airshed of Murujuga.
- MAC is seeking access to all raw data and interpretation of this data.
- MAC is seeking for proponents situated within Murujuga to implement locally based offset projects, carbon trading and research into climate change adaptation and resilience on Murujuga associated with GHG emissions.
- MAC is seeking the development of a Marine Environmental Quality Management Plan that addresses all values.
- MAC welcomes conditions that require proponents to engage with the Corporation during the implementation and operation of proposals including management plans that address social and economic aspects.

1 Extension Proposal

Existing North West Shelf Project

The North West Shelf Project, also known as Karratha Gas Plant was originally commissioned in 1984 and has undergone a number of expansions, and additional facilities have been installed since it was first commissioned (Woodside 2018).

At present, the existing North West Shelf Project processes natural gas and fluids from the North West Shelf Joint Venture (NWSJV) field resources to produce up to 18.5 mtpa of liquefied natural gas (LNG) at the North West Shelf Project.

The existing North West Shelf Project includes key processing, storage and offloading facilities. These onshore and offshore facilities will be used for continued operation as set out in the North West Shelf Project Extension (Extension Proposal), and include:

- five LNG processing trains
- two domestic gas trains
- six condensate stabilisation units
- three liquefied petroleum gas (LPG) fractionation units
- LPG, LNG and condensate storage facilities
- two jetties for export of LPG, LNG and condensate
- power generation and supporting utilities
- emergency, operational and storage and loading flares
- two subsea pipelines/trunklines (TL1 and TL2) within State waters crossing onshore to the project facilities
- the King Bay Supply Facility used for activities such as diesel storage, refueling, piloting and logistics
- associated infrastructure (Woodside 2018).

There are four existing Ministerial Statements (MS) that authorise particular elements of the existing North West Shelf Project:

- MS 320 allowed the establishment of additional facilities for LPG extraction and export within the existing onshore treatment plant.
- MS 334 allowed a change to dredge spoil disposal from No Name Creek to marine disposal.
- MS482 allowed the construction of a second trunkline and load out facilities.
- MS 536 allowed the construction of two additional LNG processing trains (trains 4 and 5) with support facilities. The production capacity of the existing North West

Shelf Project is 18.5 Mtpa, being 7.5 Mtpa for LNG trains 1 to 3 and 11 Mtpa for LNG trains 4 and 5.

Other existing operations at the existing North West Shelf Project are not the subject of a current Ministerial Statement. However, those operations are currently regulated by a licence issued under Part V of the *Environmental Protection Act 1986* (EP Act) for air and marine emissions.

North West Shelf Project Extension Proposal (Extension Proposal)

The Extension Proposal, subject of this assessment, is a proposal to allow the continued future operation of the North West Shelf Project and the ongoing supply of gas and fluids. The proponent is seeking approval to continue to use the existing North West Shelf Project facilities for the:

- Long-term processing of third-party gas and fluids and NWSJV field resources through the existing facilities described above, which includes:
 - potential changes to feed gas composition
 - potential changes to composition of environmental discharges and emissions
 - potential construction of additional operational equipment to accommodate potential changes to feed gas composition or management of environmental discharge and emissions.

- Ongoing operation of the existing North West Shelf Project to enable long-term processing at the project facilities, up to 2070 which includes:
 - ongoing use of the existing facilities to process third party gas and fluids and NWSJV field resources
 - continued inspection, maintenance, repair and improvement programs
 - continued maintenance dredging associated with jetties and berthing pockets
 - replacement of equipment, plant and machinery as required
 - continued emissions and discharges to the environment (the proponent will continue to assess emissions reduction opportunities (including NO_x, CO₂ and VOCs) that could result in a staged decrease in emissions over time
 - continued monitoring and management of environmental impacts (Woodside 2018).

The Extension Proposal is located on the Burrup Peninsula, approximately 10 kilometres (km) north-east of Dampier and 18 km north-west of Karratha in the Pilbara region of Western Australia (see Figure 1).

The proponent for the Extension Proposal is Woodside Energy Ltd as operator for, and on behalf of the North West Shelf Joint Venture (NWSJV).

The existing North West Shelf Project's onshore and offshore development envelopes are provided in Figures 2 and 3. These development envelopes remain unchanged for the Extension Proposal.

The Extension Proposal is a significant amendment to the components of the existing North West Shelf Project which are subject to MS 320, MS 334, MS 482 and MS 536. The Extension Proposal was referred to the Environmental Protection Authority (EPA) by the proponent on 14 November 2018. The referral information (Woodside 2018) was published on the EPA website for seven days public comment. On 10 December 2018, the EPA decided to assess the Extension Proposal and set the level of assessment at the level of Public Environmental Review.

The Environmental Scoping Document (ESD) (Woodside 2019b), which the proponent prepared to define the work to be undertaken to assess the preliminary key environmental factors, was released for public review from 6 June 2019 to 20 June 2019. The Environmental Review Document (ERD) (Woodside 2019a), which the proponent prepared to assess the impacts of the Extension Proposal, was released for public review from 18 December 2019 to 12 February 2020.

The Extension Proposal was determined under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process.

In assessing the Extension Proposal, the EPA has assessed the environmental effects of the Extension Proposal in the context of the ongoing operation of the existing North West Shelf Project. The EPA has had regard to the combined effects there might be on the environment and has considered the implementation conditions that should be applied to ensure the combined and ongoing effects of the amended proposal can be implemented consistently with the EPA's current environmental factors objectives.

Consideration of these issues is included in the key environmental factor and holistic assessment sections below (where relevant).

The elements of the Extension Proposal which have been subject to the EPA's assessment are included in Table 1.

Table 1: Extension Proposal elements which are likely to affect the environment

Proposal element	Existing North West Shelf Project	Extension proposal
<i>Operational elements</i>		
Reserve Source	North Rankin, Goodwyn gas fields and gas received through onshore receipt points and tie-ins	NWSJV field resources and third-party gas and fluids
LNG production capacity	18.5 Mtpa	18.5 Mtpa
CO ₂ -e emissions	2.9 Mtpa (Trains 4 and 5) 4.8 Mtpa (Trains 1 to 3)	7.7 Mtpa

Proposal element	Existing North West Shelf Project	Extension proposal
NO _x emissions	Not specified	8,900 tpa ¹
Project life	30+ years	Up to 2070

¹ This estimate is based on each turbines' maximum exhaust gas flow rate (from vendor data). It is based on measured exhaust gas concentrations for licence compliance, engineering calculation estimation and NPI Emissions Estimate Techniques.

Extension Proposal amendments

The Extension Proposal content is set out in section 2 of the proponent's referral supporting document (Woodside 2018), which is available on the EPA website.

During the assessment process, the proponent requested a change to the referred proposal. The changes were assessed to be unlikely to significantly increase any impact of the proposal on the environment.

The changes pertained to:

- Renaming a development envelope from NWS1 Project (onshore component physical disturbance; excluding KBSF2) to NWS Project (onshore component).
- Reducing the size of the NWS Project (Karratha Gas Plant and Adjacent Buffer Zone) development envelope from 466 ha to 331 ha.
- Including an element titled NWS Project (KBSB3, Southern Expansion Lease and Access Road) with a development envelope of 193 ha and disturbance area of 104 ha.
- Increasing the development envelope of the NWS Project (offshore component; State waters) from 670 ha to 700 ha.
- Including a quantification of the future NO_x emissions based on current turbine maximum exhaust gas flow rates.
- Confirmation that the Extension Proposal involves the ongoing operation of the North West Shelf Project to 2070.
- Amending the description of the reserve source to be consistent with Attachment 4 of MS 536.

The changes were assessed to be unlikely to significantly increase any impacts of the Extension Proposal. The EPA Chair's notice of 16 December 2019 (EPA 2019) consenting to the change is available on the EPA website.

The elements of the Extension Proposal which has been subject to the EPA's assessment are included in Table 1.

Extension Proposal alternatives

The only alternative considered in the referral document to the Extension Proposal was the 'depletion of the current NWSJV field resources and the subsequent decommissioning of the North West Shelf Project' (Woodside 2018).

The proponent considered (Woodside 2018) the option to continue the operation of the existing North West Shelf Project (Extension Proposal) for the following reasons:

- the construction of other/new facilities to process third party gas and fluids, would cause additional physical disturbance onshore and offshore
- maximising the use of the existing facilities is a key enabler for production of stranded gas or fields with marginal economics
- failure to develop future gas reserves, may present a decrease in energy security for future customers and domestic requirements
- the proponent considers the development of natural gas as an energy resource is recognised as part of the transition as society moves to a lower carbon future, being less carbon-intensive than other fossil fuels such as coal and oil
- the Extension Proposal is expected to assist in supporting WA's ongoing economic growth and local employment opportunities over the life of the extended operations (Woodside 2018).

Extension Proposal context

Murujuga is the traditional Aboriginal name for the Dampier Archipelago and surrounds, including the Burrup Peninsula and Murujuga National Park. Murujuga has been listed on Australia's National Heritage List under the Dampier Archipelago (including Burrup Peninsula) by the Australian Government since 2007⁴. Portions of the National Heritage Listing Area and the Murujuga National Park overlap (see figure 4).

On 23 January 2020, the Murujuga Cultural Landscape was added to the Australia's World Heritage Tentative List by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre.⁵

Murujuga has numerous important values including more than one million petroglyphs in an area of more than 37,000 ha, representing one of the most dense and diverse collections of petroglyphs in the world. In addition, the Dampier Archipelago comprises 42 islands, islets and rocks, all within a 45 km radius of Dampier having exceptional natural beauty, high conservation values, and outstanding heritage.⁶

⁴ Commonwealth of Australia (2007). Gazette Special No. S127, Tuesday, 3 July 2007.

⁵ Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environmental and Energy)

⁶ Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environmental and Energy)



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Figure 1: Regional location



Figure 2: North West Shelf Project Extension Proposal development envelopes



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Figure 3: North West Shelf Project Extension Proposal onshore development envelope and King Bay Supply Base development envelope

2 Assessment of key environmental factors

This section includes the EPA's assessment of the key environmental factors.

The EPA has assessed the ongoing operation of the existing North West Shelf Project (including those elements approved under MS 320, MS 334, MS 482 and MS 536). The construction and commissioning of the physical elements approved under MS 320, MS 334, MS 482 and MS 536 are complete.

The EPA has had regard to the combined and cumulative effect that the implementation of the Extension Proposal may have on the following environmental factors.

2.1 Greenhouse gas emissions

2.1.1 Environmental objective

The EPA's environmental objective for greenhouse gas (GHG) emissions is to *reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change* (EPA 2021b).

2.1.2 Extension Proposal elements with potential impacts

The proponent has developed the North West Shelf Project Extension Greenhouse Gas Management Plan, Revision 7, G2000RF1401194400 (GHGMP) (Woodside 2021b) which has been used to inform the assessment of GHG emissions. The proponent has provided an estimate of annual and the life of the Extension Proposal scope 1, scope 2 and scope 3 GHG emissions which are as follows:

- Scope 1 GHG emissions are up to 7.7 Mtpa CO₂-e (unmitigated). This estimate is based on LNG production of 18.5 Mtpa and includes the production of domgas, LPG and condensate. Total scope 1 emissions over the 50-year life of the Extension Proposal (with no mitigation) are expected to be 385 million tonnes (Mt) of CO₂-e⁷.
- Scope 2 GHG emissions (estimated to be less than 0.002 Mtpa CO₂-e) are emitted because of consumption of electricity at the King Bay Supply Base located near the Pluto LNG Facility.
- The proponent estimates that the Extension Proposal's maximum scope 3 GHG emissions will be approximately 80.19 Mtpa of CO₂-e. This is based on the third-party use of LNG, LPG, condensate and domgas products as well as transport of LNG to customers (Woodside 2021b).

⁷ Maximum scope 1 GHG emissions are based on 50 years of operation at full capacity. The proponent expects that GHG emissions would decline towards the end of project life.

It should be noted that the Extension Proposal is to operate the existing North West Shelf Project up to 2070. For the assessment, the GHG emissions have been calculated for a 50-year operating period (2020 to 2070).

To put the proposal's unmitigated scope 1 emissions into context, the Extension Proposal's unmitigated scope 1 GHG emissions have been compared to State and Australian total GHG emissions (using 2019 reported GHG emissions as future emissions are unknown). Based on 2019 GHG emissions (for the State and nationally) and the Extension Proposals maximum annual scope 1 emissions (7.7 Mt CO₂-e), the estimated percentage contribution of the Extension Proposal's emissions to State and national GHG emissions would be:

- approximately 8.3% of WA's total GHG emissions (which were 91.85 Mt of CO₂-e in 2019) (Commonwealth of Australia 2021a)
- approximately 1.4% of Australia's total GHG emissions (which were 518.9 Mt of CO₂-e in 2019) (Commonwealth of Australia 2021b).

It should be noted that the scope 1 GHG emissions reported to the Clean Energy Regulator for the existing North West Shelf Project in 2019 was 6.8 Mt of CO₂-e.

The proponent commissioned a benchmarking assessment in 2019 (Jacobs 2019a) which is Appendix F of the ERD (Woodside 2019a) to compare the GHG emissions performance of the current North West Shelf Project against other comparable facilities in Australian and internationally. The highest GHG intensity for the 4 years of data utilised in the assessment was 0.41 t CO₂-e / t LNG (this does not include the transport and end-combustion of LNG produced).

The benchmarking assessment shows the current North West Shelf Project's emissions intensity:

- for Trains 1 to 5 is lower than the average for facilities in Australia (0.44 t CO₂-e / t LNG)
- is similar to international facilities 'located in a similar climate and of similar age' (Jacobs 2019a).

Noting the variable carbon dioxide content of feed gases, the benchmarking assessment also calculated the emissions intensity without the reservoir emissions from the Acid Gas Removal Unit (AGRU) to be 0.33 t CO₂-e / t LNG for the Extension Proposal. When using the GHG intensity without reservoir emissions, the emissions intensity for the Extension Proposal is slightly higher than the average for the Australian facilities (0.31 t CO₂-e / t LNG) (Jacobs 2019a).

The *Environmental factor guideline – Greenhouse gas emissions* (EPA 2020a) (GHG Guideline) provides that, generally, GHG emissions from a proposal will be assessed where they exceed 100,000 tonnes of scope 1 GHG emissions each year measured in CO₂-e. This is currently the same as the threshold criteria for designation of a large facility under the Australian Government's *Safeguard Mechanism*.

‘Global warming potentials (GWPs) are values that allow direct comparison of the impact of different greenhouse gases in the atmosphere by comparing how much energy one tonne of a gas will absorb compared to one tonne of carbon dioxide’ (Australian Government Clean Energy Regulator 2021).

Amendments were made to the National Greenhouse and Energy Reporting Regulations 2008 on 1 July 2020 providing updates to GWPs for all greenhouse gases reported under NGER (except carbon dioxide). Currently the GWP for one tonne of methane is 28. The Extension Proposal’s GHG emissions have been calculated using GWPs aligned with the National Greenhouse and Energy Reporting Regulations 2008 as of 1 July 2020 (Woodside 2021b).

Noting that scope 2 emissions are negligible, the Extension Proposal’s GHG emissions assessed in this report hereinafter relate to scope 1 GHG emissions of up to 7.7 Mtpa of CO₂-e.

The key sources of GHG emissions from the Extension Proposal include (Woodside 2021b):

- gas turbine compressors used to liquefy natural gas, estimated to produce about 4.1 Mtpa of CO₂-e
- acid gas removal: removal and venting of carbon dioxide from the gas stream during gas processing, estimated to produce about 1.64 Mtpa CO₂-e (reservoir emissions component)
- acid gas removal: venting of methane carried over in carbon dioxide vent stream gas, estimated to produce 0.1 Mtpa of CO₂-e
- compressor seal vents, estimated to produce 0.05 Mtpa of CO₂-e
- gas turbines used to generate on site electricity, estimated to produce about 1.2 Mtpa of CO₂-e
- other emissions sources (flaring, production of domestic gas, and production of condensate), estimated to be 0.592 Mtpa of CO₂-e
- fugitive emissions, estimated to be less than 0.007 Mtpa of CO₂-e.

2.1.3 Consultation

Consultation on the Extension Proposal raised significant public concerns related to:

- the Extension Proposal’s contribution to climate change
- the need for the proponent’s GHG emissions targets to align with current Government policy
- requiring the proponent to use best available technology to reduce GHG emissions.

2.1.4 Impact minimisation measures (including regulation by other decision-making authorities)

The Extension Proposal utilises an existing and operating facility (existing North West Shelf Project). The proponent proposes to continue operation of the North West Shelf Project up to 2070 as a facility that is 'commercially capable of accepting gas for processing from other resource owners' (Woodside 2021b). The proponent proposes to make modifications to the facility to enable processing of third-party gas and fluids as well as upgrades to metering to facilitate processing of third-party gas and fluids.

The GHGMP (Woodside 2021b) contains interim and long-term GHG emissions reduction targets commencing in 2025, to achieve net zero GHG emissions by 2050. These targets and the Extension Proposal's key GHG emissions sources are presented in Figure 4. It should be noted that the proponent has not proposed to mitigate GHG emissions for the period of 2020 to 2024.

Interim emissions reduction targets 2025 to 2030

The interim GHG emissions reduction targets presented in the GHGMP (Woodside 2021b) are to:

- 'maintain scope 1 emissions below 6.55 million tonnes per year by 2025. This is 15% lower than the existing project emissions baseline'
- 'maintain scope 1 emissions below 5.39 million tonnes per year by 2030. This is 30% lower than the existing project baseline' (Woodside 2021b).

Long-term emissions reduction targets

The long-term 'aspirational' GHG emissions reduction targets presented in the GHGMP are:

- 'Avoid, reduce or offset GHG emission by 47% by 2035
- Avoid, reduce or offset GHG emissions by 65% by 2040
- Avoid, reduce or offset GHG emissions by 82% by 2045
- Avoid, reduce or offset GHG emissions by 100% by 2050' (Woodside 2021b).

Reservoir emissions

The Commonwealth Government's Safeguard Mechanism Document defines reservoir carbon dioxide as tonnes of reservoir carbon dioxide that were separated in an AGRU (from natural gas, crude oil mixtures or products produced from extracted hydrocarbons) as part of a series of activities including natural gas processing (Commonwealth of Australia 2021c).

The EPA notes that reservoir carbon dioxide due to acid gas removal (removal and venting of carbon dioxide from the gas stream during gas processing) is estimated to produce about 1.64 Mtpa of CO₂-e (reservoir emissions component).

The EPA notes the proponent's proposed emissions reduction targets, and that reservoir carbon dioxide is estimated to be 21.4% of scope 1 GHG emissions (approximately 1.64 Mtpa). The proponent is only proposing to avoid, reduce or

offset the equivalent of 100% of estimated reservoir carbon dioxide emissions from 2030 onwards.

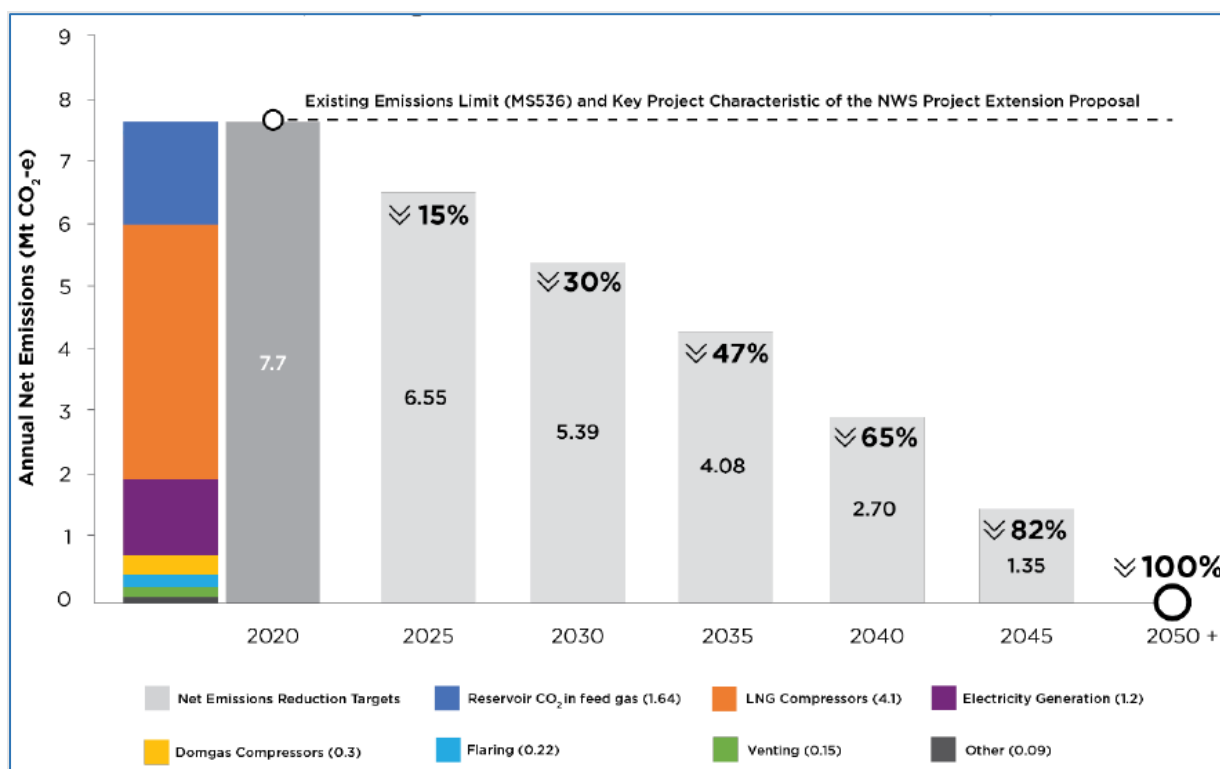


Figure 4: Extension Proposal interim and long-term emissions reduction targets and emissions sources (Woodside 2021b)

In the GHGMP, the proponent has proposed a series of management actions to mitigate GHG emissions. These include to:

- establish and achieve interim and long-term emissions reduction targets as shown in Figure 4
- identify and adopt management and mitigation measures including improving energy efficiency, reducing fuel use and intensity, and minimising flaring
- establish annual targets for flared gas to be consumed by the Extension Proposal
- identify emissions reduction opportunities for the Extension Proposal that have recently been implemented or that are to be implemented (Table 4-2 of the GHGMP (Woodside 2021b))
- undertake five-yearly assessments to identify 'practicable and reasonable' opportunities to improve GHG emissions performance
- offset GHG emissions in accordance with the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015
- deliver annual and five-yearly reporting of Scope 1 and Scope 2 GHG emissions, emissions intensity and any offsets acquired and surrendered in that period (Woodside 2021b).

With regard to the emissions reduction targets for the 50 year operation presented in the GHGMP (Woodside 2021b), and assuming the level of GHG emissions are constant for each five-year period, it is estimated that the lifetime (50 years) net Scope 1 GHG emissions would be reduced from 385 Mt of CO₂-e to 138.85 Mt of CO₂-e (net reduction of 246.15 Mt).

The EPA notes that the proponent will be subject to reporting requirements to the Clean Energy Regulator to comply with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act).

2.1.5 Assessment of impacts to environmental values

The Extension Proposal will not increase GHG emissions beyond the maximum 7.7 Mtpa for the existing North West Shelf Project. However, as the Extension Proposal is for the ongoing use of the North West Shelf Project up to 2070, the Extension Proposal would result in an increase to the total life of proposal emissions.

There is an established link between cumulative GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on WA's environment and environmental values. For example, climate change has already caused significant drying of the State's South-West, and the Intergovernmental Panel on Climate Change (IPCC) "The Physical Science Basis" report August 2021 shows Southern Australia as already having observed change in hot extremes and agricultural and ecological drought. Changes like these in turn place significant additional pressures on water resources, flora and fauna, marine environmental quality, and social surroundings of WA's environment.

The EPA advises that the specific environmental impacts of the Extension Proposal's GHG emissions are not known with certainty. However, as cumulative GHG emissions from a range of sources have an impact on WA's environment, and consistent with its GHG Guidance (EPA 2020a) that it will usually assess GHG emissions where they are more than 100,000 tonnes of CO₂-e per annum, the EPA has considered the GHG emissions from the Extension Proposal as a key environmental factor.

The EPA's GHG Guideline (EPA 2020a) recognises that WA's cumulative GHG emissions sources are expected to continue to increase in the short to medium term. However, in the meantime the objective of the GHG Guideline is *to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change*.

The intent of the EPA's GHG Guideline (EPA 2020a) is to inform the development and assessment of emissions (and emissions reduction) from specific proposals, not pre-determine the outcome of the EPA's assessment. Consistent with this, the EPA assesses proposals where GHG emissions are a key environmental factor on a case-by-case basis and recognises that a flexible approach is important to drive innovation and improvement in best practice technologies.

To provide a consistent framework for this case-by-case assessment, the EPA usually considers a proposal's annual and total (life of proposal) contributions to GHG emissions, and the proponent's contribution and trajectory towards the goal of net zero by 2050, having regard to the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, the Intergovernmental Panel on Climate Change's (IPCC) 1.5 report (IPCC 2021a) and other policy instruments which seek achievement of net zero emissions by 2050 to reduce the risk of global temperature increase of more than 1.5 degrees.

The EPA notes that since the UNFCCC Paris Agreement and IPCC 1.5 Report (IPCC 2021b), the IPCC "The Physical Science Basis" report August 2021 now indicates 1.5 degrees of global warming is more likely than not to be exceeded in the near term (2021-2040) even under low and very low GHG emissions scenarios (IPCC 2021b). Global temperatures could decline back toward 1.5 degrees of global warming by the end of the 21st century, but only under a very low GHG emissions scenario (IPCC 2021b).

In relation to the scope 1 GHG emissions from the Extension Proposal, the EPA had particular regard to:

- annual and total (life of proposal) contributions to GHG emissions
- the emissions intensity of the proposal (including by considering industry benchmarking)
- whether the proponent has provided emissions reduction targets over time in accordance with a trajectory (based on 5 yearly targets) towards net zero by 2050
- emissions reduction this decade
- whether it has incorporated continual improvement; transparency and reporting; and whether it has considered offsetting emissions.

In its consideration, the EPA has noted:

- Total (life of proposal) scope 1 GHG emissions from the Extension Proposal would be up to 385 Mt of CO₂-e with no mitigation (based on 50 years of operation). With the proponent's proposed mitigation, the Extension Proposal would result in net scope 1 GHG emissions estimated at up to 138.85 Mt of CO₂-e (assuming that net GHG emissions are constant within each five-year period) over the 50-year project lifetime (to 2070). With mitigation, the Extension Proposal's lifetime net scope 1 GHG emissions will reduce by 246.15 Mt of CO₂-e.
- Based on 2019 GHG emissions (for the State and Australia wide) and the Extension Proposal's maximum annual scope 1 emissions (7.7 Mtpa of CO₂e), the estimated percentage contribution of the Extension Proposal's unmitigated GHG emissions are approximately 8.3% of WA's total GHG emissions and approximately 1.4% of Australia's total GHG emissions.
- The proponent's benchmarking assessment showed that the emissions intensity (with reservoir carbon dioxide) is 0.41 t CO₂-e / t LNG and this emissions intensity

is lower than the average for facilities in Australia (0.44 t CO₂-e / t LNG) and is similar to international facilities 'located in a similar climate and of similar age' (Jacobs 2019a).

- The proponent's benchmarking assessment showed that the emissions intensity (excluding reservoir carbon dioxide) is 0.33 t CO₂-e per t LNG, and this shows that the proposal's emissions intensity (excluding reservoir carbon dioxide) is slightly higher than the average for facilities in Australia (0.31 t CO₂-e / t LNG) (Jacobs 2019a).
- The proponent's trajectory (based on five yearly targets) towards net zero GHG emissions by 2050.
- The proponent is not proposing to mitigate GHG emissions from 2020 to 2024.
- The proponent is not proposing to avoid, reduce and/or offset the equivalent amount of reservoir carbon dioxide emissions until 2030 onwards.
- The proponent's proposed emissions reduction this decade of 5.75 Mt (assuming constant emissions for the 2020 to 2024 and 2025 to 2029 periods).
- The proponent's proposed use of offsets to ensure a trajectory (based on 5 yearly targets) towards net zero GHG emissions by 2050 (if continuous improvement opportunities are not sufficient).
- The EPA has also considered as part of its holistic assessment whether the Extension Proposal is a sufficiently large source of WA's GHG emissions that refusal of it could be seen to make a meaningful contribution to reducing WA's emissions consistent with achievement of the long-term temperature goal of limiting global warming to 1.5 degrees. The EPA's assessment of this is in section 3 (holistic assessment).

2.1.6 Consideration of conditions

The EPA has considered whether the residual impacts are consistent with the EPA factor objective *to reduce net GHG emissions in order to minimise the risk of environmental harm associated with climate change* (EPA 2020a).

In doing so, the EPA has also considered whether reasonable conditions could be imposed to prevent potential inconsistency with the EP Act principles and the EPA's factor objective.

The EPA considers that it is reasonable to recommend a condition that requires the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions (tonnes of reservoir carbon dioxide separated in an AGRU) released to the atmosphere for the period commencing from the date of the Statement to 2024 and the period from 2025 to 2029, rather than delay until 2030.

From 2030, the proponent's proposed emissions reduction targets will exceed the equivalent amount of reservoir carbon dioxide in the feed gas (based on the estimate of 1.64 Mtpa in the proponent's GHGMP (Woodside 2021b)). The EPA's recommended condition will further reduce the net scope 1 GHG emissions from the

Extension Proposal from 138.85 Mt to 128.2 Mt (assuming that net GHG emissions are constant within each five-year period) over the 50-year project lifetime (to 2070).

The EPA considers it is reasonable to recommend a condition which requires the Extension Proposal to achieve GHG emissions limits along a trajectory (based on 5 yearly limits) from 2030 towards net zero by 2050. To provide certainty and transparency, the recommended condition is based on the Extension Proposal achieving (or exceeding) emissions reduction limits for each five-year period, rather than the approach based on the reduction and aspirational targets as proposed in the GHGMP.

The EPA also considers it is reasonable to recommend the proponent implement the GHGMP (revision 7 dated December 2021), provided it is not inconsistent with the requirement to avoid, reduce and/or offset reservoir emissions and the GHG emissions reduction limits in the recommended conditions.

The EPA considers that a revision to the GHGMP is required to be developed within twelve months of the issue of the statement. The EPA recommends that the proponent develop the revised GHGMP in consultation with MAC and NYFL.

The revised GHGMP will be subject to the emissions reduction limits, and also subject to continuous improvement through ongoing 5 yearly reviews. Conditions relating to peer reviews will provide certainty regarding calculations of estimated GHG emissions. Conditions relating to reporting, audits, and summary plans and reports are also recommended to increase transparency and continuous improvement of the proposal's GHG emissions and emissions intensity.

The majority of electricity consumed at the Extension Proposal will be generated on site and therefore is considered as Scope 1 GHG emissions. The EPA does not consider it reasonable to impose conditions on Scope 3 GHG emissions at this stage because those emissions are beyond the reasonable control of the proponent. As noted earlier, scope 2 GHG emissions are negligible.

The GHG conditions recommended by the EPA require achievement of specific GHG emissions reduction limits but are flexible enough to ensure the GHGMP includes innovation and practicable technologies.

The EPA notes that the science and policy of GHG emissions and climate change are rapidly evolving. The EPA advises that the GHG condition framework is able to be responsive to such evolution, particularly by enabling reviews of the GHGMP to reflect any significant changes (e.g. if there are material changes to relevant State, Commonwealth or international GHG science or policy). The EPA also notes that the Minister has the ability to direct the EPA to inquire into Ministerial Statement conditions (including GHG conditions) at any time.

The EPA considers the GHG conditions it is recommending will be reasonably responsive to take account of changes in this evolving area as well as provide the flexibility to deliver innovation and improvement in technologies. The conditions are

also generally consistent with the GHG guideline (EPA 2020a) which is based on a continuous improvement approach to emissions reduction.

2.1.7 Summary of key factor assessment and recommended regulation

The EPA has considered whether the residual emissions from the proposal are consistent with the principles of the EP Act (see Appendix C) and with the EPA factor objective for GHG emissions.

In doing so, the EPA has also considered whether reasonable conditions could be imposed to reduce potential inconsistency with the EP Act principles and the EPA's factor objective.

The EPA advises that, with the application of the recommended condition 2, the proponent's continuous improvement, and the trajectory towards net zero GHG emissions by 2050, the Extension Proposal is generally consistent with the EPA's GHG Guideline (EPA 2020a).

With the recommended conditions, the Extension Proposal would result in residual net Scope 1 GHG emissions of up to 128.2 Mt of CO₂-e over the 50-year life of the Extension Proposal. Although this represents a significant reduction from the 385 Mt of CO₂-e estimated from the Extension Proposal without mitigation, whether this reduction in net Scope 1 GHG emissions is sufficient to minimise the risk to climate change impacts to WA's environment depends on the state of cumulative emissions over time (such as whether any current emission sources discontinue).

The EPA assessment findings are presented in Table 2.

Table 2: Summary of assessment for GHG emissions

No.	Residual emissions	Assessment finding	Recommended conditions and DMA regulation
1.	<p>Scope 1 emissions are expected to commence at 7.7 Mtpa of CO₂-e and reduce to net zero by 2050 (Woodside 2021b). GHG emissions of 7.7 Mtpa, with no additional mitigation are estimated to constitute approximately 8.3% of WA's and approximately 1.4% of Australia's total reported annual GHG emissions (based on 2019 data).</p> <p>The proponent estimates (Woodside 2019b) that the Extension Proposal's Scope 3 GHG emissions, will be approximately</p>	<p>With the recommended conditions, the Extension Proposal would result in residual net Scope 1 GHG emissions of up to 128.2 Mt of CO₂-e over the 50-year life of the Extension Proposal.</p> <p>The following aspects of the Extension Proposal are generally consistent with the GHG Guideline (EPA 2020a):</p> <ul style="list-style-type: none"> reduction of scope 1 GHG emissions to net zero by 2050, and a trajectory (based on five yearly targets) towards net zero from 2020 to achieve this 	<p>Condition 2, which requires:</p> <ul style="list-style-type: none"> the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions (tonnes of reservoir carbon dioxide separated in an AGRU) released to the atmosphere from the date of issue of the Statement to 2029 achievement of and reporting on specific emissions limits implementation and periodic reviews of the GHGMP GHG emissions reporting requiring the Ngarluma Yindjibarndi Foundation Ltd and the Murujuga Aboriginal Corporation to be consulted

	<p>80.19 Mtpa of CO₂-e based on currently available and quantifiable information.</p> <p>GHG emissions contribute to climate change, which impacts on WA's environment.</p>	<ul style="list-style-type: none"> • continuous improvement approach is applied to the GHGMP • achieve emissions reduction targets in accordance with the mitigation hierarchy. 	<p>on future reviews of the GHGMP</p> <ul style="list-style-type: none"> • the GHGMP and all reports required by condition 2 to be made publicly available. <p>Complementary reporting requirements to the Clean Energy Regulator to comply with the <i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act).</p>
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2.2 Air quality

2.2.1 Environmental objective

The EPA's environmental objective for this factor is *to maintain air quality and minimise emissions so that environmental values are protected* (EPA 2021b).

2.2.2 Investigations and surveys

The EPA advises the following investigations undertaken on behalf of the proponent were used to inform the assessment of the potential impacts to air quality:

- *Air Quality Impact Assessment* (Jacobs 2019b) which is Appendix E of the ERD (Woodside 2019a)
- *Air Quality Impact Assessment Addendum – Benzene Assessment* (Jacobs 2020) which is Appendix F of the RtS document (Woodside 2021a).

Air quality modelling was conducted for the Extension Proposal for key parameters under a number of scenarios representing current, worst-case and potential future industrial cumulative emission sources within the Murujuga airshed, including shipping (Woodside 2019a).

The air quality modelling applied was the CSIRO Atmospheric Research Air Dispersion Model 'TAPM-GRS' (Version 4.0.5) (The Air Pollution Model - Generic Reaction Set) which is the model used for other recent assessments of proposals located within the Murujuga airshed. The modelling considered the following key pollutants relevant to the Extension Proposal:

- oxides of nitrogen (NO_x) [as nitrogen dioxide (NO₂) to allow comparison against health criteria]
- ozone (O₃)
- sulfur dioxide (SO₂)
- benzene.

The five air emissions scenarios are described in Table 6-5 of the ERD (Woodside 2019a).

The modelling assessment considered the potential air quality impacts at three locations:

- Karratha
- Burrup Peninsula Road monitoring station
- Dampier (Jacobs 2019b).

The potential for human health to be adversely affected by industrial air emissions was assessed by Jacobs (Jacobs 2019b) against applicable criteria in the National Environment Protection (Ambient Air Quality) Measure that were current in 2019 when the modelling was undertaken.

During the assessment of the Extension Proposal, the National Environment Protection (Ambient Air Quality) Measure was varied in 2021 (NEPC 2021). The EPA has considered the implications of the variation to the National Environment Protection (Ambient Air Quality) Measure 2015 during its assessment of the Extension Proposal's potential impacts on air quality.

An additional air quality modelling assessment for benzene emissions, *Air Quality Impact Assessment Addendum Benzene, 6 July 2020* (Jacobs 2020) located in Appendix F of the RtS Document (Woodside 2021a) was undertaken against the criteria in the following:

- Approved methods for the modelling and assessment of air pollutants in New South Wales (NWS 2016)
- National Environment Protection (Ambient Air Quality) Measure
- Department of Water and Environmental Regulation Air Emissions Guideline October 2019 (DRAFT) (DWER 2019).

In 2020, the Department of Water and Environmental Regulation (DWER) commissioned a study on the 'cumulative impacts of air emissions within the Murujuga airshed including air emissions from existing and proposed future industries, shipping, and aggregated sources in the Pilbara region' (Ramboll 2022).

The DWER Study (Ramboll 2022) quantified existing and potential future air emissions from a variety of different anthropogenic and non-anthropogenic sources and provided predicted cumulative ground level concentrations (GLCs) for various air pollutants including, but not limited to:

- NO₂
- SO₂
- O₃
- ammonia (NH₃)
- volatile organic compounds (VOCs) (including benzene, toluene, ethylbenzene and xylene (BTEX))

- particulates (as PM₁₀ (particulate matter less than 10 micrometres in diameter) and PM_{2.5} (particulate matter less than 2.5 micrometres in diameter)).

GLCs (and acidic deposition) were predicted at different locations (Hearson Cove, Deep Gorge/Ngajarli, Burrup Road, Dampier and Karratha) across the Murujuga airshed and the wider Pilbara region, and were compared with relevant criteria in the:

- National Environment Protection (Ambient Air Quality) Measure
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA 2016)
- National Environment Protection (Air Toxics) Measure (for BTEX only).

2.2.3 Assessment context – existing environment

Rock art, National Heritage Place and World Heritage Tentative Listing

Murujuga supports more than one million petroglyphs in an area of more than 37,000 ha, representing one of the most dense and diverse collections of petroglyphs in the world. Rock art has significant cultural and spiritual value to Aboriginal people, and significant state, national, and international heritage value. Murujuga has been listed on Australia's National Heritage List under the Dampier Archipelago (including Burrup Peninsula) by the Australian Government since 2007⁸. On 23 January 2020, the Murujuga Cultural Landscape was added to the Australia's World Heritage Tentative List by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre.

Human health and amenity

The towns of Dampier, Karratha, and the locations of Hearson Cove and Deep Gorge (Ngajarli) are sensitive receptor locations from a human health and amenity perspective due to their residential, recreational and cultural land use. The Extension Proposal's proximity to these sensitive receptor locations may potentially impact ambient air quality at these locations.

Murujuga airshed

The Murujuga airshed encompasses the entire Burrup Peninsula and includes the population centres of Dampier and Karratha and surrounding areas. Industrial facilities that currently release or have approval to release significant quantities of air emissions into the Murujuga airshed include the:

- The existing North West Shelf Project
- Woodside Pluto LNG Plant
- Yara Pilbara Fertilisers Pty Ltd Ammonia Plant
- Yara Pilbara Nitrates Pty Ltd Technical Ammonium Nitrate Production Facility (TANPF)

⁸ Commonwealth of Australia (2007). Gazette Special No. S127, Tuesday, 3 July 2007.

- Perdaman Urea Project
- Pilbara Iron Yurralyi Maya Power Station
- Santos Devil Creek Power Station
- ATCO Karratha Power Station
- EDL West Kimberley Power Plant (Maitland LNG Plant).

The Coogee Chemicals Pty Ltd Downstream Processing Chemical Production Facility is a future potential industrial air emissions source within the Murujuga airshed.

In addition to the above, shipping operations mainly associated with the loading of iron ore and LNG at Dampier Port also release emissions into the Murujuga airshed.

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the Response to Submissions (RtS) document (Woodside 2021a).

Consultation on the Extension Proposal raised significant public concerns about the potential impacts of air emissions on rock art, the Murujuga Cultural Landscape World Heritage Tentative Listing and human health from the Extension Proposal when considered both in isolation and cumulatively with other existing industrial emission sources within the Murujuga airshed.

2.2.5 Potential impacts from the Extension Proposal

The Extension Proposal has the potential to impact air quality through the generation of air emissions from gas turbine generators, furnaces / boilers, and flaring associated with the gas processing plant. The predominant pollutants emitted from the Extension Proposal that relate to human health and rock art include oxides of nitrogen (NO_x), unburnt VOCs (including benzene), sulfur dioxide (SO₂), and particulates (as PM₁₀). Generally, ozone is not directly emitted by the Extension Proposal but is formed as a result of anthropogenic sources via chemical reactions (Woodside 2019a).

The Extension Proposal has the potential to impact on human health and amenity, and potentially impact the Murujuga rock art and vegetation.

Human health/particulates

Particulate matter (PM₁₀ and PM_{2.5}) was not modelled in the air quality impact assessment undertaken on behalf of the proponent as it was considered the Extension Proposal would have 'negligible' contribution of particulate matter when compared to 'smoke from bushfires and controlled burns, raised dust, and other industrial sources' (Jacobs 2019b).

The DWER Study (Ramboll 2022) predicted GLCs for PM₁₀ and PM_{2.5} particulates either reach or slightly exceed the relevant NEPM standards. The DWER Study

determined that background (non-industrial) dust sources were the main contributors (>85% of PM₁₀ and >82% of PM_{2.5}) to these exceedances rather than industry. The vast majority of industrial emissions are associated with bulk commodity operations in the region.

Given this, the issue of impacts to human health from particulate matter raised in public submissions is considered unlikely to make a material contribution to the dust levels on the Burrup Peninsula or significantly contribute to exceedances of NEPM standards. Therefore, this issue has not been considered further in this assessment.

Amenity/dark smoke

The EPA understands that dark smoke emissions which have the potential to impact on amenity are currently managed through the monitoring and reporting requirements of Licence L5491/1984/18 for the existing North West Shelf Project issued under Part V of the EP Act.

The issue of dark smoke was raised during public consultation; however, the EPA considers that this issue is unlikely to be material as the emission of dark smoke from the existing North West Shelf Project is infrequent and has significantly reduced in occurrence since 2012. This is presented in Figure 2-4 of the ERD.

Amenity/odour

Potentially odorous air emissions from the Extension Proposal include VOCs (including BTEX) and sulfurous compounds such as hydrogen sulfide (H₂S). Noting the separation distance to sensitive receptors (closest sensitive receptor is more than 3 km, with main population centres being located more than 10 km away) from the Extension Proposal, impacts of odour are not considered further in this assessment. Furthermore, the ERD (Woodside 2019b) notes that the existing North West Shelf Project has a long operational history without reports of nuisance odours.

Volatile organic carbons (VOCs)

The original air quality impact assessment undertaken on behalf of the proponent undertook a review of VOC monitoring and determined that there were 'insignificant air quality effects' due to VOCs (Jacobs 2019b).

The DWER Study (Ramboll 2022) predicted that VOC concentrations at sensitive receptors are below standards. However, the DWER Study did identify benzene levels above standards at the Burrup Road monitoring site, located close to the industrial premises.

The impact of benzene emissions on human health are considered in Sections 2.2.7 and 2.2.8 below.

Vegetation

Vegetation with heritage values (i.e. bush-medicine plants) can be found on the Burrup Peninsula. The air quality impact assessment undertaken on behalf of the proponent considered impacts to vegetation and utilised results from the annual

average NO_x and SO₂ for comparison against European Union air quality standards for the protection of vegetation (Jacobs 2019b).

For all scenario's modelled, the predicted maximum concentrations of NO_x and SO₂ were well below European Union standards (56% of the European Union standard for NO_x) and 56% of the standard for SO₂ (Jacobs 2019b)).

As there were no predicted exceedances of the available standards for the protection of vegetation, and the emissions were well below the standards, this has not been considered further in this assessment.

2.2.6 Impact minimisation measures (including regulation by other decision-making authorities)

Existing and proposed mitigation measures for the management of impacts to air quality are presented in Table 6-9 of the ERD (Woodside 2019a). Mitigation measures include:

- existing design measures to manage NO_x and VOC emissions
- a no access buffer zone established around the site
- continuation of the emissions testing and verification program
- continuation of Woodside management system to assess changes in feed gas sources (Woodside 2019a).

As detailed in the ERD (Woodside 2019a), the most recent LNG trains (trains 4 and 5) constructed at the existing North West Shelf Project are already equipped with lower NO_x technology for gas turbines than trains 1-3 (Woodside 2019a). This is reflected in the NO_x emissions limits in licence L5491/1984/18 (being 350 milligrams per cubic metre (mg/m³) for trains 1-3 and 100 mg/m³ for trains 4-5).

The proponent proposes to manage air emissions by implementing the *North West Shelf Project Extension Air Quality Management Plan (Revision 2, February 2021)* (Woodside 2021c) (AQMP) which is Appendix B of the RtS (Woodside 2021a). The proponent proposes to minimise impacts to air quality by:

- reducing NO_x emissions by 40% and 'substantially reduce' VOC emissions by 31 December 2030
- implementing an emissions testing and verification program
- undertaking emissions performance monitoring and reporting
- monitoring ambient air concentrations of relevant emissions (i.e., NO_x as NO₂, O₃, and BTEX) that contribute to human health risks to achieve no exceedance of relevant NEPM standards attributable to the Extension Proposal
- undertaking further studies to identify and evaluate opportunities to achieve a long-term reduction in air emissions from the Extension Proposal
- implementing an adaptive management plan addressing the potential impact to rock art from industrial emissions once the environmental criteria for the

management of rock art on the Burrup Peninsula becomes available (Woodside 2021c).

Since the response to submissions document was formalised, the proponent confirmed that ‘substantial reduction’ of VOC emissions referred to in the AQMP ‘can be quantified as a 40% reduction by 2030’ (Woodside 2022).

The AQMP also describes the process that the proponent will undertake in assessing each potential new third-party gas source to be processed by the facility. This will enable the proponent to identify any changes which may impact the character of an existing emission and review existing approvals to identify any additional requirements (Woodside 2021c).

The EPA notes that the existing North West Shelf Project is regulated by the Department of Water and Environmental Regulation (DWER) under Part V of the EP Act through licence L5491/1984/18. The DWER has advised that a review of the emissions and discharges authorised under the licence will be undertaken in accordance with DWER’s Regulatory Framework. In addition, any future changes to air emission composition as a result of processing third party gas may also require the licence to be reviewed.

2.2.7 Assessment of impacts to environmental values

The EPA has considered the emissions from the Extension Proposal in the context of the existing North West Shelf Project, in relation to its contribution to the cumulative emissions of the Murujuga airshed and the recent changes to the National Environment Protection (Ambient Air Quality) Measure which occurred during the assessment of the Extension Proposal.

The EPA has reviewed the five scenarios that were included in the air quality impact assessment (Jacobs 2019b) and considers that there are three relevant scenarios for its assessment. These include:

- ‘current baseline’ scenario which includes all existing industrial (including the North West Shelf Project) and background emissions on the Burrup Peninsula
- ‘worst-case’ scenario of the ‘future Burrup Strategic Industrial Area State (FBSIA)’ which includes the Extension Proposal without air emissions improvements applied to the existing North West Shelf Project (described in section 2.2.6), the expansion of the Pluto LNG Development (Train 2) and future urea and methanol proposals
- ‘long-term, possible’ scenario of the ‘future Burrup Strategic Industrial Area State with KGP Improvement Opportunities (FBSIA-KIO)’ which represents the Extension Proposal with air emissions improvements applied to the existing North West Shelf Project (described in section 2.2.6) and includes the expansion of the Pluto LNG Development (Train 2) and future urea and methanol proposals.

The predicted GLCs for the scenarios listed above presented in the proponent’s air quality impact assessment (Jacobs 2019b) are provided in Table 3 below.

The 'worst-case' scenario (FBSIA) enabled the EPA to consider the combined effect of existing industry, an approved urea proposal and a proposed methanol plant on air quality at sensitive receptor locations. This scenario did not include the proponent's proposed air emissions improvements.

The 'FBSIA-KIO' enabled the EPA to consider the combined effect of existing industry, the Extension Proposal, an approved urea proposal and a future proposed methanol plant on air quality at the sensitive receptor locations. This scenario includes the proponent's proposed air emissions improvements.

The proponent's air quality impact assessment (Jacobs 2019b) did not predict GLCs for Hearson Cove and Deep Gorge (Ngajarli). As such, the EPA has also considered the predicted GLCs derived for sensitive receptors within the DWER Study (Ramboll 2022). This includes Dampier, Karratha, Hearson Cove and Deep Gorge (Ngajarli).

The relevant scenarios from the DWER Study (Ramboll 2022) are:

- Scenario 2 – all anthropogenic and natural emissions including current industries on the Burrup Peninsula (Ramboll 2022)
- Scenario 3 – scenario 2 plus proposed future emissions (2030) from all sources (Ramboll 2022).

Of the parameters modelled in the DWER Study (Ramboll 2022), the most relevant for the Extension Proposal are:

- NO₂
- SO₂
- O₃
- VOCs (including BTEX).

The GLCs for scenario 2 and scenario 3 of the DWER Study for relevant air pollutants are provided in Table 4 below.

Table 3: Predicted GLCs at Dampier and Karratha derived from the proponent's modelling (Jacobs 2019b)

Air pollutant	Assessment parameter for applicable air quality standards	Applicable air quality standards	Predicted GLCs (ppb) for current baseline as sensitive receptors ¹		Predicted cumulative GLCs (ppb) for 'worst-case' scenario (FBSIA) (change from current baseline in brackets) ¹		Predicted cumulative GLCs (ppb) for FBSIA - KIO (change from current baseline in brackets) ¹	
			Dampier	Karratha	Dampier	Karratha	Dampier	Karratha
NO ₂	Max 1-hour	80 ppb ²	24.8	24.8	25.8 (+1.0)	28.3 (+3.5)	19.5 (-5.3)	20.9 (-3.9)
	Annual average	15 ppb ²	1.7	0.9	1.8 (+0.1)	1.0 (+0.1)	1.7 (0)	0.9 (0)
O ₃	Max 1-hour	100 ppb ³	55.4	57.9	56.5 (+1.1)	61.2 (+3.3)	54.4 (-1)	55.8 (-2.1)
	Max 4-hour	80 ppb ³	52.5	56.3	53.6 (+1.1)	59.1 (2.8)	51.8 (-0.7)	53.8 (-2.5)
	Max 8-hour (Not modelled)	65 ppb ²	-	-	-	-	-	-
SO ₂	Max 1-hour	100 ppb ²	12.9	3.6	12.9 (0)	3.6 (0)	13.3 (+0.4)	3.6 (0)
	Max 24-hour	20 ppb ²	4.6	1.7	4.6 (0)	1.7 (0)	4.5 (-0.1)	1.7 (0)

¹ Data sourced from (Jacobs 2019b). ² National Environment Protection (Ambient Air Quality) Measure .

³ Variation to the National Environment Protection (Ambient Air Quality) Measure 2015 (previous 1-hour and 4-hour average O₃ standards prior to NEPM variation on 18 May 2021).

Table 4: Concentration of air pollutants at sensitive receptors derived from the DWER Study (Ramboll 2022)

Air pollutant	Assessment parameter for applicable air quality standards	Applicable air quality standards	Scenario 2 (GLCs for current cumulative emissions (ppb)) ¹				Scenario 3 of the DWER Study (GLCs for future cumulative emissions (ppb) (2030)) ¹			
			Dampier	Karratha	Hearson Cove	Deep Gorge (Ngajarli)	Dampier	Karratha	Hearson Cove	Deep Gorge (Ngajarli)
NO ₂	Max 1-hour	80 ppb ²	45.24	32.86	44.46	45.45	46.41 (+1.17)	35.86 (+3)	43.46 (-1)	43.56 (-1.89)
	Annual average	15 ppb ²	7.55	3.39	5.21	4.28	8.19 (+0.64)	3.53 (+0.14)	5.76 (+0.55)	4.80 (+0.52)
O ₃	Max 8-hour	65 ppb ²	42.71	45.67	44.05	43.25	44.43 (+1.72)	46.37 (+0.7)	44.40 (+0.35)	43.68 (+0.43)
SO ₂	Max 1-hour	100 ppb ²	53.25	13.99	34.33	29.18	20.21 (-33.04)	4.23 (-9.76)	8.48 (-25.85)	7.43 (-21.75)
	Max 24-hour	20 ppb ²	16.31	3.78	11.10	10.61	4.47 (-11.84)	1.31 (-2.47)	2.92 (-8.18)	2.81 (-7.8)
Benzene	Max 1-hour	9 ppb ³	1.69	1.46	3.78	3.62	2.57 (+0.88)	1.92 (+0.46)	5.19 (+1.41)	4.90 (+1.28)
	Annual average	3 ppb ⁴	0.06	0.06	0.1	0.08	0.07 (+0.01)	0.06 (0)	0.15 (+0.05)	0.10 (+0.02)

¹ Data sourced from the DWER Study (Ramboll 2022). ² National Environment Protection (Ambient Air Quality) Measure. ³ Approved methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016 ⁴ National Environment Protection (Air Toxics) Measure.

Residual NO_x (as NO₂) and SO_x (as SO₂) emissions at sensitive receptors (Karratha, Dampier, Hearson Cove and Deep Gorge (Ngajarli))

The predicted GLCs for NO₂ and SO₂ at Karratha and Dampier are predicted to remain well below the current respective applicable NEPM standards which came into force on 18 May 2021 (NEPC 2021).

As presented in Table 3, the proponent's modelling (Jacobs 2019b) indicates that under the 'worst-case' scenario (FBSIA) which includes the Extension Proposal without air emissions reductions, the highest concentration at Karratha or Dampier for key parameters were:

- NO₂ (maximum 1-hour average) – 28.3 ppb (35.4% of the NEPM standards)
- NO₂ (annual average) – 1.8 ppb (12% of the NEPM standards)
- SO₂ (maximum 1-hour average) – 12.9 ppb (12.9% of the NEPM standards)
- SO₂ (24-hour average) – 4.6 ppb (23% of the NEPM standards).

The proponent's modelling did not predict GLCs for Hearson Cove and Deep Gorge (Ngajarli) for NO₂ and SO₂, as such, the EPA has considered the results of the DWER Study (Ramboll 2022) below. However, it should be noted that scenario 3 described below is not a worst-case scenario.

As presented in Table 4, the results for scenario 3 of the DWER Study (future cumulative emissions (2030)) including the Extension Proposal (with air emissions reduction described in section 2.2.6) indicate that the highest concentration at Hearson Cove or Deep Gorge (Ngajarli) were:

- NO₂ (maximum 1-hour average) – 43.56 ppb (54.4% of the NEPM standards)
- NO₂ (annual average) – 5.76 ppb (38.4% of the NEPM standards)
- SO₂ (maximum 1-hour average) – 8.48 ppb (8.48% of the NEPM standards)
- SO₂ (24-hour average) – 2.92 ppb (14.6% of the NEPM standards).

The EPA notes the data presented in sections 7.2 and 7.4 of the air quality impact assessment (Jacobs 2019b) undertaken on behalf of the proponent which predicts that:

- When compared against current baseline, the modelling predicts that the GLCs for NO₂ at Karratha and Dampier will reduce as a result of the air emissions reduction proposed for the Extension Proposal (data presented for the FBSIA-KIO scenario in Table 3).
- When compared against current baseline, the modelling predicts that there will be either no change or a marginal reduction in the predicted GLCs at sensitive receptors except for the maximum 1-hour average SO₂ concentration at Dampier which is predicted to marginally increase (increase of 0.4 ppb for the FBSIA-KIO scenario presented in Table 3) as a result of the Extension Proposal. The predicted GLC remains well below the NEPM standards.

The EPA notes that the above predictions for SO₂ are likely to be overestimated in the proponent's modelling due to the introduction of the International Maritime Organization (IMO) regulations (from 1 January 2020). Sulphur deposition is expected to have already decreased, as these regulations mandate a maximum sulphur content for marine fuels (0.5%) (IMO 2020). Data from the DWER study (Ramboll 2022) presented in Table 4 shows that significant reductions in GLCs for SO₂ at sensitive receptors are predicted by 2030 as a result of the IMO regulations.

Residual O₃ emissions at sensitive receptors (Karratha, Dampier, Hearson Cove and Deep Gorge (Ngajarli))

The EPA notes the data presented in section 7.3 of the air quality impact assessment (Jacobs 2019b) undertaken on behalf of the proponent. The data shows that when compared against current baseline, the predicted GLCs for O₃ (for maximum 1-hour and maximum 4-hour) at Karratha and Dampier will reduce as a result of the Extension Proposal's air emissions reductions.

The EPA notes that following the recent variation to the NEPM standards in 2021, the applicable O₃ criteria is now an 8-hour average GLC of 65 ppb. As the proponent's air quality modelling to predict GLCs for Karratha and Dampier was undertaken before this date, it did not include predicted 8-hour average O₃ GLCs. However, the EPA notes that the maximum predicted 1-hour and 4-hour average are lower than the 8-hour average standard in the NEPM standards.

Further, the DWER Study (Ramboll 2022) predicted GLCs for O₃ for Karratha, Dampier, Hearson Cove and Deep Gorge (Ngajarli). As presented in Table 4, the results for scenario 3 of the DWER Study (future cumulative emissions (2030)) indicate that the maximum concentration at Hearson Cove or Deep Gorge (Ngajarli) were:

- O₃ (maximum 8-hour) – 44.40 ppb (68.3% of NEPM standards).

Residual Benzene emissions at sensitive receptors

The EPA considers the following criteria to be relevant to the assessment of benzene:

- 9 ppb (1 hour average) derived from the Approved methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016 (NSW EPA 2016)
- 3 ppb (annual average) derived from the National Environment Protection (Air Toxics) Measure.

No changes to the benzene standard were made as a result of the variation of the National Environment Protection (Ambient Air Quality) Measure in 2021.

Benzene GLCs were not predicted in the original air quality impact assessment undertaken by the proponent (Jacobs 2019b) as there were no exceedances of hourly average concentrations measured at Dampier and Karratha, and the exceedances at the Burrup Road monitoring locations were infrequent (Jacobs 2019b).

In response to concerns raised in the public submissions about previously monitored exceedances of the applicable air quality criteria for benzene, the proponent conducted an additional air quality modelling assessment for benzene emissions, *Air Quality Impact Assessment Addendum Benzene, 6 July 2020* (benzene addendum) (Jacobs 2020) located in Appendix F of the RtS Document (Woodside 2021a).

The modelling in the benzene addendum considered all benzene sources from the existing North West Shelf Project and from shipping. GLCs were predicted for comparison with the benzene criteria listed above.

As presented in the addendum (Jacobs 2020), the predicted GLCs for benzene within the vicinity of the North West Shelf Project were:

- maximum 1-hour average benzene GLC in proximity to the North West Shelf Project, including background was 8.5 ppb
- maximum annual average benzene GLC in proximity to the North West Shelf Project, including background was 1.05 ppb
- maximum 1-hour average benzene GLC in close proximity to shipping source, including background was 16.6 ppb.

The air quality addendum predicted that exceedances of the 1-hour average criteria of 9 ppb (NSW EPA 2016 criteria) would occur in an area centred near the Extension Proposal offshore condensate ship loading facilities which extends to just cross over the shoreline into the north-west portion of the Extension Proposal site. The air quality addendum details that the 'Safe Work Australia occupational exposure standard for benzene is 1 part per million (ppm) or 1000 ppb as an 8-hour average' (Jacobs 2020). The benzene concentration at these industrial locations is well within the Safe Work Australia occupational exposure standard.

The EPA notes that VOC (including BTEX) emissions from the Extension Proposal will be monitored on a monthly basis.

In addition to the modelling outlined in the addendum (Jacobs 2020), the EPA has considered the predicted benzene GLCs in the DWER Study (Ramboll 2022). The DWER Study (Ramboll 2022) predicts that benzene concentrations at sensitive receptors will increase as a result of proposed future emissions (2030) from all sources.

The EPA notes that GLCs at sensitive receptors predicted in the DWER Study (Ramboll 2022) were well below the 1-hour average standard of 9 ppb and the annual average standard of 3 ppb at all sensitive receptors. The EPA notes that similar to the air quality addendum, the GLCs for benzene in the vicinity of the North West Shelf Project are predicted to exceed the 1-hour average standard (predicted to be 15.3 ppb) (Ramboll 2022). The air quality addendum details that the 'Safe Work Australia occupational exposure standard for benzene is 1 part per million (ppm) or 1000ppb as an 8-hour average' (Jacobs 2020).

2.2.8 Summary of assessment of impacts to human health and amenity

The EPA has assessed the residual impact to human health and amenity from the Extension Proposal's predicted NO₂, SO₂, O₃ and benzene emissions at sensitive receptors (Dampier, Karratha, Hearson Cove and Deep Gorge (Ngajarli) in a cumulative context with other existing and future emission sources. The EPA notes the proponent's commitments regarding air emissions reduction (including a commitment to reduce NO_x and VOCs by 40% by 2030).

Predicted GLCs at all sensitive receptors remain below applicable criteria for current and future proposed, at worst case 'FBSIA' cumulative impact scenarios in the proponent's air quality impact assessment (Jacobs 2019b) and for scenario 3 in the DWER Study (Ramboll 2022). The impact of the Extension Proposal is likely to be consistent with the EPA's objective for air quality in relation to human health and amenity. The EPA recommends that the proponent implement an AQMP to include progressive reduction of air emissions.

The EPA considers that additional measures are required to ensure that the proponent adopts practicable and efficient technologies to minimise air emissions.

2.2.9 Assessment of impacts to rock art

The EPA advises that there are significant environmental values associated with rock art within Murujuga (see context section 2.2.3 above). The EPA considers there may be a threat of serious or irreversible damage to that rock art from industrial air emissions (in particular NO_x and SO_x from the Extension Proposal) accelerating the natural weathering. Furthermore, the EPA acknowledges that there is contested science and a lack of consensus on the science about whether such emissions are adversely affecting rock art within Murujuga.

The EPA is aware of numerous independent scientific studies and monitoring of potential cumulative impact of industrial air emissions on the rock art that have been undertaken since 2004. The conclusions of some of these studies and monitoring are contested as shown in the Senate Environmental and Communication References Committee Report on the Protection of Aboriginal rock art of the Burrup Peninsula (Commonwealth of Australia 2018), the Burrup Peninsula Aboriginal Petroglyphs: Colour Change & Spectral Minerology 2006-2016 (Duffy et al 2017) and the Summary of scientific studies and monitoring programs commissioned and overseen by the Burrup Rock Art Monitoring Management Committee and the Burrup Rock Art Technical Working Group (DWER 2021).

Recent independent reviews commissioned by the DWER have identified a number of improvements that could be made to provide robust, replicable and reliable results about the impact of emissions on the rock art in which stakeholders and the public can have confidence (DWER 2019).

To address the contested and uncertain science, the DWER is currently implementing the Murujuga Rock Art Strategy (MRAS) which was released by the State Government in February 2019. The purpose of the MRAS (DWER 2019) is to protect the rock art on Murujuga from the potential impacts of anthropogenic emissions and establish the framework for long-term monitoring and analysis of

changes to the rock art to determine whether the rock art is subject to accelerated change. The framework provides a risk-based and adaptive approach for the management of impacts to the rock art, and initial data and interim findings from the MRAS are anticipated in 2023.

The scope of the MRAS (DWER 2019) is to:

- 'establish an Environmental Quality Management Framework, including the derivation and implementation of environmental quality criteria
- develop and implement a robust program of monitoring and analysis to determine whether change is occurring to the rock art on Murujuga
- identify and commission scientific studies to support the implementation of the monitoring and analysis program and management
- establish governance arrangements to ensure that:
 - monitoring, analysis and reporting are undertaken in such a way as to provide confidence to the traditional owners, the community, industry, scientists and other stakeholders about the integrity, robustness, repeatability and reliability of the monitoring data and results
 - government is provided with accurate and appropriate recommendations regarding the protection of the rock art
- develop and implement a communication strategy in consultation with stakeholders' (DWER 2019).

Five-yearly reviews of the strategy, or earlier as determined by the Minister for Environment, are aimed at ensuring that the MRAS remains relevant, supports appropriate governance procedures, and reflects the best available scientific knowledge and management practices applicable to protecting the rock art on Murujuga (DWER 2019).

The MRAS includes the Murujuga Rock Art Monitoring Program (MRAMP) which will monitor, evaluate, and report on changes and trends in the integrity of the rock art, specifically to determine whether anthropogenic emissions are accelerating the natural weathering, alteration, or degradation of the rock art (DWER 2019).

The EPA expects that the final results obtained from the MRAMP will enable the level of risk of degradation of the rock art from cumulative air emissions from industrial activities to be determined. The EPA also expects interim results of the MRAMP in 2023, will facilitate the development of air quality standards. The air quality standards will include environmental quality objectives and environmental quality standards for the purpose of avoiding the cumulative risks of adverse impact of the rock art within the Murujuga Cultural Landscape.

The EPA notes the data presented in table 7-11 of the air quality impact assessment undertaken on behalf of the proponent (Jacobs 2019b). The data predicts that the deposition of NO₂ and SO₂ will decrease as a result of the Extension Proposal's air emissions reductions when compared to the current baseline. However, the EPA notes that:

- Annual NO₂ deposition is predicted to increase from current baseline (5.7 kilograms per hectare per year (kg/ha/year)) under both 'worst case' (FBSIA) and the 'long-term possible' scenario (FBSIA-KIO). The highest increase equates to 1.1 kg/ha/year under the 'worst-case' scenario.
- Annual SO₂ deposition is predicted to marginally increase (0.1 kg/ha/year) from current baseline (13.6 kg/ha/year) under both 'worst case' (FBSIA) and the 'long-term possible' scenario (FBSIA-KIO).

The EPA notes that the predicted increase in NO₂ deposition under the 'long-term, possible' scenario (KBSIA-KIO) is due to other future industry sources in the region as emissions of NO_x from the Extension Proposal are to be reduced by 40% by 2030.

The EPA considers that the SO₂ deposition predictions are likely to be overestimated. As detailed above, sulphur deposition is expected to have already decreased due to the IMO regulations mandating a maximum sulphur content in marine fuels (0.5%) (IMO 2020).

The EPA considers that there is a lack of full scientific consensus about whether these emissions will adversely affect rock art within Murujuga by accelerating the natural weathering of the rock art.

Given the lack of full scientific consensus about whether proposal specific, and cumulative industrial air emissions in the Murujuga airshed are adversely affecting rock art within Murujuga by accelerating the natural weathering of the rock art and noting there may be a threat of serious or irreversible harm if the Extension Proposal is implemented, the EPA has given particular consideration to the precautionary principle and the principle of intergenerational equity.

Consistent with the precautionary principle, the EPA has adopted an overall cautious approach and has carefully evaluated options to avoid serious or irreversible impact to the rock art, including whether air emission minimisation measures proposed by the proponent are sufficient to meet the EPA's objectives, whether there are additional practicable measures that can be recommended so that the Extension Proposal avoids degradation of the rock art, or whether it should recommend that the Extension Proposal not be implemented.

Consistent with the principle of intergenerational equity, the EPA has also considered whether there are practicable measures that can be recommended to ensure that the health and diversity of the environmental values associated with the rock art can be maintained for the benefit of future generations. The EPA advises that it is unlikely that the rock art, if impacted, could be rehabilitated, and so maintenance of the rock art for future generations requires consideration of cautious and preventative measures.

The EPA notes the proponent's commitment to reduce NO_x emissions from the Extension Proposal by 40% by the end of 2030. However, given the significant environmental values associated with the rock art, the EPA considers that measures which are additional to those proposed by the proponent, also need to be considered as part of the EPA's assessment and whether the Extension Proposal will result in

inconsistency with the EP Act principles and its environmental objectives for air quality and social surroundings.

2.2.9 Summary of assessment of impacts to rock art

The EPA acknowledges the lack of full scientific consensus to potential residual impacts on the significant environmental values associated with the rock art and as a result, has given consideration to the matters in the precautionary principle and the principle of intergenerational equity when assessing consistency of the Extension Proposal with its objectives. The EPA has assessed that with proposal specific outcomes-based regulation, MRAMP derived environmental quality objectives and the environmental quality standards for cumulative impact regulation, and other recommended conditions, the Extension Proposal may be implemented in a way which is not likely to be inconsistent with the EPA's objectives.

2.2.10 Additional measures considered by the EPA to manage impacts to air quality

The EPA has considered the following additional measures:

- Requiring the proponent to achieve an air quality outcome to ensure that no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates.
- Requiring the proponent to minimise air emissions from the proposal, including reducing NOx and VOC emissions by 40% by 31 December 2030.
- Requiring the proponent to maintain regional air quality in accordance with the NEPM standards and other applicable guidelines.
- Requiring the proponent to specify monitoring trigger criteria and threshold criteria to ensure that the air quality outcome is achieved.
- Contingency measures would be required to be developed and implemented to ensure the air quality outcome is met if the monitoring trigger criteria and threshold criteria are exceeded.
- Requiring the proponent to achieve compliance with any detailed air quality standards to ensure that there are no adverse impacts accelerating the weathering of rock art within Murujuga beyond natural rates. The EPA expects that this will include environmental quality objectives and environmental quality standards derived from the results of the MRAMP.
- Requiring the proponent to include a trajectory of the proposed air emissions reductions for the life of the Extension Proposal.
- Requiring the proponent to review the AQMP within twelve months of the issue date of the statement.
- Requiring the proponent to review the AQMP within six months of a notification of when any air quality standards are amended in the future.
- Requiring an independent peer review to:
 - ensure that there is significant rigour in the baseline monitoring data

- review the final AQMP before it is submitted to ensure the AQMP is adequate to achieve the air quality outcome and objectives.
- Requiring timely reporting of any exceedance of threshold criteria in the AQMP to the CEO of the DWER within 48 hours of an exceedance being identified.
- Requiring the proponent to implement contingency actions with seven days or in accordance with the AQMP.
- Requiring that MAC and NYFL to be consulted by the proponent during a review of the AQMP.

The EPA is satisfied that these additional measures, if implemented, would mean that the Extension Proposal is not likely to be inconsistent with the EPA's objectives and consideration of these measures is consistent with consideration of the matters in the precautionary principle and the principle of intergenerational equity. The additional measures provide greater certainty that the air quality environmental outcomes can be met.

The EPA considers that recommending that the Extension Proposal be implemented with conditions which reflect the above measures would be a reasonably proportionate response in order to prevent degradation of the rock art and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA's objectives. The EPA notes that the Extension Proposal could not be implemented in a way which is likely to be consistent with its objectives without these recommended conditions.

2.2.11 Summary of key factor assessment and recommended regulation

The EPA has considered whether the residual impacts are consistent with the EP Act principles (see above and also Appendix C), and the EPA factor objectives *to maintain air quality and minimise emissions so that environmental values are protected and to protect social surroundings from significant harm* (EPA 2021b).

In doing so, the EPA has also considered whether reasonable conditions could be imposed to prevent inconsistency with the EPA's factor objective.

The EPA summary assessment findings are presented in Table 5.

Table 5: Summary of assessment for air quality

No	Residual impact	Assessment finding	Recommended conditions, and DMA regulation
1.	Emissions from the proposal are not expected (on its own or cumulatively) to result in exceedances of NEPM standards for NO ₂ , SO ₂ , and O ₃ . Emissions from the proposal are not expected	The NEPM standards are expected to be met at all sensitive receptors (Dampier, Karratha, Hearson Cove and Deep Gorge (Ngajarli). The Extension Proposal's predicted exceedance of the air quality criteria for	Condition 2 provides for air quality regulation including: <ul style="list-style-type: none"> • seek to adopt practicable and efficient technologies to minimise air emissions (including NO_x, SO_x and VOC [including BTEX]) • seek to maintain regional air quality in accordance with NEPM standards and DWER

No	Residual impact	Assessment finding	Recommended conditions, and DMA regulation
	<p>(on its own or cumulatively) to result in exceedance of the NEPM standards / DWER draft Air Emissions Guidelines for VOCs at known sensitive receptors.</p> <p>There are occasional exceedances of the 1-hour criterion for benzene at the Burrup Road monitoring station and modelled exceedances near the Extension Proposal's offshore condensate ship loading facilities which extends to just cross over the shoreline into the north west portion of the onshore development envelope. There is no exceedance of the Safe Work Australia occupational benzene criteria at these locations.</p>	<p>benzene within the vicinity of the industrial area is not expected to impact sensitive receptors but will require the proponent to implement measures to ensure air quality standards for VOCs [including BTEX] emissions are not being exceeded.</p> <p>The residual impacts on human health and amenity are not expected to be inconsistent with the EPA's objectives for air quality and social surroundings if the proponent is required to achieve environmental outcomes and objectives, and to implement an AQMP to including the progressive reduction of air emissions.</p> <p>Air emissions will also be regulated under Part V of the EP Act to achieve the environmental outcomes and objectives established by any conditions under Part IV of the EP Act.</p>	<p>air quality standards by the minimisation of air emissions from the Extension Proposal</p> <ul style="list-style-type: none"> • seek to ensure air quality criteria for benzene are not exceeded by requiring the minimisation of air emissions from the Extension Proposal • requirement to implement an AQMP which is reviewed every 5 years to ensure continuous improvement and reduction in emissions in consultation with MAC • monitoring, contingency measures and reporting. <p>Requirement to submit the AQMP to Department of Agriculture, Water and the Environment (DAWE) to support regulation under the EPBC Act.</p> <p>Regulated through other acts: Part V of the EP Act – for air emissions.</p>
2.	<p>There is a lack of consensus on the science about the impacts of cumulative industrial emissions on the significant environmental values associated with the rock art in Murujuga.</p> <p>The Extension Proposal is likely to result in a continued contribution to the current baseline air emissions in the Murujuga airshed.</p> <p>There is a lack of full scientific consensus of the potential impact of proposal emissions (NOx and SOx) on the significant environmental values associated with the rock art.</p>	<p>There may be a threat of serious and irreversible impact on environmental values associated with the rock art from the Extension Proposal and other cumulative emission sources.</p> <p>Specific regulation in addition to the minimisation measures proposed by the proponent is needed to ensure the Extension Proposal is not likely to be inconsistent with the EPA's environmental objective for air quality and social surroundings.</p> <p>This regulation should include:</p> <ul style="list-style-type: none"> • a requirement to comply with an outcome to ensure the continuation of the significant environmental values of 	<p>Condition 2 provides for air quality regulation including:</p> <ul style="list-style-type: none"> • an air quality outcome to ensure that no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates • requirements to minimise emissions, including a 40% reduction in NOx and VOC emissions by 31 December 2030 • a requirement to achieve air quality objectives and criteria advised (including standards derived from the results of the Murujuga Rock Art Monitoring Program and any amendments to those standards, which are subject of notification to the proponent by the Minister

No	Residual impact	Assessment finding	Recommended conditions, and DMA regulation
		<p>the rock art, and threshold and trigger criteria with associated adaptive contingency measures to ensure this</p> <ul style="list-style-type: none"> • requirement for interim and final results of the MRAMP to be complied with and incorporated into the AQMP • a requirement for the proponent to comply with any future air quality criteria material changes • a requirement for the AQMP to include progressive minimisation of air emissions (in addition to compliance with outcomes) • a requirement for the AQMP to be reviewed every 5 years to ensure continuous improvement. 	<ul style="list-style-type: none"> • to require an independent peer review of the proponent's baseline data and air quality management plan to ensure that proponent-developed criteria are scientifically valid and robust • a requirement to implement an Air Quality Management Plan, with 5 yearly reviews required to implement continuous improvement • adaptive monitoring, contingency measures and reporting • requiring the Ngarluma Yindjibarndi Foundation Ltd and the Murujuga Aboriginal Corporation to be consulted by the proponent when it reviews and submits the AQMP. <p>Air emissions from the proposal will also be regulated by the DWER via licence under Part V of the EP Act.</p> <p>A requirement to submit the AQMP to DAWE to support regulation under the EPBC Act.</p>

2.3 Social surroundings

2.3.1 Environmental objective

The EPA's environmental objective for social surroundings is *to protect social surroundings from significant harm* EPA (2021b)

2.3.2 Investigations and surveys

The assessment of the Extension Proposal is informed by sections 4, 6.3, 6.5, and 6.6 of the ERD (Woodside 2019a). Further information relating to surveys and consultation considered in the assessment is provided in the *North West Shelf Project Extension Cultural Heritage Management Plan, Revision 3* (CHMP) (Woodside 2021d) in Appendix C of the RtS (Woodside 2021a). During the response to submissions period, further consultation was undertaken between the proponent and the Murujuga Aboriginal Corporation (MAC). The consultation is documented in the Response to Submissions document (Woodside 2021a).

The information presented by the proponent is generally consistent with the *Environmental Factor Guideline – Social Surroundings* (EPA 2016a) as past surveys identifying sites are referenced, potential impacts have been identified and the mitigation hierarchy is addressed.

It is recognised that the Extension Proposal does not involve additional ground disturbance or dredging of subsea limestone, therefore investigations into direct impacts to rock art in the development envelope have not been conducted. Similarly, the proponent made no investigation into the impacts of light, noise, traffic or visual amenity as the Extension Proposal involves the extension of the life of the existing North West Shelf Project rather than additional construction.

2.3.3 Assessment context – existing environment

National and World Heritage Listings

Murujuga is the traditional Aboriginal name for the Dampier Archipelago and surrounds, including the Burrup Peninsula. Under the *Environment Protection and Biodiversity Conservation Act 1999* Murujuga has been listed on Australia's National Heritage by the Australian Government since 2007⁹. Portions of the National Heritage Listing Area overlap the Murujuga National Park (see Figure 5). The Murujuga National Park is jointly managed between MAC and the Department of Biodiversity Conservation and Attractions (DBCA) as required under the Burrup and Maitland Industrial Estate Agreement (BMIEA)¹⁰. The Murujuga National Park is managed to protect the values of the area and facilitate visitor access.

⁹ Commonwealth of Australia (2007). Gazette Special No. S127, Tuesday, 3 July 2007.

¹⁰ State of Western Australian, Western Australian Land Authority and Contracting Parties (2002) Burrup and Maitland Industrial Estates Agreement.

On 23 January 2020, the Murujuga Cultural Landscape was added to the Australia's World Heritage Tentative List by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre¹¹.

Murujuga has numerous important values including more than one million petroglyphs in an area of more than 37,000 ha, representing one of the most dense and diverse collections of petroglyphs in the world. In addition, the Dampier Archipelago comprises 42 islands, islets and rocks, all within a 45 km radius of Dampier having exceptional natural beauty, high conservation values and outstanding heritage¹².

The Ngarluma, Yindjibarndi, Yaburara, Mardudhunera and Wong-Goo-Tt-Oo groups, collectively known as the *Ngurra-ra Ngarli*, are represented by the MAC who are the custodians of Murujuga. The MAC was established in 2003 under the BMIEA¹³.

The EPA acknowledges the role that MAC and the Western Australian Government have in establishing appropriate and effective management and conservation measures relevant to Murujuga (including the Burrup Peninsula and the Dampier Archipelago) that is critical to the success of the World Heritage Nomination.

Murujuga is sacred to the *Ngurra-ra Ngarli*. It is a place where everything is connected, through the Ancestral Beings - the land, the sky, the plants, the animals, the Lore and the spiritual world. This is the belief system that underlies life on Murujuga today¹⁴.

The MAC confirmed a definition of intangible heritage values to the DWER in December 2021. MAC defines intangible heritage values as:

'In the context of industry approvals, intangible heritage values are the non-material aspects of heritage that are valued, including cultural, spiritual, aesthetic and social aspects. Intangible heritage values are intergenerational and formed through interaction with the environment. Expressions of intangible heritage include practices, representations, expressions, knowledge, skills, traditions, practices, performance, use, knowledge and language' (MAC 2021).

MAC also provided examples of intangible heritage values that are relevant to Murujuga and the *Ngurra-ra Ngarli* which include but are not limited to:

- *'Ceremonies*
- *Connection to Country*

¹¹ Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity,

¹² Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environmental and Energy).

¹³ State of Western Australian, Western Australian Land Authority and Contracting Parties (2002) Burrup and Maitland Industrial Estates Agreement.

¹⁴ Murujuga Aboriginal Corporation (2016). *Murujuga Cultural Heritage Management Plan*. Pindan Printing Pty Ltd Broome.

- *Practices*
- *Sense of place*
- *Songlines*
- *Totems'* (MAC 2021).

The Extension Proposal's onshore development envelope is situated adjacent to the National Heritage Listed Area. The north-eastern portion of the Extension Proposal's onshore development envelope at Withnell Bay and a small section of the King Bay Supply Base overlaps the boundary of the National Heritage Listed Area (Woodside 2019a) (see Figure 5).

The Extension Proposal is subject to an Agreement¹⁵ originally signed in 1998 between Elders of the Ngarluma and Yindjibarndi people and the Joint Venture partners of the North West Shelf Project. The Ngarluma Yindjibarndi Foundation Ltd (NYFL) manages payments received under the Agreement, to ensure effectively support the NYFL's beneficiaries, particularly the Ngarluma and Yindjibarndi people, and their communities.

Aboriginal heritage and culture

The following Aboriginal heritage and cultural values have been identified in proximity to the Extension Proposal and outside of the development envelope (Woodside 2019a):

- Murujuga National Park which is located 120 m east of the Extension Proposal (see Figure 5), is jointly managed by the MAC and the DBCA, and hosts one of the largest concentrations of rock art in the world
- Deep Gorge (Ngajarli) is located within the Murujuga National Park and is about 3 km east of the Extension Proposal within the Murujuga National Park and includes rock art and a new boardwalk and interpretive signage to educate visitors about its cultural significance
- the National Heritage Listed Area which is adjacent to and overlaps the onshore development envelope (see Figure 5)
- vegetation with heritage value
- heritage features within the marine environment (Woodside 2019a).

The ERD (Woodside 2019a) identifies that 134 Aboriginal heritage sites are recorded inside or adjacent to the Extension Proposal development envelope, however, 'records have not confirmed the presence of submerged heritage features'. The ERD (Woodside 2019a) notes that the development envelope contains the following heritage features: petroglyph sites; ceremonial/restricted access sites; ethnographic

¹⁵ Hunt and Humphry (1998). Agreement for the Payment Relating to Native Title and Grants of Interest in Land and for Donations Relating to Goodwill and the Establishment of Mutually Beneficial Relationships Between the North West Shelf Joint Venturers, Woodside and the Ngarluma and Yinjibandi People and Providing for the Establishment of a Ngaluma and Yinjibandi People and Providing for the Establishment of a Ngarluma and Yinjibandi Foundation and Trust

sites; standing stones; shell middens; artefact scatters; quarries; grinding patches; coastal fishing and foraging opportunities (Woodside 2019a).

The EPA notes that Aboriginal heritage sites have tangible values and some sites, for example ceremonial sites, also have intangible heritage values.



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Unique Record ID:

Figure 5: National Heritage Listed Area and Murujuga National Park

2.3.4 Consultation

Consultation on the Extension Proposal raised concerns about the adequacy of the Cultural Heritage Management Plan Revision 1 which was provided as Appendix C of the ERD (Woodside 2019a). These concerns included the identification of stakeholders, incident reporting, cultural awareness training, transparency of application process to gain access to Aboriginal heritage sites and associated reporting. In addition, there were concerns regarding meaningful engagement with traditional owners and custodians.

The EPA undertook consultation with the MAC on 3 September 2021 and 17 February 2021, key issues raised include:

- ethnographic knowledge capture – addressed in section 6 of this report (Other Advice)
- greenhouse gas management and offsets – addressed in section 2.1 of this report (Greenhouse Gas Emissions)
- air emissions and risk to cultural significant values including rock art – addressed in section 2.2 of this report (Air Quality)
- strategic approach to managing cumulative effects on the marine environment and airshed of Murujuga – addressed in section 6 (Other Advice).

The proponent provided a list of outstanding issues from the consultation session held with MAC in October 2021 (Woodside 2021f). The outstanding issues were confirmed by MAC on 21 February 2022 (MAC 2022).

The following list is a summary of outstanding issues and how they are addressed:

- identification of spiritual and cultural values for MAC Land and Sea country, the proponent has committed to consulting with MAC regarding this issue – the overarching spiritual and cultural values for Murujuga are discussed in section 6 of this report (Other Advice)
- access to all raw data and interpretation of this data to be provided to MAC – this issue is outside the scope of the EPA’s assessment and a matter to be resolved by MAC and the proponent, see the EPA’s recommendation in section 6 of this report (Other Advice), in addition recommended condition 9 also ensures that all validated data is made publicly available
- implementation of the MRAS findings – this is addressed in section 2.2 of this report (Air Quality) and recommended condition 3-3
- identifying the role MAC can play in carbon trading, the proponent has committed to consulting with MAC regarding this issue, – recommended condition 2 (2-4 (5)) requires the proponent to consider offsets in consultation with MAC and NYFL
- identifying and contributing to research and activities to understand and enhance climate change adaptation and resilience on Murujuga, the proponent has committed to consulting with MAC regarding this issue – this issue is outside the scope of the EPA’s assessment of the proposal

- management plans / environmental quality management frameworks should identify all values, regardless of whether these values are likely to be impacted or not – this is addressed in section 2.4 of this report (Marine Environmental Quality) and recommended condition 5-4
- the development of a new management plan that addresses social and economic aspects (a Social Impact Management Plan) – this is outside of the EPA’s scope for assessment under Part IV of the EP Act
- methane calculations should use the 20-year GWP when calculating CO₂ equivalent – the proponent has calculated the proposal’s GHG emissions using the GWPs listed in 2.02 of the National Greenhouse and Energy Reporting Regulations 2008. The EPA notes that 100-year GWPs are currently the accepted practice for calculating GHG emissions in Australia and internationally.

No submissions were received during the consultation period relating to noise, traffic or light associated with the Extension Proposal.

2.3.5 Potential impacts from the Extension Proposal

The Extension Proposal has the potential to impact on tangible and intangible Aboriginal heritage values due to:

- ongoing air emissions from the proposal potentially causing an impact to Rock Art and the Murujuga Cultural Landscape World Heritage Listing
- ongoing discharges to the marine environment impacting on cultural and spiritual heritage values associated with the marine environment
- accidental damage to heritage features within the development envelope
- restricted access to Aboriginal heritage sites within the fenced onshore development envelope
- odour impacts to traditional owners and custodians accessing Aboriginal heritage sites within the development envelope
- continued presence of the Extension Proposal activities in the development envelope
- noise, traffic, light and visual impacts causing an impact to Hearson Cove and Deep Gorge (Ngajarli) sensitive receptors.

The issue raised during public consultation relating to indirect impacts to the cultural and spiritual values of the marine environment from wastewater discharges are addressed in section 2.4 (Marine Environmental Quality).

Indirect impacts to cultural heritage values as a result of the Extension Proposal, specifically impacts to rock art (petroglyphs) from acidic air emissions are assessed in section 2.2 of this report (Air Quality).

Indirect impacts to amenity from odour affecting Hearson Cove and Deep Gorge (Ngajarli) are assessed in section 2.2 of this report (Air Quality). Potential odour impacts to traditional owners and custodians accessing the Extension Proposal are addressed below.

The issue raised during the public consultation about potential impacts to submerged rock art in the marine environment is considered unlikely to be material for the Extension Proposal. No new disturbance to the marine environment is required with the exception of maintenance dredging (required every 5 to 10 years to remove sediment build up in the shipping channel, turning basins and berthing pockets) (Woodside 2019a). The proponent has stated that there are no recorded underwater heritage sites within the Extension Proposal development envelope (Woodside 2021e).

Noting that the area is highly disturbed due to previous dredging and the proponent has stated that there are no recorded underwater heritage sites within the Extension Proposal development envelope, the EPA considers that further maintenance dredging of the same areas for the Extension Proposal is not expected to impact submerged rock art and is therefore not discussed further in this report. However, the EPA has recommended a condition that requires the proponent to avoid where possible, and otherwise minimise direct impacts to social, cultural, heritage and archaeological values within the development envelopes.

Impacts to amenity (from noise, light, traffic and the Extension Proposal's location in the landscape) at Hearson Cove and Deep Gorge (Ngajarli) have been considered in the context of the existing industry in the area. The impacts are not expected to alter from those of the existing North West Shelf Project. The proposal will be expected to comply with the assigned noise levels in the Environmental Protection (Noise) Regulations 1997. Noting the location of the Extension Proposal in the existing industrial area, and the separation distance to sensitive receptors (more than 3 km), the EPA has not considered this issue further in this assessment.

2.3.6 Impact minimisation measures (including regulation by other DMAs)

No further direct disturbance is proposed for the Extension Proposal, except for maintenance dredging described above.

The proponent prepared the *North West Shelf Project Extension Cultural Heritage Management Plan, Revision 3* (CHMP) (Woodside 2021d) Appendix C of the Response to Submissions document (Woodside 2021a) which defines the traditional owners and custodians that will be included in management and mitigation actions as members of the Ngarluma, Yindjibarndi, Yaburara, Mardudhunera and Wong-Goo-Tt-Oo peoples.

Odour emissions associated with VOCs (including BTEX) and sulphurous compounds (such as hydrogen sulfide) may impact traditional owners and custodians while accessing the areas within the development envelope. In the ERD, the proponent has detailed that odorous emissions due to sulphurous compounds are not expected to cause a nuisance due to the sulphur content of the Extension Proposal's gas sources being very low.

As detailed in section 2.2 of this report (Air Quality), there are exceedances of air quality guidelines for benzene within the industrial area. The proponent has committed to reducing VOC emissions by 40% by 2030 (Woodside 2022).

The CHMP (Woodside 2021d) includes management-based provisions (management actions, targets, monitoring and reporting). The CHMP requires that:

- the existing disturbance zones are maintained (areas within which operational activities take place) within the onshore development envelope to ensure project personnel do not directly interact with Aboriginal cultural heritage features
- any personnel undertaking activities outside designated disturbance zones are subject to the *North West Shelf Cultural Heritage Management Procedures – Onshore Operations (Woodside ID 8915252)* under which a permit must be issued for access to areas outside of the disturbance zones. Requirements to access are assessed by the Heritage Manager and Permits are subject to conditions that ensure compliance with the *Aboriginal Heritage Act 1972* and the CHMP
- personnel are educated on the importance of Aboriginal heritage features by continuing to conduct onsite inductions for personnel, contractors and visitors
- cultural awareness training for staff is provided by traditional owners and custodians
- a database of known Aboriginal heritage sites within the onshore development envelope is maintained
- annual heritage audits be conducted with traditional owners and custodians, and a qualified archaeologist over the onshore components to monitor and report on the condition of Aboriginal heritage features and sites
- the findings of the annual heritage audits and appropriate mitigation measures are discussed with traditional owners and custodians, and an audit report be produced with recommendations for future work
- the process to permit traditional owner and custodian access is maintained to ensure the connection to culturally significant heritage sites within the onshore development envelope continues during operation
- odour complaints are investigated and responded to within Murujuga National Park and the National Heritage Place (Woodside 2021e).

2.3.7 Assessment of impacts to environmental values

The ERD (Woodside 2019a) notes that the existing North West Shelf Project operates within 276 ha of cleared land (within a 331 ha development envelope). Previous EPA Reports (Report 962 in 1999, Report 893 in 1998 and Report 724 in 1993) note that historic disturbance of Aboriginal heritage sites has been undertaken in accordance with section 18 of the *Aboriginal Heritage Act 1972* for the existing North West Shelf Project. The Extension Proposal for the ongoing operation of the existing Project does not require any further disturbance.

Accidental physical damage to heritage sites could occur through direct interactions with the Extension Proposal's workforce, for example, accidental damage (through vehicle contact and spills from operational activities) or deliberate actions that cause damage. The proponent has outlined appropriate mitigation measures in the CHMP to minimise accidental damage (designated disturbance zones) and deliberate actions (education of personnel) (Woodside 2021d).

The EPA notes that the CHMP (Woodside 2021d) contains a description of the process that enables traditional owners and custodians to request ongoing access to the Extension Proposal development envelope. The EPA considers that it is important for traditional owners and custodians to be able to access sites of cultural heritage value during operation and after decommissioning of the Extension Proposal to maintain connection to country.

The EPA is aware of the NYFL agreement which is the primary mechanism for consultation between the proponent and the Ngarluma People. The EPA considers that it is important for the proponent to also consult with MAC who has responsibility to jointly manage the Murujuga National Park with DBCA and who have submitted the Murujuga Cultural Landscape for inclusion on the World Heritage tentative list.

The EPA notes the avoidance and minimisation measures committed to in the proponent's CHMP (Woodside 2021d). The EPA advises that the proponent's avoidance and minimisation measures should be required to be implemented along with the following additional measures, to reduce the potential for inconsistency with the EPA factor objective:

1. an objective to avoid and minimise impacts to Aboriginal heritage sites and associated intangible heritage values within the onshore development envelope
2. measures to facilitate ongoing traditional owner and custodian access and connection to Aboriginal heritage sites and culturally significant heritage areas within the onshore development envelope subject to reasonable health and safety requirements
3. measures to re-establish traditional owner and custodian access to the onshore development envelope during decommissioning of the Extension Proposal
4. a framework for consultation with traditional owners and custodians during the life of the Extension Proposal, including MAC.

The EPA notes the proponent's commitment to reduce VOCs emissions from the Extension Proposal. Noting the benzene concentrations in the industrial area, the EPA has recommended condition 3-5 (1)(f) requiring the proponent to reduce VOCs emissions.

The EPA has assessed the residual impacts to Aboriginal heritage sites and the associated intangible heritage values from the Extension Proposal and advises that (provided appropriate management measures are implemented) impacts are not likely to be inconsistent with the EPA's objective for social surroundings (EPA 2016a)

2.3.8 Summary of assessment of impacts to environmental values

The EPA has assessed the likely residual impacts of the Extension Proposal on social surroundings to be:

1. avoidance of direct impact the 134 Aboriginal heritage sites or their associated intangible heritage values within the development envelope
2. sufficient to maintain traditional owner and custodian access to Aboriginal heritage sites and culturally significant areas within the development envelope during operation

3. current controls insufficient to maintain traditional owner and custodian access to Aboriginal heritage sites or culturally significant areas within the development envelope following decommissioning
4. current controls insufficient to maintain adequate consultation with traditional owners and custodians during the life of the Extension Proposal
5. current controls insufficient to manage impact of odour to traditional owners and custodians while undertaking cultural heritage activities within the development envelope.

The EPA has further consideration of controls and recommended controls through conditions in section 2.3.9 below.

2.3.9 Summary of assessment and recommended regulation

The EPA has considered the likely residual impacts of the Extension Proposal on Aboriginal cultural heritage sites and cultural values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 6.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 6: Summary of assessment, conditions and DMA regulation for social surroundings

No	Residual impact	Assessment finding	Recommended conditions, and DMA regulation
1.	Potential for accidental impacts to Aboriginal heritage sites and associated intangible heritage values within the development envelopes.	<p>Unlikely to be a material impact as there are no planned direct impacts to Aboriginal heritage sites and associated intangible heritage values within the development envelope.</p> <p>Direct accidental impacts to Aboriginal heritage sites and associated intangible heritage values within the development envelopes will be managed through the implementation of a Cultural Heritage Management Plan.</p> <p>This residual impact is likely to be consistent with the EPA's objectives for this factor subject to a condition minimising risk of accidental impacts to Aboriginal heritage sites.</p>	<p>Regulated through recommended conditions:</p> <p>Condition 1 – limitations and extent of the Extension Proposal</p> <p>Condition 4 (Cultural Heritage), including:</p> <ul style="list-style-type: none"> • an objective to avoid and minimise accidental direct impacts to Aboriginal heritage sites within the development envelopes. • submission of a revised CHMP to be developed in consultation with MAC, NYFL and the DAWE.

2.	Restricted traditional owner and custodian access to Aboriginal heritage sites and culturally significant areas within the development envelopes during operation.	<p>The EPA has concluded that there is unlikely to be a material impact during operation as access will continue to be managed through implementation of the proponent's Cultural Heritage Management Plan.</p> <p>Likely to be consistent with the EPA's objectives for this factor subject to a condition requiring access to Aboriginal heritage sites, subject to reasonable health and safety requirements.</p>	<p>Regulated through recommended conditions:</p> <p>Condition 4 (Cultural Heritage), including:</p> <ul style="list-style-type: none"> an objective to allow ongoing traditional owner and custodian access to the culturally significant heritage areas located in the development envelopes during operation.
3.	Traditional owner and custodian potential loss of access and connection to the Aboriginal heritage sites and culturally significant areas within the development envelope after decommissioning.	<p>The EPA has concluded that a formal process is required to ensure the proposal is decommissioned in a manner that will allow traditional owner access to Aboriginal heritage sites located in the development envelope.</p> <p>Residual impact to cultural heritage through the loss of access to, or restriction of access to Aboriginal heritage sites within the development envelope after decommissioning.</p> <p>Residual impacts should be subject to conditions to ensure access to Aboriginal heritage sites, so the environmental outcome is likely to be consistent with the EPA's objective for social surroundings.</p>	<p>Regulated through recommended conditions:</p> <p>Condition 4 (Cultural Heritage), including:</p> <ul style="list-style-type: none"> an objective to ensure the proposal is decommissioned in a manner that will allow traditional owner and custodian access to the culturally significant heritage sites areas located in the development envelopes subject to reasonable health and safety requirements. <p>Condition 7 (Decommissioning and Closure), including:</p> <ul style="list-style-type: none"> requiring consultation with traditional owners and custodians during the preparation of the decommissioning rehabilitation plan.
4.	Maintenance of sufficient consultation throughout the life of the Extension Proposal	<p>The EPA has concluded that all relevant traditional owners and custodians should be consulted during the operation and closure of the Extension Project.</p> <p>There is unlikely to be a material impact and likely to be consistent with the EPA's objectives for this factor, subject to a condition requiring a consultation framework.</p>	<p>Regulated through recommended conditions:</p> <p>Condition 4 (Cultural Heritage), including:</p> <ul style="list-style-type: none"> requiring a revised Cultural Heritage Management Plan requiring a framework for consultation with traditional owners and custodians.

<p>5.</p>	<p>Odour impacts to traditional owners and custodians accessing Aboriginal heritage sites within the development envelope</p>	<p>The EPA has concluded that there is a potential impact to the amenity of traditional owners and custodians undertaking activities within the development envelope.</p> <p>The EPA notes the proponent's commitment to reduce VOC emissions by 40% by 2030.</p> <p>With implementation of the CHMP (Woodside 2021d) and the reduction in VOCs as required by Condition 2 (Air Quality), it is the EPA's view that odour emissions are likely to be consistent with the EPA's objective subject to the requirements of the conditions to reduce VOCs.</p>	<p>Condition 3 – Air Quality including:</p> <ul style="list-style-type: none"> • requiring the proponent to adopt practicable and efficient technologies to minimise VOCs emissions. • implementation of the AQMP • requiring the proponent to consult with the Ngarluma Yindjibarndi Foundation Ltd and the Murujuga Aboriginal Corporation.
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2.4 Marine environmental quality

2.4.1 Environmental objective

The EPA's environmental objective for marine environmental quality is *to maintain the quality of water, sediment and biota so that environmental values are protected* (EPA 2021b).

2.4.2 Investigations and surveys

The assessment of the Extension Proposal is informed by the following investigations:

- The ERD (Woodside 2019a) which discusses the following investigations:
 - chemical characterisation and Whole Effluent Toxicity (WET) testing of discharges from the Jetty Outfall
 - the 2017 investigation to detect the presence of per and poly-fluoroalkyl substances / perfluorooctanoic acid (PFAS/PFOA) in sediment
 - the Chemical and Ecological Monitoring of Mermaid Sound (ChEMMS) program which was initiated by the NWSJV in June 1985 and includes an annual surveillance monitoring program of:
 - contaminant concentrations (e.g., metals, hydrocarbons) in samples of sediments, oysters and mud whelks
 - mangrove health
 - coral health.
- The *North West Shelf Project Extension Karratha Gas Plant Wastewater Discharge Modelling* (Dilution Modelling (RPC 2019)) provided as Appendix G of the ERD (Woodside 2019a) modelled the expected dilution values around the Jetty Outfall and Administration Drain.
- The *North West Shelf Project Extension Marine Environmental Quality Management Plan, Revision 4* (MEQMP) (Woodside 2021e) provided as Appendix D of the RtS document (Woodside 2021a) was developed from the baseline monitoring and modelling outputs. This MEQMP 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 Extension Proposal.
- The *Karratha Gas Plant Wastewater Dilution Validation Study, Study Report Revision 0* (Validation Study (Jacobs 2021)) to verify the dilution and extents of discharge influence for the Jetty Outfall and Administration Drain, including the mixing zone.

The proponent's investigations are generally consistent with the *Environmental factor guideline – Marine environmental quality* (EPA 2016b) and the *Technical guidance – Protecting the quality of Western Australia's marine environment* (EPA 2016c).

2.4.3 Assessment context – existing environment

The project is located on the Burrup Peninsula in proximity to the Dampier Archipelago which is recognised for its very high marine biodiversity and conservation values in the *Pilbara Coastal Water Quality Consultation Outcomes – Environmental Values and Environmental Quality Objectives Marine Series Report No 1* (DoE 2006) (Pilbara Coast Report (DoE 2006)). Mermaid Sound which is located adjacent to the Dampier Archipelago supports a range of marine-related industry sector uses including shipping and other industrial premises (Woodside 2021e).

The Extension Proposal's offshore infrastructure includes the 32 km State waters component of the existing pipelines/trunklines (1TL and 2TL), two jetties, jetty outfall and dredged channels within the Port of Dampier. These components of the Extension Proposal lie within the waters of Mermaid Sound in the broader Dampier Archipelago (Woodside 2019a).

Marine Levels of Ecological Protection (LEP) for Mermaid Sound were set out in the Pilbara Coast Report (DoE 2006). Most of Mermaid Sound has been assigned a high LEP. The areas surrounding the various industrial facility jetties and wharves in Mermaid Sound and Dampier Port have moderate LEPs. In the Pilbara Coast Report (DoE 2006), there are areas around some outfalls (areas not defined) where it is recognised that social values may not be protected, and lower environmental protection may be required (DoE 2006). This applies to areas such as the Extension Proposal's Jetty Outfall and Administration Drain discharge areas.

The Jetty Outfall is located within a Moderate Ecological Protection Area (MEPA) encompassed by a High Ecological Protection Area (HEPA). The Administration Drain discharges into a HEPA (DoE 2006).

Sediment quality in Mermaid Sound is considered clean with the only anthropogenic contaminant of concern being tributyltin (TBT) (Woodside 2019a). Ministerial Statement 536 conditions the proponent's commitment to protect the marine environment from impacts of dredging and TBT in Mermaid Sound. The proponent previously monitored sediments for TBT between 1991 until 2003. The final monitoring results did not detect any TBT near the gas processing plant with sediment sampling near the King Bay Supply Base detecting levels around the ANZECC 2000 trigger levels (Woodside 2015).

The existing North West Shelf Project was reported to the DWER prior to the commencement of the *Contaminated Sites Act 2003* (commenced on 1 December 2006). The Extension Proposal area is classified as *possibly contaminated – investigation required* under the *Contaminated Sites Act 2003*. The reason for classification was several historical incidents at the site that were considered likely to cause impacts to soil and/or groundwater (DWER 2021).

As detailed in the ERD (Woodside 2019a), a preliminary site investigation was undertaken in 2017 which identified the presence of per-and poly-fluoroalkyl substances / perfluorooctanoic acid (PFAS/PFOA) beyond the immediate plant boundary (caused by historic leaks and spills and the use of firefighting foams).

Sampling and analysis of sediments in No Name Bay did not detect the presence of PFAS/PFOA. Sediment sampling and analysis of samples taken at North East Creek Beach did detect PFAS at a maximum value of 0.001 mg/kg which is below the human health trigger level prescribed in the Commonwealth government PFAS National Environmental Management Plan (2 mg/kg) (Woodside 2019a).

The EPA notes that further investigations of the historic contamination are required to meet the requirements of the *Contaminated Sites Act 2003*.

2.4.4 Consultation

Consultation on the Existing Proposal raised concerns about the composition and impacts of third-party gas and fluids on wastewater discharges, concerns around consultation with traditional owners and custodians on environmental values, and the need to present cumulative impacts for the marine environment.

2.4.5 Potential impacts from the Extension Proposal

Operation of the Extension Proposal has the potential to impact on marine environmental quality due to:

- ongoing discharge of wastewater and stormwater causing an impact to ecosystem health within the marine environment of Mermaid Sound from:
 - the Jetty Outfall which receives process water from LNG and Domgas processing areas via an oil-contamination water system
 - the Administration Drain receives treated sewage from the sewage treatment plant, water discharged from the demineralisation water plant and stormwater run-off (Woodside 2021e)
- changes to discharge characteristics at the Jetty Outfall resulting from the introduction of third-party gas and fluids. No changes are expected for the Administration Drain as it is unrelated to the natural gas processing equipment (Woodside 2019a)
- unplanned discharges (offshore and onshore) to the marine environment due to accidents or emergencies (Woodside 2019a)
- turbidity from ship loading and ship movements at the Extension Proposal (Woodside 2019a)
- turbidity from maintenance dredging activities (Woodside 2019a).

2.4.6 Impact minimisation measures (including regulation by other DMAs)

Planned wastewater discharges

The proponent will implement measures to minimise impacts from planned discharges on the marine environment. These measures include the following:

- The implementation of the MEQMP Revision 4 (Woodside 2021e) which:
 - identifies the environmental values to be protected
 - establishes spatially defined environmental quality objectives (EQOs) to ensure the environmental values are maintained

- spatially defines low, moderate, and high ecological protection areas
 - establishes Environmental Quality Criteria (EQC) for the discharges from the Jetty Outfall and Administration Drain to ensure that EQOs are met
 - presents monitoring that will be required to demonstrate that discharges to the marine environment meet the level of ecological protection assigned to the discharge area, and to ensure the EQOs are achieved
 - provides an adaptive management program to ensure the management measures continue to be appropriate, and to ensure protection of the environmental values (Woodside 2021e).
- The installation of additional treatment equipment to reduce hydrocarbons and heavy metals discharged from the Jetty Outfall (Woodside 2019a).

Migration of onshore contaminants

The proponent will mitigate impacts by continuing to implement existing management measures which include:

- storing all hydrocarbons in accordance with the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007 (Woodside 2019a)
- phasing out the use of PFAS at the site and not using PFAS firefighting foams on unsealed ground during training, collecting all waste from training and disposing the waste in licenced third-party facilities (Woodside 2019a)
- continuing the NWS Joint Ventures Chemical and Ecological Monitoring of Mermaid Sound (ChEMMS) program to monitor the health and detect changes in the marine environment and report environmental change (contaminant concentrations in sediments, oysters, mud whelks, mangrove health and coral health) that may indicate impacts arising from operation of the Extension Proposal (Woodside 2019a).

Turbidity

The proponent will continue to conduct all maintenance dredging in accordance with a licence issued by the Pilbara Ports Authority (PPA) which operates under the *Port Authorities Act 1999* (PA Act). Licences issued by PPA ensure that other obligations under the PA Act are met such as protecting the environment of the port and minimising the impact of port operations on that environment.

Any dumping of dredged sediment is governed by the Commonwealth *Environmental Protection (Sea Dumping) Act 1981* (Sea Dumping Act) and the Sea Dumping permit issued by DAWE. The Sea Dumping Act regulates ocean waste disposal to minimise marine environmental impacts (Woodside 2019a).

Maintenance dredging occurs every five to ten years, last occurring in 2016 (Woodside 2019a). Noting the existing regulation regarding maintenance dredging, this issue has not been considered further in this assessment.

Ship movements already occur because of the existing North West Shelf Project and are not expected to increase. Noting that ship movements cause short-term (not chronic) turbidity impacts, this issue has not been considered further in this assessment.

Regulation of unplanned discharges

The proponent will continue to implement the NWS Trunklines (State Waters) Environment Plan (State Waters Trunklines EP) to reduce impacts to sediments from unplanned discharges of hydrocarbon oils. The State Waters Trunklines EP has been prepared in accordance with the Petroleum (Submerged Lands) (Pipelines) Regulations 2007 and the Petroleum (Submerged Lands) (Environment) Regulations 2012 and approved by the Department of Mines, Industry, Regulation and Safety (Woodside 2019a).

Discharges from vessels are performed in accordance with the Australian Government's Australian Marine Orders to prevent pollution from garbage, sewage and oily water, and the requirements of the Pilbara Ports Authority (Woodside 2019a).

Taking the existing regulation of unplanned discharges into account, this issue has not been considered further in this assessment.

2.4.7 Assessment of impacts to environmental values

The EPA has assessed the proposal in the context of the existing North West Shelf Project and had regard to the combined and cumulative effect that the implementation of the approved proposal may have on marine environmental quality.

Planned wastewater discharge

As noted in the MEQMP (Woodside 2021e), there are discharges to the marine environment from the King Bay Supply Base (treated sewage and site run-off). The proponent has stated that the site-run off 'is from areas with a low likelihood of contamination by oils or other chemicals'. Further, the sewage treatment plant is 'below the thresholds for management under Part V of the EP Act' (Woodside 2019a). Noting this, the EPA has not considered these impacts further in its assessment of the Extension Proposal.

In the MEQMP, the proponent has proposed an Environmental Quality Plan (EQP) for the Administration Drain (Figure 6) and an EQP for the Jetty Outfall (Figure 7).

The proposed EQP for the Jetty Outfall defines a Low Ecological Protection Area (LEPA) that extends 70 m from the Jetty Outfall and a Moderate Ecological Protection Area (MEPA) that extends a minimum of 600 m from the Jetty Outfall. Beyond the MEPA, a high level of ecological protection will be required to be met (Woodside 2021e). The levels of change to key elements of ecosystem integrity under the different levels of ecological protection are defined in the EPA's *Technical Guidance for Protecting the Quality of Western Australia's Marine Environment* (EPA 2016c).

The proposed EQP for the Administration Drain defines a MEPA (70 m in an arc from the point where the discharge enters No Name Bay). The MEPA is located within the broader High Ecological Protection Area (HEPA) that applies to most of the Port of Dampier (Woodside 2021e).

The discharge of wastewater from the Jetty Outfall and Administrative Drain has the potential to impact on water and sediment quality in Mermaid Sound due to the contaminants (physical and chemical stressors) contained in discharge water (Woodside 2019a).

Prior to being discharged to the Jetty Outfall, process water (from LNG and Domgas processing) and site run-off is treated via an oil-contaminated water system and sampled and tested against internal discharge limits (Woodside 2021e).

The Administration Drain is a concrete lined drain that discharges into No Name Creek that terminates at the site boundary where water continues to flow into No Name Bay and Mermaid Sound. The proponent has stated that no public access is permitted within 1.5 km of the discharge point to No Name Bay (Woodside 2021e).

The proponent advises that the Administration Drain receives wastewater from the sewage treatment facility which is a tertiary treatment facility designed to treat sewage to a high quality. The demineralisation water plant treats potable scheme water using reverse osmosis which is designed to achieve a total dissolved solids concentration of 4,000 milligrams per litre in the brine discharged (Woodside 2019a).

The Administration Drain also receives stormwater runoff from 'various areas' of the Extension Proposal and the stormwater run-off 'has the potential to be contaminated with residual oils or chemicals'. Collected water from the main site stormwater drain must meet discharge criteria or undergo a risk assessment before it can be released to the Administration Drain'. Table 4-3 of the MEQMP provides the discharge criteria (Woodside 2019e).

The marine discharges contain several contaminants of concern which include bioaccumulating toxicants; and non-bioaccumulating toxicants and stressors. These are outlined in sections 4.2.4 and 4.3.5 of the MEQMP (Woodside 2021e).

The proponent commissioned Dilution Modelling (RPC 2019) for the Jetty Outfall and the Administration Drain to review the mixing zones and discharge concentrations at the Jetty Outfall and Administration Drain. This work was undertaken to determine the dilution required to ensure the various LEP thresholds can be met.

A Validation Study (Jacobs 2021) using field data was also undertaken to 'verify the dilution, extents of discharge influence and define the mixing zone' for the Jetty Outfall and Administration Drain. The Validation Study (Jacobs 2021) showed that the Dilution Modelling (RPC 2019) for the Jetty Outfall was more conservative than actual results (actual dilution rates were four times higher than the Dilution Modelling predictions).

The Validation Study (Jacobs 2021) showed that the Dilution Modelling (RPC 2019) over-estimated the dilutions of the Administration Drain discharge when it enters No Name Bay under worst case conditions (neap tides). As a result, the proponent revised the EQC values in the MEQMP (Woodside 2021e).

The proponent will undertake quarterly monitoring of the Administration Drain discharge. For the Jetty Outfall, the proponent will undertake monitoring each time

water is discharged. For sediments, the proponent will undertake monitoring every five years (Woodside 2021e).

The proponent has identified environmental values relevant to the Jetty Outfall and Administration Drain discharges and has established spatially defined EQOs, EQCs and monitoring programs for maintaining ecosystem health (Woodside 2021e).

The proponent has proposed two types of EQC to manage impacts:

- Environment Quality Guidelines (EQG) which are early warning triggers that if met there is a high likelihood that the EQO will be achieved. If the EQGs are exceeded, there is uncertainty as to whether the EQO is being achieved.
- Environmental Quality Standards (EQS) which are thresholds that if exceeded suggest there is a significant risk that the EQO is not being achieved (Woodside 2021e).

EQCs have been provided in the MEQMP for:

- the protection of ecosystem health
- the protection of societal values associated with fishing and aquaculture (thermotolerant coliforms in the discharge water)
- the protection of recreation (enterococci levels in the discharged water) (Woodside 2021e).

No EQCs have been provided specifically for protecting cultural and spiritual values although it is the proponent's view that if water quality is maintained to meet ecological values, then this will go some way to protect cultural and spiritual values (Woodside 2021e).

Noting the results of the Dilution Modelling (RPC 2019) and the Validation Study (Jacobs 2021), and the revised trigger values for the Administration Drain, the EPA has a higher level of confidence that the LEPA/MEPA/HEPA criteria can be met for both the Administration Drain and Jetty Outfall discharges.

The EPA has considered the investigations and the MEQMP. The EPA has assessed the residual impact of planned discharges and considers that if managed as proposed in the MEQMP Revision 4 (subject to revisions detailed below) there is not likely to be a material impact. Therefore, the EPA considers that the Extension Proposal is likely to be consistent with the EPA's objective *to maintain the quality of water, sediment and biota so that environmental values are protected* (EPA 2016b).

The EPA has recommended a condition to implement the MEQMP. This condition includes a requirement to submit a revised MEQMP within twelve months of the date of the Ministerial Statement. The EPA expects the proponent to re-evaluate the EQCs in Table 7.4 and 7.5 of the MEQMP for the Jetty Outfall and Administration Drain. The EQCs in these two tables are based on back-calculations from the guideline concentrations that must be met at the LEPA/MEPA/HEPA boundaries and so represent a maximum allowable concentration with no allowance for best practice.

Further the EPA notes that WET testing has only been conducted on the Jetty Outfall wastewater. The EPA recommends that the proponent carry out toxicity testing on the discharge from the Administration Drain. This discharge contains a mixture of sewage, stormwater and wastewater from the demineralisation plant. This will provide further accuracy on the proposed dilution and mixing to manage toxicity.

Licence L5491/1984/18 issued under Part V of the EP Act includes conditions for monitoring and reporting of volume and quality of discharge from the Jetty Outfall and Administration Drain. The EPA notes that the licence does not currently contain limits for discharge of wastewater to the marine environment.

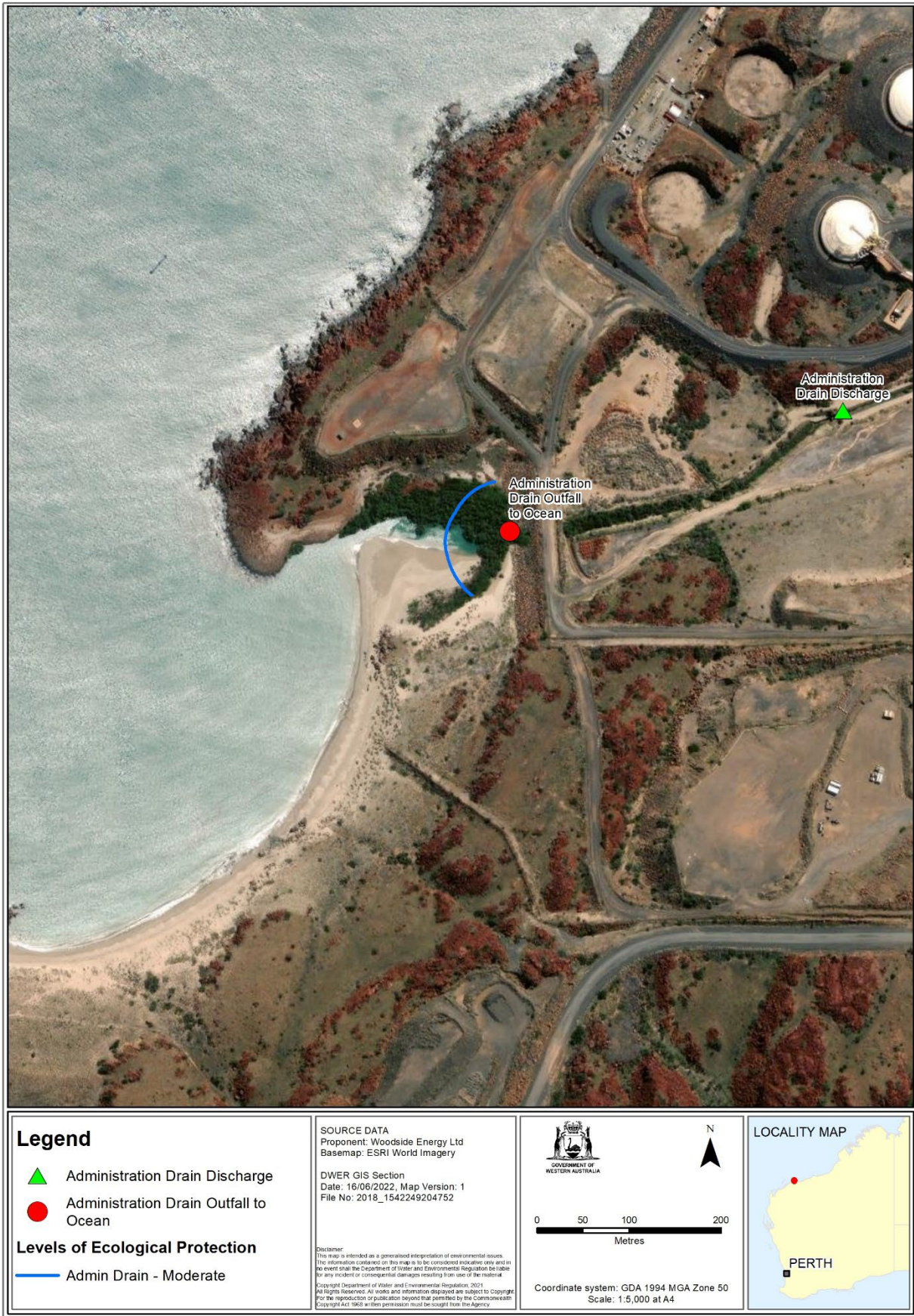
The DWER has informed the EPA that it plans to conduct a full review of licence L5491/1984/18 using DWER's current Regulatory Framework. The EPA recommends that the DWER update the licence to be consistent with the EPA's Technical Guidance for Protecting the Quality of Western Australia's Marine Environment (EPA 2016c) and the MEQMP, and also consider the incorporation of the MEQMP's water quality monitoring program including EQCs (limits) and contingency management measures during the assessment and review of the licence.



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Figure 6: Jetty outfall levels of ecological protection



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Figure 7: Administration drain levels of ecological protection

Wastewater compositional changes

The EPA notes that changes to the chemical composition of the wastewater discharge of the Jetty Outfall may occur as a result of the modification of feed gas source. The MEQMP states that if there is a change in feed gas source an adaptive management testing program will be undertaken to confirm compliance with the EQPs and that management measures remain suitable for the maintenance of environmental quality objectives.

The EPA considers the MEQMP's proposed adaptive management approach will ensure the residual impacts are not material and the Extension Proposal is not likely to be inconsistent with its objective to ensure marine water quality environmental values are protected.

The EPA is aware that the possible changes to the characteristics of discharged wastewater from the processing of third-party gas and fluids may trigger section 53 of the EP Act in relation to licence L5491/1984/18 and therefore may require further approval by DWER under Part V of the EP Act.

Migration of onshore contaminants

As detailed above, the historical contamination of PFAS/PFOA requires detailed investigation to meet the requirements of the *Contaminated Sites Act 2003*. The EPA notes that the proponent has committed to no planned release of PFAS to unsealed surfaces unless in emergency situations (Woodside 2019a). The EPA also notes that the MEQMP requires five yearly monitoring of sediments including the presence of PFAS to ensure guideline values are not exceeded.

The EPA notes that the proponent has included sediment EQCs for PFAS/PFOA. The EPA expects the proponent to include PFAS water quality EQCs and monitoring provisions in the revised MEQMP.

The EPA is aware that the storage of hydrocarbons is managed under the *Dangerous Goods Safety Act 2004* and the *Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007* which requires the proponent to implement measures to eliminate or minimise risk to people, property and the environment.

Cultural and spiritual values

The proponent states in the MEQMP that 'in the absence of any specific environmental quality requirements for protection of 'Cultural and Spiritual' values, it is assumed that if water quality is managed to protect ecosystem integrity, then this may go some way towards maintaining cultural values' (Woodside 2021e).

It is noted that the MAC provided a submission requesting that consultation is undertaken to determine environmental values that are relevant to local Aboriginal peoples, particularly in the case of marine fauna. In the MEQMP the proponent has committed to ongoing consultation with traditional owners and custodians on potential impacts of cultural and spiritual significance to local Aboriginal peoples and outlines how indirect impacts to marine fauna will be addressed.

The EPA has recommended a condition to implement the MEQMP. This condition includes a requirement to submit a revised MEQMP within twelve months of the date of the Ministerial statement. This condition also requires the proponent to consult with NYFL and MAC when revising the MEQMP. If through this process environmental quality requirements are identified to maintain cultural and spiritual values, the EPA expects the proponent to develop EQCs and monitoring programs to ensure these values are maintained.

The EPA has also provided other advice (section 6) on the need for an overarching Strategic Environmental Management Framework to strategically manage the potential for cumulative effects on the marine and terrestrial environment of Murujuga.

The EPA notes that the Edible Oyster project is about 14 km from the discharge locations and the proposed Conzinc Bay Tourism Precinct is about 10 km from the Extension Proposal. The MEPA/HEPA boundaries extend 600m from the Jetty outfall and 70m from the Administrative Drain discharge into No Name Bay.

Cumulative impacts

The EPA has considered the information in the Pilbara Coast Report (DoE 2006) and the proponent's proposed EQP for the Jetty Outfall (Figure 6) and Administration Drain (Figure 7). The closest areas of industrial impact to the Jetty Outfall and Administration Drain discharges are:

- discharges from the King Bay Supply Base (treated sewage and site run-off) (located more than 3 km from the Jetty Outfall and Administration Drain discharges)
- the Pluto LNG Loading Facility which has a MEPA in place around the loading jetty
- Multi User Brine Return line operated by the Water Corporation in accordance with Ministerial Statement 594, approximately 6 km from the Jetty Outfall and Administration Drain (Woodside 2021e).

Noting the EQPs for the Jetty Outfall (Figure 6) and Administration Drain (Figure 7), a high level of ecological protection is expected to be achieved within 600 m and 70 m of the Jetty Outfall and Administration Drain respectively. No mixing of different discharges or overlapping zones of impact are expected.

2.4.8 Summary of impacts of Extension Proposal to environmental values

The EPA has assessed the likely residual impacts of the Extension proposal on marine environmental quality to be:

1. impact from continued wastewater discharged as a result of the Extension Proposal and change to wastewater composition are unlikely to significantly impact ecosystem integrity in the Mermaid Sound, subject to the implementation of the MEQMP Revision 4 (with recommended revisions) (Woodside 2021e)
2. material impacts to marine environmental quality from migration of onshore contamination is unlikely

3. material impacts to marine turbidity from short term maintenance dredging (for about two weeks every five to ten years) and shipping is unlikely
4. material impact on aquaculture and a proposed tourism precinct located 14 km and 10 km from discharges respectively is unlikely
5. due to the distance to other marine discharges in Mermaid Sound, cumulative impacts are not material.

The EPA considers the proponent's proposed EQP for the Jetty Outfall (see Figure 6) and EQP for the Administration Drain (see Figure 7) to be appropriate.

2.4.9 Summary of assessment and recommended regulation

The EPA has assessed the residual impacts to marine environmental quality and considers that if managed as proposed in the MEQMP Revision 4 (subject to revisions described above) there is not likely to be a material impact to the environmental values identified. Therefore, the EPA considers that the Extension Proposal is likely to be consistent with the EPA's objective *to maintain the quality of water, sediment and biota so that environmental values are protected* (EPA 2016b). The EPA's assessment findings are presented in Table 7.

The EPA has considered whether the residual impacts are consistent with the EP Act principles (Appendix C).

In doing so, the EPA has also considered whether reasonable conditions could be imposed to prevent inconsistency with the EPA's factor objective. The EPA has recommended a condition requiring the implementation of the MEQMP.

Table 7: Summary of assessment, conditions and DMA regulation for marine environmental quality

No	Residual impact	Assessment finding	Draft conditions / DMAs regulation
1.	Potential impacts to marine water quality from ongoing wastewater discharges to Mermaid Sound, including potential change of wastewater composition from the Jetty Outfall.	<p>A high level of ecological protection will be maintained 600 m from the Jetty Outfall and 70 m from the Administration Drain Outfall.</p> <p>The MEQMP has identified environmental values, EQOs, criteria and monitoring programs to protect the identified environmental values.</p> <p>Impacts to marine water quality from wastewater discharge and changes to the composition of wastewater discharge are likely to be consistent with EPA's objectives for this factor subject to a condition</p>	<p>Regulated through recommended conditions:</p> <p>Condition 5 (Marine Environmental Quality), including:</p> <ul style="list-style-type: none"> • an objective to manage discharges to the marine environment to maintain water and sediment quality, protect the environmental values and achieve the defined levels of ecological protection • the implementation of MEQMP Revision 4 until a revision has

No	Residual impact	Assessment finding	Draft conditions / DMAs regulation
		<p>requiring the implementation (and subsequent revision) of the MEQMP.</p> <p>The licence under Part V of the EP Act (for wastewater discharge) currently requires monitoring and reporting of wastewater volumes and quality. The licence will be fully reviewed and may require further assessment of composition of wastewater discharges.</p>	<p>been approved by the CEO</p> <ul style="list-style-type: none"> a revised MEQMP in consultation with MAC and NYFL within twelve months of approval of the proposal. The MEQMP is required to identify environmental values, EQCs and monitoring programs to maintain environmental values in Mermaid Sound. <p>Regulated through other acts: Part V of the EP Act - for waste water discharge.</p>
2.	<p>Potential impacts to sediment from the migration of onshore contamination including contamination from use of PFAS and other onshore contaminants.</p>	<p>Further impacts from PFAS are not expected due to:</p> <ul style="list-style-type: none"> the use of PFAS being phased out PFAS is currently only used during emergencies or during training on sealed surfaces (and disposed offsite) PFAS levels in sediment are currently not detected or are well below limits. <p>Historical contamination is to be managed through the requirements of the <i>Contaminated Sites Act 2003</i>.</p> <p>The storage of hydrocarbons will be managed in accordance with the <i>Dangerous Goods Safety Act 2004</i> and the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007.</p> <p>The MEQMP will monitor sediment quality to ensure guideline values are not exceeded.</p>	<p>Regulated through recommended conditions:</p> <p>Condition 5 (Marine Environmental Quality)</p> <ul style="list-style-type: none"> requiring the implementation of MEQMP Revision 4 which includes five-yearly monitoring of PFAS in sediments. The EPA recommends that water quality EQCs be developed for PFAS in the revised MEQMP. <p>Regulated through other acts: The <i>Contaminated Sites Act 2003</i> which protects human health, the environment and environmental values by providing for the identification, recording management and remediation of contaminated sites.</p> <p>The <i>Dangerous Goods Safety Act 2004</i> and the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007 requires the proponent to</p>

No	Residual impact	Assessment finding	Draft conditions / DMAs regulation
		Likely to be consistent with EPA's objectives for this factor.	implement measures to eliminate or minimise risk to people, property and the environment
3.	Potential impacts to marine water quality from turbidity caused by maintenance dredging and shipping.	<p>Unlikely to be a material impact due to:</p> <ul style="list-style-type: none"> • short duration of dredging, about two weeks every five to ten years • intermittent turbidity caused by ongoing shipping. <p>Likely to be consistent with EPA's objectives for this factor.</p>	<p>Regulated through other acts:</p> <p>The Pilbara Port Authority (PPA) operate in accordance with the <i>Port Authorities Act 1999</i> under which). This act requires the protection of the marine environment from port operations. PPA ensures this is achieved through required maintenance dredging licences.</p> <p>The <i>Environmental Protection (Sea Dumping) Act 1981</i>. This Act protects the environment by regulating the disposal at sea of dredge or excavation material through a permit.</p>

3 Holistic assessment

While the EPA assessed the impacts of the Extension Proposal against the key environmental factors individually, the EPA also recognises the links between greenhouse gas emissions, air quality, social surroundings and marine environmental quality (see Figure 8) and has therefore also considered the connections and interactions between parts of the environment to inform a holistic view of impacts to the whole environment.

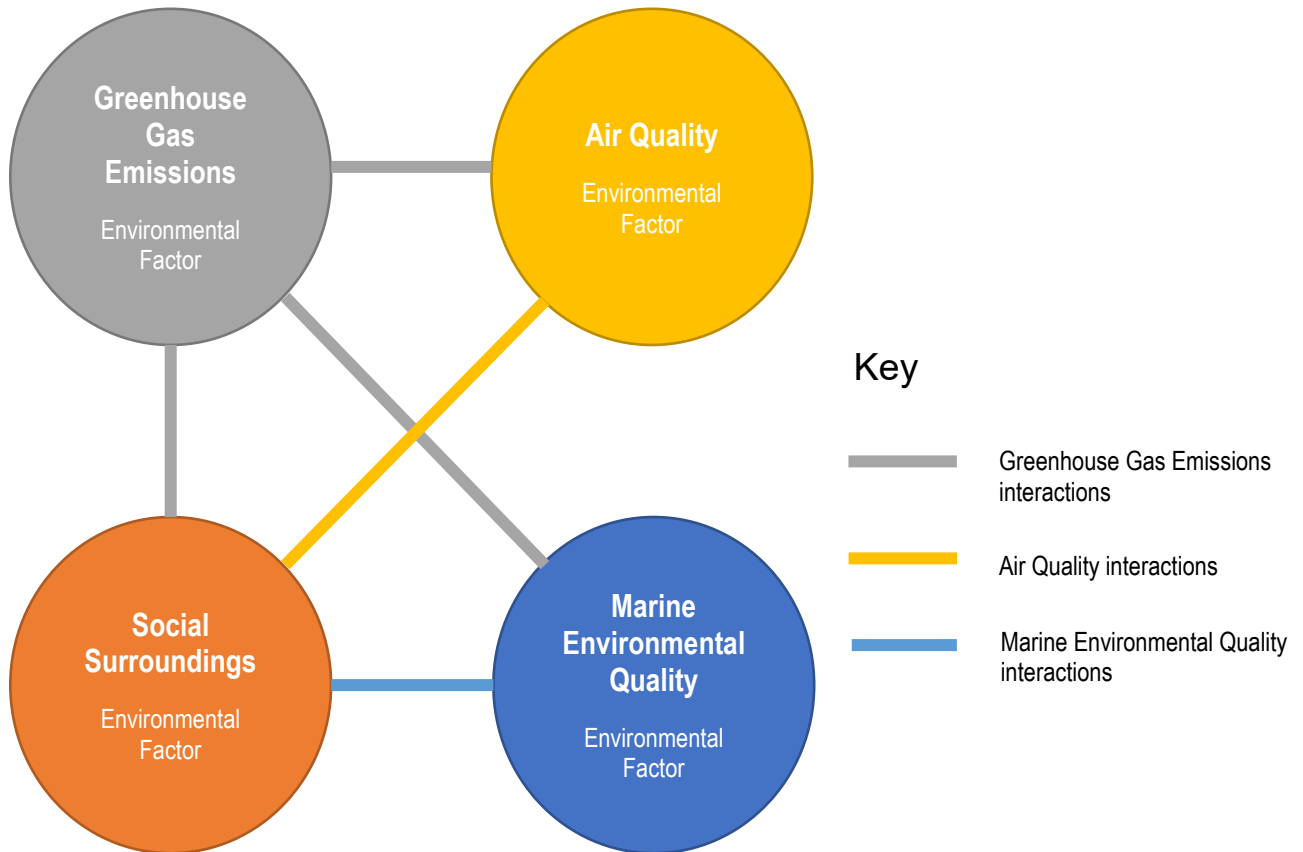


Figure 8: Intrinsic interactions between key environmental factors

Greenhouse gas emissions

There is an established link between GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on Western Australia’s environment and environmental values.

The Extension Proposal’s GHG emissions are up to 7.7 Mtpa of CO₂-e. With the proponent’s proposed emissions reduction targets, the residual impact associated with GHG emissions from the Extension Proposal is up to 138.85 Mt of CO₂-e generated over the 50-year life of the Extension Proposal (up to 2070).

The EPA has recommended a condition requiring the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions released to the atmosphere

from the issue date of the Statement to 31 December 2029. The EPA has also recommended a condition requiring the achievement of specific net GHG emissions limits. With the recommended conditions, the residual GHG emissions would reduce to 128.2 Mt of CO₂-e over the 50-year life of the Extension Proposal (up to 2070). The conditions require the proponent to achieve net zero GHG emissions by 2050.

The EPA considers that the proposed mitigation measures and recommended conditions to regulate GHG emissions will also mean that the impacts to the health of other factors of the environment including the values associated with social surroundings, marine environmental quality and air quality are not likely to be inconsistent with the EPA's environmental factor objectives.

Air quality – Social surroundings

Air emissions have the potential to impact on social surroundings in the form of health and amenity impacts. A critical linkage for this assessment is the potential impact on significant cultural and heritage values associated with the rock art of Murujuga due to changes in air quality.

The Extension Proposal's residual impact on human health and amenity through the emission of NO_x, SO₂, O₃ and VOCs, when considered together with other airshed emissions meet NEPM standards at the sensitive receptors of Dampier, Karratha, Hearson Cove and Deep Gorge (Ngajarli). The proponent's air quality impact assessment for benzene (Jacobs 2020) predicted that GLCs would exceed the relevant New South Wales criteria (NSW EPA 2016) of 9ppm in close proximity to offshore condensate ship loading facilities. The impact assessment (Jacobs 2020) also notes that the 'Safe Work Australia occupational exposure standard for benzene is 1 ppm or 1000 ppb as an 8-hour average'. The EPA has recommended additional measures be implemented to ensure the applicable practical and efficient technologies are adopted to minimise air emissions including VOCs (including BTEX).

The EPA considers there may be a threat of serious or irreversible damage to rock art from industrial air emissions (in particular NO₂) from the Extension Proposal accelerating the natural weathering. The EPA considers that there is lack of full scientific consensus about potential residual cumulative impacts on the significant environmental values (including social surroundings values) associated with rock art within Murujuga. Therefore, after consideration of the precautionary principle and principle of intergenerational equity in particular, the EPA recommends that a cautious, preventative approach be taken, and the Extension Proposal be required to ensure no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates. The EPA also recommends that the Extension Proposal be required to meet future detailed air emissions quality objectives and criteria which are developed for cumulative emissions sources when there is adequate certainty about this. In addition, a peer review of revised Air Quality Management Plans will be required to ensure the methodology for the baseline modelling, the criteria, management actions and reporting requirements are scientifically valid and robust and will be effective at ensuring the outcome of no impact to rock art is able to be achieved. If these recommendations are adopted, the EPA considers the Extension Proposal (if

implemented) is not expected to be inconsistent with the EPA's environmental factor objectives and EP Act principles which are relevant to rock art.

The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to air quality will also mean the impacts to the values associated with social surroundings are likely to be consistent with the EPA's environmental factor objectives.

Marine environmental quality – Social surroundings

To ensure the ongoing protection of Marine Environmental Quality the proponent has produced the Marine Environmental Quality Management Plan (MEQMP). The MEQMP includes Environmental Values, Environmental Quality Objectives, monitoring against guidelines, management responses and reporting to maintain environmental values and objectives such as the maintenance of ecosystem integrity, seafood for human consumption and recreation.

The EPA notes the MAC submission which requested consultation be undertaken to determine Environmental Values particularly in the case of marine fauna.

The EPA considers that the MEQMP will ensure the environmental quality of the marine environment is maintained subject to the implementation of recommended condition 5. This condition allows for the revision of the MEQMP in consultation with MAC and NYFL, to ensure all Environmental Values including cultural and spiritual are identified and maintained.

By applying the proposed management measures in the MEQMP, the EPA considers the impacts to the health of other factors of the environment including the values associated with social surroundings including aquaculture and a proposed tourism precinct are not likely to be inconsistent with the EPA's environmental factor objectives.

Summary of holistic assessment

The EPA recognise Murujuga is an area of outstanding conservation and heritage value, with one of the most dense and diverse collections of rock art in the world. The EPA is also aware of the potential for industry and other activities located within Murujuga to influence the complex interactions between environmental factors. These interactions have the potential to influence the environment in a holistic and non-linear nature, effecting all environmental values which are physically and intrinsically linked to Social Surroundings and specifically cultural heritage.

The EPA advises that there is lack of full scientific consensus about potential residual cumulative impacts on the significant environmental values associated with rock art within Murujuga. Therefore, after consideration of the precautionary principle and principle of intergenerational equity in particular, the EPA recommends that a cautious, preventative approach be taken, and the Extension Proposal be required to ensure no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates.

The EPA in considering the significant environmental and cultural values of Murujuga has recommended implementation conditions to be imposed on the Extension Proposal. And if implemented, would mean that the Extension Proposal is not likely to be inconsistent with the EPA's objectives.

The EPA considers that a five yearly environmental performance report should be required from the proponent. This report will require the proponent to report on trends in air emissions (that may impact rock art and human health) and trends in the quality of discharges to the marine environment. This environmental performance reporting will provide the proponent and the Minister with renewed and current information about the performance of the proposal with respect to environmental values over the life of the Extension Proposal.

Given the cumulative nature of many impacts in the area likely to be affected by the Extension Proposal, the EPA recommends the proponent be permitted to prepare the report in whole or part with other proponents who have proposals operating there.

To ensure heritage and cultural values which may be affected by impacts on other key environmental factors are continued to be considered in a holistic way, the EPA has recommended that NYFL and MAC be consulted by the proponent when it submits and reviews management plans for the key environmental factors of greenhouse gas emissions, air quality, social surroundings and marine environmental quality.

When the separate environmental factors of the Extension Proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the Extension Proposal would not lead to any change to its view about consistency with the EPA's factor objectives.

4 Matters of national environmental significance

The Commonwealth Minister for the Environment has determined that the Extension Proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as it is likely to have a significant impact on one or more Matters of National Environmental Significance (MNES). It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- National Heritage places (sections 15B & 15C).

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether or not to approve the Extension Proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth policy and guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- Australian Government 2008, *Australia's National Heritage – Applying the Principles*.
- Commonwealth of Australia 2012, *Commonwealth EPBC Act Environmental Offsets Policy*.
- Commonwealth of Australia 2016, *Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

Consultation

The ERD (Woodside 2019a) indicates that the proponent commenced the provision of information to the Ngarluma, Yaburara and Wong-GooTt-Oo people, the Ngarluma Aboriginal Corporation, the Coastal Mardudhunera Aboriginal Corporation, the NYFL and the MAC after the level of assessment for the Extension Proposal had been set.

In its submission provided during the public comment period, the MAC made several recommendations, one of which called for meaningful consultation. Given the above information the EPA considers that the proponent's approach to consultation was not entirely consistent with the *Australia's National Heritage – Applying the Principles* (Australian Government 2008) and the *Engage Early – Indigenous Engagement Guidelines, Department of the Environment and Energy* (Engage Early Guidelines) (DoEE 2016) which require early and appropriate engagement with relevant and affected traditional owners and custodians.

The EPA notes that the proponent undertook further consultation with MAC as a result of its submission to ensure that adequate consultation was undertaken. Section 2.3.5 provides a list of outstanding issues identified through the consultation process between the proponent and the MAC. These issues have been addressed in this report where they are within the scope of the assessment under Part IV of the EP Act.

EPA assessment

Impacts to the environment relating to MNES are also covered under the key environmental factors of Air Quality (section 2.2 of this report) and Social Surroundings (section 2.3 of this report).

Murujuga National Park and the National Heritage Place

Murujuga supports more than one million petroglyphs in an area of more than 37,000 ha, representing one of the most dense and diverse collections of petroglyphs in the world. Rock art has significant cultural and spiritual value to Aboriginal people, and significant state, national, and international heritage value. Murujuga has been listed on Australia's National Heritage List under the Dampier Archipelago (including Burrup Peninsula) by the Australian Government since 2007¹⁶.

The Extension Proposal is adjacent to a portion of the National Heritage listed Dampier Archipelago (Figure 5) and overlaps the Extension Proposal's onshore development envelope in the north-east at Withnell Bay and over a small section of the King Bay Supply Base.

The heritage values of a national heritage place (sections 15B and 15C)

Continued operation of the Extension Proposal has the potential to impact on:

- Aboriginal rock art because of acidic air emissions
- the Murujuga Cultural Landscape World Heritage Listing by one or more of the National Heritage values being lost
- Aboriginal heritage sites and cultural values (Woodside 2019a).

Assessment of impacts

Indirect impacts to cultural heritage values from the Extension Proposal, and specifically rock art situated within Murujuga is assessed in the air quality assessment in section 2.2 (Air Quality).

As detailed in section 2.2 of this report, the EPA considers there may be a threat of serious or irreversible damage to rock art from industrial air emissions (in particular NO_x from the Extension Proposal) accelerating the natural weathering. Furthermore, the EPA acknowledges that there is contested science and a lack of consensus on the science about whether such emissions are adversely affecting rock art within Murujuga.

¹⁶ Commonwealth of Australia (2007). Gazette Special No. S127, Tuesday, 3 July 2007.

To address the contested and uncertain science the DWER is currently implementing the Murujuga Rock Art Strategy (MRAS) which was released by the State Government in February 2019. The purpose of the MRAS (DWER 2019) is to protect the rock art on Murujuga from the potential impacts of anthropogenic emissions and establishes the framework for long-term monitoring and analysis of changes to the rock art to determine whether the rock art is subject to accelerated change. The framework provides a risk-based and adaptive approach for the management of impacts to the rock art, and initial data and interim findings from the MRAS are anticipated in 2023.

The MRAS (DWER 2019) includes the Murujuga Rock Art Monitoring Program (MRAMP) which will monitor, evaluate, and report on changes and trends in the integrity of the rock art, specifically to determine whether anthropogenic emissions are accelerating the natural weathering, alteration, or degradation of the rock art.

The EPA expects that the final results obtained from the MRAMP will enable the level of risk of degradation of the rock art from cumulative air emissions from industrial activities to be determined. The EPA also expects interim results of the MRAMP, anticipated in 2023, will facilitate the development of detailed air quality standards. The air quality standards will include environmental quality objectives and environmental quality standards for the purpose of avoiding the cumulative risks of adverse impact of the rock art within the Murujuga Cultural Landscape.

The EPA acknowledges the lack of full scientific consensus regarding the potential indirect impacts of industrial air emissions on rock art within Murujuga and takes a cautious approach in recommending additional measures to reduce emissions. These measures include a recommended outcome to ensure that air emissions do not have an adverse impact on rock art, objectives to minimise emissions and a requirement to achieve air quality objectives and criteria including standards derived from the Murujuga Rock Art Monitoring Program.

The EPA notes the proponent's commitment to reduce NO_x and VOC emissions from the Extension Proposal by 40% by the end of 2030. However, given the significant environmental values associated with the rock art, the EPA considers that measures which are additional to those proposed by the proponent, also need to be considered as part of the EPA's assessment of whether the Extension Proposal will result in inconsistency with the EP Act principles and its environmental objectives for air quality and social surroundings.

No additional direct disturbance is required for the Extension Proposal. The EPA notes the avoidance and minimisation measures committed to in the proponent's Cultural Heritage Management Plan (CHMP) (Woodside 2021d) including ongoing inclusion of traditional owners and custodians in the management, monitoring, access and revision of the CHMP. This is consistent with the requirement for ongoing communication in the Engage Early Guidelines. The EPA recommends that the CHMP is amended to include:

- an objective to avoid and minimise direct impacts to Aboriginal heritage sites within the development envelope

- an objective to allow ongoing traditional owners and custodian access and connection to culturally significant heritage sites within the onshore development envelope
- an objective to allow traditional owners and custodian access to the onshore development envelope following decommissioning of the Extension Proposal
- the revision of the CHMP in consultation with MAC, to include a framework for consultation with traditional owners and custodians risk-based management actions, measurable management targets, monitoring.

The EPA considers that these measures will also protect the values of the National Heritage Place.

The EPA notes the *Commonwealth EPBC Act Environmental Offsets Policy* (Commonwealth of Australia 2012) enables offsets to be made for impacts to national heritage places and world heritage places. The EPA does not consider offsets to be applicable for this proposal as direct impacts are not predicted; the potential indirect impacts from air emissions cannot be determined with full scientific certainty at this time.

The EPA has assessed the residual impacts to cultural heritage values from the Extension Proposal and (provided appropriate management measures are implemented) are not likely to be inconsistent with the EPA's objective to protect social surroundings from significant harm.

Summary

The EPA recommends the following environmental conditions in Appendix A to minimise impacts on MNES:

- condition 3 to minimise air emissions from the Extension Proposal so that the environmental values are protected. This includes:
 - requiring the proponent to achieve an outcome to ensure that no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates
 - requiring the proponent to reduce emissions including NO_x and VOCs
 - requiring the proponent to revise the AQMP to ensure the above outcomes are met.
- condition 4 to prevent direct impacts to Aboriginal heritage sites and features within the onshore development envelope and facilitate ongoing traditional owner and custodian access and connection to the culturally significant heritage sites within the onshore development envelope.

The EPA's view is that the impacts from the Extension Proposal on the above-listed MNES are therefore not expected to result in an unacceptable or unsustainable impact on the:

- heritage values of the Dampier Archipelago National Heritage Listed Area (Place ID 105727).

The EPA considers that recommending that the Extension Proposal be implemented with conditions would be a reasonably proportionate response in order to prevent degradation of the rock art and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA's objectives.

The EPA is not satisfied that the Extension Proposal could be implemented in a way which was likely to be consistent with its objectives without these recommended conditions. Without these recommended conditions, the EPA would recommend the Extension Proposal not be implemented.

5 Conclusion and recommendations

The EPA has taken the following into account in its assessment of the Extension Proposal:

- environmental values likely to be affected by the Extension Proposal
- residual impacts, emissions and effects in relation to the key environmental factors, separately and holistically. This has included considering cumulative impacts of greenhouse gas emissions on the WA environment, and cumulative air quality impacts in the Burrup region (Murujuga)
- likely environmental outcomes (taking into account the EPA's recommended conditions) and the consistency of these with the EPA's objectives for the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures
- whether there are other statutory decision-making processes that can mitigate the potential impacts of the Extension Proposal on the environment
- the EP Act principles.

It is the EPA's view that reasonable conditions could be imposed on the Extension Proposal to prevent inconsistency with the EPA's objectives for environmental factors.

Given the above, the EPA recommends that the Extension Proposal may be implemented subject to the conditions recommended in Appendix A.

6 Other advice

The EPA is aware of the potential for industry and other activities located within Murujuga to impact on the Murujuga marine and terrestrial environments and airshed environments, and further that these issues are beyond the control of any one proponent or agency.

The EPA is committed to supporting the Australian Government, the Western Australian Government and MAC to achieve a World Heritage listing formally recognising the long-term, ongoing protection and conservation of the values of the Murujuga Cultural Landscape.

This advice is provided to inform the regulatory management framework to contribute to the future integrated governance arrangements for the holistic protection of the international, national, state, and local values of Murujuga.

The EPA notes that the legal management of Murujuga, through the Burrup and Maitland Industrial Estates Agreement (BMIEA), is the responsibility of both the MAC and the Western Australian Government who engage with the Commonwealth, State and local government agencies and other organisations to ensure effective management and conservation arrangements are in place¹⁷.

The EPA notes that the State Government is committed to protecting the Murujuga Cultural Landscape and considers that the unique Aboriginal culture and heritage values of Murujuga can continue to co-exist with well-regulated industry¹⁸. The EPA understands that the maintenance of appropriate and effective management and conservation measures are critical to the success of the World Heritage Nomination. The EPA acknowledges the role that MAC and the State Government have in establishing appropriate and effective management and conservation measures relevant to Murujuga that is critical to the success of the World Heritage Nomination.

The EPA acknowledges the many individual management arrangements that are in place including, but not limited to, the establishment of the Murujuga National Park, the twenty eight islands vested in the Conservation and Parks Commission of Western Australia and associated management planning under the *Conservation and Land Management Act 1984*, the BMIEA (2003) and various Australian Government signed Conservation Agreements with Rio Tinto and Woodside Energy Ltd to protect and research the National Heritage Values of the Dampier Archipelago.

In addition, the following legislation provides further management and protection of the Murujuga Cultural landscape:

¹⁷ Australian Government (2020). World Heritage Tentative List Submission, Murujuga Aboriginal Corporation in cooperation with Western Australian Government (Department of Biodiversity, Conservation and Attractions) and Australian Government (Department of Environmental and Energy).

¹⁸ Department of Biodiversity Conservation and Attractions and the Department of Water and Environmental Regulation (2020). *Draft DBCA and DWER Communication and Engagement Strategy for the Murujuga World Heritage Nomination and the Murujuga Rock Art Strategy*.

- *Aboriginal Heritage Act 1972 (WA)*
- *Heritage Act 2018 (WA)*
- *Environmental Protection Act 1986 (WA)*
- *Conservation and Land Management Act 1984 (WA)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cwth)*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cwth).*

The MRAS (DWER 2019), which is currently being implemented by DWER, and is discussed in section 2.2 of this report, establishes a framework for the long-term management and monitoring of environmental quality to protect Murujuga's petroglyphs from impacts of industrial emissions. Environmental quality criteria standards are scheduled to be available in 2023. To support the MRAS the DWER's Study of the Cumulative Impacts on Air Emissions in the Murujuga Airshed (Ramboll 2022) will inform the MRAMP and the establishment of the Murujuga Ambient Air Quality Monitoring Network. The Study will also inform current and future industrial development proposals that are located within the Murujuga airshed.

To support the existing measures to manage impacts to Murujuga, the EPA considers that there is a need for government to establish an overarching and Strategic Environmental Management Framework (e.g. an Environmental Protection Policy under Part III of the EP Act) to strategically manage the potential for cumulative effects on the sea, country and airshed of Murujuga.

The EPA considers that an overarching strategic approach to managing the Murujuga sea, country and airshed would provide a mechanism building on the existing management instruments, strategically protecting the marine and air environment and cultural values (including ethnographic values) from cumulative effects.

In the meantime, the EPA notes that there is likely to be lack of a consensus about whether any further industrial development which may affect the Murujuga can proceed in a way which is consistent with the EPA's objectives until the strategic environmental management framework is in place.

Also, the EPA recommends that when the opportunity arises to review the ministerial conditions of other existing industrial facilities within Murujuga, the review should include a consideration of additional measures to reduce the risk of cumulative impacts to rock art from air emissions.

Once the Murujuga Ambient Air Quality Monitoring Network and the Murujuga Rock Art Monitoring Program have been established and a suitable mechanism for the collection of resources from industries has been determined, the EPA recommends that consideration be given to whether the implementation conditions imposed on ministerial statements of existing industries should be changed via section 46 of the EP Act to:

- where necessary, remove any requirements for the proponents to undertake their own individual ambient air quality monitoring and / or rock art monitoring in order to avoid any regulatory duplication of monitoring activities
- include a requirement for the relevant proponents to contribute to airshed monitoring activities.

The EPA further notes that the Department of Jobs, Tourism, Science and Innovation is seeking to facilitate an ethnographic survey of cultural values within Murujuga which extends beyond the Extension Proposal's development envelope. The EPA notes that the outcomes of the regional ethnographic survey may trigger a review of the Extension Proposal's Cultural Heritage Management Plan.

The EPA recognises that MAC are the custodians of Murujuga, and it supports MAC in working in partnership with industry in the Burrup and Maitland Strategic Industrial Estates to establish beneficial offset projects.

The EPA has also undertaken consultation with MAC throughout the assessment of this proposal. The EPA highlights the following issues which have been raised by MAC in relation to development within Murujuga and address matters which are outside the assessment scope of the Extension Proposal:

- MAC supports the implementation of a strategic environmental management framework to strategically manage the potential for cumulative effects on the sea, country and airshed of Murujuga
- MAC are seeking access to all raw data and interpretation of this data
- MAC are seeking for proponents situated within Murujuga to implement locally based offset projects, carbon trading and research into climate change adaption and resilience on Murujuga associated with GHG emissions
- MAC are seeking the development of a Marine Environmental Quality Management Plan that addresses all values
- MAC welcomes conditions that require proponents to engage with the MAC during the implementation and operation of proposals including management plans that address social and economic aspects.

The EPA considers that the values of the sea and country of Murujuga and its surrounds are unique environmental assets of global significance that require a cautious approach. The EPA notes future activities and developments should assess compatibility with the protection of key values in Murujuga and its surrounds. The EPA considers there is an opportunity to strengthen the protection of Murujuga through avoidance of activities and development proposals that could use alternative locations for example in the Maitland Industrial Estate. The EPA will scrutinise activities and future proposals that impact upon key values of significance. The EPA encourages the proponent to provide open access to data.

Appendix A: Recommended conditions

Section 44(2)(b) of *Environmental Protection Act 1986* 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.

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

NORTH WEST SHELF PROJECT EXTENSION PROPOSAL

Proposal: Proposals the subject of Ministerial Statements 320, 334, 482 and 536 ("approved proposal") as amended by the North West Shelf Project Extension Proposal ("significant amendment").

Significant amendment: The North West Shelf Project Extension Proposal, being the proposal referred to the Environmental Protection Authority on 21 November 2018, as amended under section 43A of the Environmental Protection Act on 16 December 2019.

This is a proposal for the ongoing operation of the North West Shelf (NWS) Project to enable the long-term processing of third-party gas and fluids and **NWSJV** field resources through the NWS project facilities until 2070.

Proponent: Woodside Energy Ltd.
Australian Company Number 005 482 986

Proponent Address: 11 Mount Street, PERTH WA 6000

Assessment Number: 2186

Report of the Environmental Protection Authority: 1727

Previous Assessment Numbers: 782, 851, 1105, and 1188

Previous Reports of the Environmental Protection Authority: 694, 724, 893, 962

Previous Statement Number: 320, 334, 482, and 536

Pursuant to section 45 of the EP Act, it was previously agreed that the approved proposal may be implemented, as set out in Ministerial Statements 320, 334, 482 and 536.

Pursuant to section 45 of the EP Act, it is now agreed that:

1. the significant amendment may be implemented; and

2. the implementation of the proposal (being the approved proposal as amended by the significant amendment) is subject to the following conditions and procedures.

This Statement supersedes Ministerial Statements 320, 334, 482 and 536 pursuant to section 40AA(6)(b) of the EP Act.

1 Limitations and Extent of Implementation of Proposal

- 1-1 Subject to the conditions of this statement, the proponent must ensure that the proposal is implemented in such a manner that the following limitation or maximum extents / capacities / ranges are not exceeded:

Proposal element	Location	Maximum extent or range
<i>Physical elements</i>		
NWS Project (onshore component)	Figures 1 and 2	276 ha of disturbance within a 331 ha development envelope.
NWS Project (King Bay Supply Base, Southern Expansion Lease and Access Roads)	Figures 1 and 2	104 ha of disturbance within a 193 ha development envelope.
NWS Project (offshore component; State waters)	Figure 1	700 ha development envelope (includes 589 ha pipeline exclusion zone and 111 ha jetty lease).
<i>Operational elements</i>		
Reserve Source	-	NWSJV field resources and third-party gas and fluids.
LNG production capacity	-	18.5 Mtpa .
CO₂-e emissions	-	7.7 Mtpa .
NO_x emissions ¹	-	8,900 tpa
<i>Timing elements</i>		
Operational life of proposal	-	Up to 2070.

Note 1: **NO_x** emissions from the proposal are subject to the requirements of condition 3-5(1)(e).

2 Greenhouse Gas Emissions

- 2-1 For the period commencing from the date of issue of this Statement to 31 December 2024 and the period commencing 1 January 2025 to 31 December 2029, the proponent must avoid, reduce and/or offset the total quantity of **Reservoir Emissions** released to the atmosphere in each period.
- 2-2 For the purposes of condition 2-1, **Reservoir Emissions** are avoided, reduced and/or offset for a period by the quantity of GHG Emissions represented by:
- (1) the amount of **Non-Reservoir Emissions** that have been avoided and/or reduced through a **Certified Improvement**; and/or
 - (2) the amount of **Authorised Offsets** that meet the **Timing and Reporting Requirements**.
- 2-3 The proponent must take measures to ensure that **Net GHG Emissions** do not exceed:
- (1) 26.95 million tonnes of **CO₂-e** for the period between 1 January 2030 and 31 December 2034;
 - (2) 20.4 million tonnes of **CO₂-e** for the period between 1 January 2035 and 31 December 2039;
 - (3) 13.5 million tonnes of **CO₂-e** for the period between 1 January 2040 and 31 December 2044;
 - (4) 6.75 million tonnes of **CO₂-e** for the period between 1 January 2045 and 31 December 2049; and
 - (5) zero tonnes of **CO₂-e** for every five-year period from 1 January 2050 to 31 December 2070.
- 2-4 Subject to, and to the extent that it is not inconsistent with, condition 2-1 and condition 2-3, the proponent must implement the North West Shelf Project Extension Greenhouse Gas Management Plan (Revision 7, G2000RF1401194400, December 2021) from the date this Statement is issued until the **CEO** confirms in writing that a revision of the plan submitted under condition 2-5 meets the requirements of conditions 2-5 (1) to 2-5(6).
- 2-5 Within twelve (12) months of the date of issue of this Statement, or such greater time approved in writing by the **CEO**, the proponent must revise in consultation with the **Murujuga Key Stakeholders**, and submit to the **CEO** a revision of the North West Shelf Project Extension Greenhouse Gas Management Plan (Revision 7, G2000RF1401194400, December 2021) that:

- (1) is consistent with the achievement of condition 2-1 and the **Net GHG Emissions** limits in condition 2-3 (or the achievement of **Net GHG Emissions** reduction beyond those required by condition 2-3);
- (2) specifies the estimated **Proposal GHG Emissions, Reservoir Emissions, Non-Reservoir Emissions, Total Emissions Intensity, Reservoir Emissions Intensity** and **Non-Reservoir Emissions Intensity** for the life of the proposal;
- (3) includes a comparison of the estimated **Proposal GHG Emissions, Reservoir Emissions, Non-Reservoir Emissions, Total Emissions Intensity, Reservoir Emissions Intensity** and **Non-Reservoir Emissions Intensity** for the life of the proposal against other comparable facilities;
- (4) identifies and describes any measures that the proponent will implement to avoid, reduce and/or offset (including offsets developed in consultation with **Murujuga Key Stakeholders**) **Proposal GHG Emissions, Reservoir Emissions and/or Non-Reservoir Emissions** and/or reduce the **Total Emissions Intensity** of the proposal;
- (5) provides for a future review of the plan to:
 - (a) assess the effectiveness of measures referred to in condition 2-5(4); and
 - (b) identify and describe options for future measures that the proponent may or could implement to avoid, reduce, and/or offset **Proposal GHG Emissions, Reservoir Emissions and/or Non-Reservoir Emissions** and/or reduce the **Reservoir Emissions Intensity, Non-Reservoir Emissions Intensity** and/or **Total Emissions Intensity**; and
- (6) includes a report of a peer review carried out by an independent person or independent persons with suitable technical expertise to review the calculations used to estimate the matters in condition 2-5(2).

2-6 The proponent:

- (1) may submit to the **CEO** a revision of the **Confirmed** Greenhouse Gas Management Plan prepared in consultation with the **Murujuga Key Stakeholders**, at any time;
- (2) must submit to the **CEO** a revision of the **Confirmed** Greenhouse Gas Management Plan, prepared in consultation with the **Murujuga Key Stakeholders**:

- (a) if there is a material risk that condition 2-1 and/or condition 2-3 will not be complied with, including but not limited to as a result of a change to the proposal;
 - (b) with each consolidated report required under condition 2-11(1); and
 - (c) as and when directed to by the **CEO** in writing.
- 2-7 Any revision of the **Confirmed** Greenhouse Gas Management Plan submitted under condition 2-6 must satisfy the requirements of conditions 2-5(1) to 2-5(6).
- 2-8 Within one month of receiving confirmation in writing from the **CEO** that a Greenhouse Gas Management Plan submitted to the **CEO** under condition 2-5 or condition 2-6 satisfies the requirements of conditions 2-5(1) to 2-5(6) the proponent must submit a separate summary of the relevant **Confirmed** Greenhouse Gas Management Plan to the **CEO**, which must:
 - (1) include a summary of the matters specified in conditions 2-5(1) to 2-5(5); and
 - (2) be published as required by condition 2-13.
- 2-9 The proponent must implement the most recent version of the **Confirmed** Greenhouse Gas Management Plan until the **CEO** has confirmed by notice in writing that it has been demonstrated that the **Net GHG Emission** limits in condition 2-3 have been met.
- 2-10 The proponent must submit an annual report to the **CEO** and the **Murujuga Key Stakeholders**, each year by 31 March, or such other date within that calendar year as is agreed in writing by the **CEO** to align with other reporting requirements for **GHG**, specifying for the previous calendar year:
 - (1) the quantity of **Proposal GHG Emissions**;
 - (2) the quantity of **Non-Reservoir Emissions**;
 - (3) the quantity of **Reservoir Emissions**;
 - (4) the **Total Emissions Intensity, Reservoir Emissions Intensity and Non-Reservoir Emissions Intensity**, including calculations and calculation methodology for each; and
 - (5) the tonnes of **LNG** produced (loaded onto ships) and amount of **DomGas** exported (terajoules).
- 2-11 The proponent must submit to the **CEO** and the **Murujuga Key Stakeholders**, by 31 March 2025 or such other date within that calendar year as is agreed in writing by the **CEO** to align with other reporting requirements for **GHG Emissions**, and every five (5) years thereafter:

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- (1) a consolidated report specifying:
 - (a) for each of the periods specified in condition 2-1 and condition 2-3, that have lapsed, the matters referred to in conditions 2-10(1) to 2-10(5);
 - (b) for the period specified in condition 2-1 or condition 2-3 that ended on 31 December of the year before the report is due:
 - (i) the quantity of **Proposal GHG Emissions, Reservoir Emissions and Non-Reservoir Emissions**;
 - (ii) the **Net GHG Emissions**;
 - (iii) the amount of **Non-Reservoir Emissions** that have been avoided or reduced through a **Certified Improvement** as contemplated by condition 2-2(1), including a description of any **Certified Improvement** that caused the avoidance or reduction;
 - (iv) the type, quantity, identification or serial number, and date of retirement or cancellation of any **Authorised Offsets** which have been retired or cancelled and which have been used to:
 - A. offset **Reservoir Emissions** for the purposes of complying with condition 2-1; or
 - B. offset **Proposal GHG Emissions** for the purposes of complying with condition 2-3,including written evidence of such retirement or cancellation; and
 - (v) any measures that have been implemented to avoid or reduce **Proposal GHG Emissions**; and
 - (2) an audit and peer review report of the consolidated report required by condition 2-11(1), carried out by an independent person or independent persons with suitable technical expertise dealing with the suitability of the methodology used to determine the matters set out in the consolidated report, whether the consolidated report is accurate and whether the consolidated report is supported by credible evidence.
- 2-12 A consolidated report referred to in condition 2-11(1) must be accompanied by:
- (1) a revision of the most recent **Confirmed** Greenhouse Gas Management Plan under condition 2-6(2)(b); and

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- (2) a separate summary report covering each of the periods specified in conditions 2-1 and 2-3 that have lapsed, which includes:
- (a) a graphical comparison of **Net GHG Emissions** with the **Net GHG Emissions** limits detailed in condition 2-3;
 - (b) **Total Emissions Intensity** compared to comparable facilities;
 - (c) a summary of measures to avoid or reduce the **Proposal GHG Emissions** undertaken by the proponent; and
 - (d) a clear statement as to whether the requirements of condition 2-1 and condition 2-3 have been met, and whether those requirements are likely to be met in the future, including a description of any reasons why those requirements have not been, and/or are unlikely to be met.
- 2-13 The proponent must make the **Confirmed** Greenhouse Gas Management Plan, the summary of that plan required by condition 2-8, and all reports required by condition 2 publicly available on the proponent's website within the timeframes specified below for the life of the proposal, or in any other manner and for any other timeframe specified in writing by the **CEO**:
- (1) any **Confirmed** Greenhouse Gas Management Plan, within two weeks of receiving written confirmation from the **CEO** that it satisfied the requirements of conditions 2-5(1) to 2-5(6);
 - (2) the summary of any **Confirmed** Greenhouse Gas Management Plan required by condition 2-8 and the reports referred to in conditions 2-10, 2-11 and 2-12 within two weeks of submitting the document to the **CEO**.
- 3 Air Quality**
- 3-1 For the purposes of this condition, the **Air Quality Outcome** is:
- (1) to ensure that no air emissions from the proposal have an adverse impact accelerating the weathering of rock art within **Murujuga** beyond natural rates.
- 3-2 The proponent must ensure implementation of the proposal achieves the **Air Quality Outcome**.
- 3-3 If:
- (1) the Minister notifies the proponent in writing, for the purposes of this condition, of one or more air quality standards to be met (including standards derived from the results of the **Murujuga Rock Art Monitoring Program**); and

- (2) the proponent complies with all those standards, and any amendments to the standards which are the subject of a notification to the proponent by the Minister in writing for the purposes of this condition,

the proponent is taken to have achieved the **Air Quality Outcome**.

3-4 Subject to, and to the extent that it is not inconsistent with, condition 3-2, the proponent must implement the North West Shelf Project Extension Air Quality Management Plan (Revision 2, G2000RF1401194398, February 2021) until the **CEO** had confirmed in writing that a revision of the plan submitted under condition 3-5 meets the requirements of conditions 3-5(1) to 3-5(12).

3-5 Within 12 months of the issue date of this Statement, or such greater time approved in writing by the **CEO**, the proponent must revise in consultation with the **Murujuga Key Stakeholders**, and submit to the **CEO** and the **DAWE**, a revision of the North West Shelf Project Extension Air Quality Management Plan (Revision 2, G2000RF1401194398, February 2021) that:

- (1) sets out measures that will be taken to achieve each of the following outcomes and objectives:

- (a) subject to condition 3-2, compliance with the **Air Quality Outcome**;

- (b) compliance with all air quality objectives and standards (including, if applicable, those derived from the results of the **Murujuga Rock Art Monitoring Program**), and any amendments to those objectives and standards, which are the subject of a notification to the proponent by the Minister in writing for the purposes of condition 3-3 and/or condition 3-8(3);

- (c) contribute to the maintenance of regional air quality in accordance with relevant **Air Quality Standards** by the minimisation of emissions of **NO_x**, **SO_x** and **VOCs** [including **BTEX**] from the proposal;

- (d) the minimisation of air emissions (including, but not limited to **NO_x**, **SO_x** and **VOCs** [including **BTEX**]) from the proposal by the adoption of **practicable** technologies;

- (e) at a minimum, reduce **NO_x** emissions from the proposal to 4,598 **tpa** by 31 December 2030; and

- (f) at a minimum, reduce **VOC** emissions from the proposal to 10,557 **tpa** by 31 December 2030.

- (2) is informed by monitoring data which establishes a scientifically valid and robust baseline (the methodology for which has been subject to a peer review by an independent person or independent persons with suitable

- technical expertise on the suitability of the methodology used to gather the baseline data) that is sufficient to measure whether the **Air Quality Outcome** and the environmental outcomes and objectives specified in condition 3-5(1) have been achieved;
- (3) describes and quantifies all of the expected air emissions from the proposal, in accordance with reporting methodologies outlined in the latest National Pollutant Inventory guideline and their sources;
 - (4) includes a comparison of the expected air emissions for the proposal against **international industry best practice** for comparable facilities;
 - (5) identifies and describes the **practicable** measures and technologies that the proponent has implemented or will implement to minimise all air emissions, including the adoption of advances in air pollution control technology and process management, since the date of this Statement (or since the date of the last plan review, whichever is later) and specifies:
 - (a) when each measure was or will be implemented; and
 - (b) the method that has been used or that will be used to determine the effectiveness of each measure in minimising air emissions;
 - (6) includes a comparison of measures referred to in condition 3-5(5) against **international industry best practice** for comparable facilities;
 - (7) includes provisions for monitoring and reporting to the **CEO** and the **DAWE** at least annually of:
 - (a) air emissions produced by the proposal;
 - (b) on-site meteorological conditions including wind speed / direction, temperature, and rainfall rate;
 - (c) ambient ground level concentrations for air emissions defined in the Air Quality Management Plan as relating to the proposal and that have the potential to impact on human health, amenity, and rock art;
 - (d) the implementation of measures required to be included in the Air Quality Management Plan by conditions 3-5(1) to 3-5(12); and
 - (e) any exceedance of trigger criteria and threshold criteria;
 - (8) includes a trajectory of the proposed air emission reductions for the life of the proposal;
 - (9) specifies scientifically valid and robust:
 - (a) trigger criteria that will forewarn the approach of threshold criteria and ensure that the **Air Quality Outcome** and outcomes and objectives in condition 3-5(1) will be achieved;

- (b) threshold criteria that will demonstrate that the **Air Quality Outcome** and outcomes and objectives in condition 3-5(1) are being achieved;
 - (c) **adaptive** monitoring program to determine if trigger criteria and threshold criteria have been met;
 - (d) management and/or contingency actions (including changes to monitoring, operations and reductions in emissions) to be implemented if the trigger criteria required by condition 3-5(9)(a) and/or the threshold criteria required by condition 3-5(9)(b) have not been met;
- (10) includes a report of a peer review, carried out by an independent person or independent persons with suitable technical expertise, of the final draft of the Air Quality Management Plan as it relates to each of the items in condition 3-5(9) which assesses the adequacy of that content to achieving the **Air Quality Outcome** and the outcome and objectives in condition 3-5(1);
- (11) provides the format and timing for the reporting to the **CEO** of monitoring results against trigger criteria and threshold criteria over the reporting period in the Compliance Assessment Report required by condition 8-6; and
- (12) subject to the peer reviews identified in conditions 3-5(2) and 3-5(10) sets out reasons for selection or adoption of the measures, criteria, monitoring program and management and/or contingency actions included in the Air Quality Management Plan, including discussion of other options considered.
- 3-6 The proponent must implement the most recent version of the **Confirmed** Air Quality Management Plan until the **CEO** has confirmed by notice in writing that the proponent has demonstrated that the **Air Quality Outcome** and the outcomes and objectives in condition 3-5(1) have been met.
- 3-7 If the proponent's monitoring, tests, surveys or investigations indicate an exceedance of threshold criteria specified in the **Confirmed** Air Quality Management Plan, the proponent must:
- (1) report a threshold criteria exceedance in writing to the **CEO** and the **DAWE** within 48 hours of an exceedance of threshold criteria being identified;
 - (2) implement the contingency actions required by the **Confirmed** Air Quality Management Plan within seven (7) days of the exceedance(s) being reported or such other time specified in the **Confirmed** Air Quality Management Plan, and continue implementation of threshold criteria

actions until the **CEO** has confirmed by notice in writing that it has been demonstrated that the relevant threshold criteria is being met and implementation of the contingency actions is no longer required;

- (3) investigate to determine the cause and potential impact of the threshold criteria being exceeded;
 - (4) if threshold criteria have been exceeded, investigate the potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded;
 - (5) provide a further report to the **CEO** within twenty-one (21) days (or such greater time approved in writing by the **CEO**) of the threshold criteria exceedance being reported which must include:
 - (a) details of management and/or contingency actions implemented;
 - (b) the effectiveness of the management and/or contingency actions implemented against the threshold criteria;
 - (c) the findings of the investigations required by conditions 3-7(3) and 3-7(4);
 - (d) measures to prevent the threshold criteria being exceeded in the future;
 - (e) measures to prevent, control or abate impacts which may have occurred; and
 - (f) justification for the threshold criteria remaining, or being adjusted based on better understanding, demonstrating that the **Air Quality Outcome** and the outcomes and objectives in condition 3-5(1) will be met.
- 3-8 Without limiting conditions 3-4 and 3-6 (implementation of the plan), and notwithstanding compliance with condition 3-7 (response to exceedance), the proponent must not cause or allow:
- (1) an exceedance of a threshold criteria specified in a **Confirmed** Air Quality Management Plan (regardless of whether threshold contingency actions have been or are being implemented);
 - (2) any non-compliance with the requirements of a **Confirmed** Air Quality Management Plan; or
 - (3) any non-compliance with any air quality objectives and standards (including those derived from the results of the **Murujuga Rock Art Monitoring Program**), and any amendments to those objectives and standards, which

are the subject of a notification in writing to the proponent by the Minister for the purposes of this condition.

3-9 The proponent:

- (1) may submit to the **CEO** and the **DAWE** a revision of the **Confirmed Air Quality Management Plan**, prepared in consultation with the **Murujuga Key Stakeholders**, at any time; and
- (2) must submit to the **CEO** and the **DAWE** a revision of the **Confirmed Air Quality Management Plan**, prepared in consultation with the **Murujuga Key Stakeholders**:
 - (a) within six (6) months (or such greater time approved in writing by the **CEO**) of being notified by the Minister of air quality standards or objectives (including those derived from the results of the **Murujuga Rock Art Monitoring Program**) or any amendments to those objectives or standards, for the purposes of condition 3-3 or condition 3-8(3);
 - (b) as and when directed to by the **CEO** in writing; and
 - (c) at least every five (5) years.

3-10 Any revision of the **Confirmed Air Quality Management Plan** submitted under condition 3-9 must satisfy the requirements of conditions 3-5(1) to 3-5(12).

3-11 If a revision of the **Confirmed Air Quality Management Plan** under condition 3-9 involves an amendment to an item that was subject to a peer review under conditions 3-5(2) or 3-5(10), the proponent must submit to the **CEO** with the revision a report of a further peer review of those item(s), carried out by an independent person or independent persons with suitable technical expertise, unless otherwise advised in writing by the **CEO**.

3-12 The proponent must interpret and report on monitoring data collected for the purposes of the **Confirmed Air Quality Management Plan** to the **CEO**, the **DAWE** and the **Murujuga Key Stakeholders** at least annually.

4 Cultural Heritage

4-1 For the purposes of this condition, the **Cultural Heritage Outcomes** are:

- (1) subject to reasonable health and safety requirements, allow ongoing traditional owner and custodian access to enable traditional activities and connection to culturally significant heritage areas within the development envelopes (as shown in Figures 1 and 2) during operation; and
- (2) ensure the proposal is decommissioned in a manner that will, subject to reasonable health and safety requirements, allow traditional owner and

custodian access to the development envelopes (as shown in Figures 1 and 2).

- 4-2 For the purposes of this condition, the **Cultural Heritage Objective** is:
- (1) avoid where possible, and otherwise minimise direct impacts to social, cultural, heritage and archaeological values within the development envelopes (as shown in Figures 1 and 2).
- 4-3 The proponent must ensure implementation of the proposal achieves the **Cultural Heritage Outcomes** and the **Cultural Heritage Objective**.
- 4-4 Subject to, and to the extent that it is not inconsistent with, condition 4-3, the proponent must implement the North West Shelf Project Extension Cultural Heritage Management Plan (Revision 3, G2000RF1401194398, February 2021) until the **CEO** confirms in writing that a revision of that plan submitted under condition 4-5 meets the requirements of conditions 4-5(1) to 4-5(7).
- 4-5 Within 12 months of the issue of this Statement, or such greater time approved in writing by the **CEO**, the proponent must revise in consultation with the **DAWE** and **Murujuga Key Stakeholders** and submit to the **CEO** a revision of the North West Shelf Project Extension Cultural Heritage Management Plan (Revision 3, G2000RF1401194416, February 2021) that:
- (1) includes a framework for consultation with traditional owners and custodians via the **Murujuga Key Stakeholders** during the life of the proposal;
 - (2) specifies operational environmental management activities relevant to cultural heritage;
 - (3) specifies management actions that will be implemented to demonstrate compliance with the **Cultural Heritage Outcomes** and the **Cultural Heritage Objective**;
 - (4) specifies measurable management target(s) to determine the effectiveness of the management actions;
 - (5) specifies monitoring to measure the effectiveness of management actions against management targets;
 - (6) specifies a process for:
 - (a) investigation to determine the cause of the outcome, objective or management target(s) not being met; and
 - (b) revision of management actions and activities, if any outcome, objective and management target is not achieved, to ensure it is achieved in the future;

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- (7) provides the format and timing of reporting, to demonstrate that the **Cultural Heritage Outcomes and the Cultural Heritage Objective** have been met for the reporting period in the Compliance Assessment Report required by condition 8-6 including, but not limited to:
- (a) verification of the implementation of management actions; and
 - (b) reporting on the effectiveness of management actions against the outcomes, objective, and management target(s).
- 4-6 The proponent must implement the most recent version of the **Confirmed** Cultural Heritage Management Plan until the **CEO** has confirmed by notice in writing that the proponent has demonstrated the **Cultural Heritage Outcomes** and the **Cultural Heritage Objective** have been met, or will be met by reason of another statutory decision-making process.
- 4-7 If the proponent's monitoring, tests, surveys or investigations indicate non-achievement of the **Cultural Heritage Outcomes**, the **Cultural Heritage Objective** or management target(s) specified in the **Confirmed** Cultural Heritage Management Plan, the proponent must:
- (1) report the non-achievement in writing to the **CEO**, the **DAWE**, the **Murujuga Key Stakeholders**, the **DPLH** and the **Cultural Heritage Government Body** within twenty-one (21) days of the non-achievement being identified by the proponent;
 - (2) investigate to determine the cause of the non-achievement of outcomes, objectives or management target(s) not being achieved;
 - (3) provide a further report to the **CEO**, the **DAWE**, the **Murujuga Key Stakeholders**, the **DPLH** and the **Cultural Heritage Government Body** within ninety (90) days of the non-achievement being reported as required by condition 4-7(1) which must include:
 - (a) the findings of the investigation required by condition 4-7(2);
 - (b) a description of the cause of the non-achievement of the outcomes, objective or management target(s), if known, or analysis of likely causes if not known;
 - (c) details of revised and/or additional management actions or changes to activities to be implemented to prevent future non-achievement of the outcomes, objective or management target(s).
- 4-8 If the proponent's monitoring, tests, surveys or investigations indicate that one or more management action(s) specified in the **Confirmed** Cultural Heritage Management Plan have not been implemented, the proponent must:

- (1) report the failure to implement the management action(s) in writing to the **CEO**, the **DAWE**, the **Murujuga Key Stakeholders**, the **DPLH** and the **Cultural Heritage Government Body** within seven (7) days of identification;
 - (2) investigate to determine the cause of the management action(s) not being implemented;
 - (3) investigate to determine potential environmental harm and/or alteration of the environment that occurred due to the failure to implement management action(s);
 - (4) provide a further report to the **CEO**, the **DAWE**, the **Murujuga Key Stakeholders**, the **DPLH** and the **Cultural Heritage Government Body** within 28 days of the failure to implement management action(s) being identified, which must include:
 - (a) the findings of the investigations required by conditions 4-8(2) and 4-8(3);
 - (b) a description of the cause of the failure to implement the management action(s), if known, or analysis of likely cause(s) if not known;
 - (c) details of changes to activities to be implemented to prevent future failure to implement the management action(s); and
 - (d) details of measures implemented or to be implemented to prevent, control or abate the environmental harm which may have occurred.
- 4-9 Without limiting conditions 4-4 and 4-6 (implementation of the plan) and notwithstanding compliance with condition 4-7 (response to non-achievement) and condition 4-8 (response to failure to implement management action(s)), the proponent must not cause or allow:
- (1) a failure to implement one or more management actions specified in the **Confirmed** Cultural Heritage Management Plan; and/or
 - (2) a failure to comply with the requirements of the **Confirmed** Cultural Heritage Management Plan.
- 4-10 The proponent:
- (1) may submit to the **CEO** a revision of the **Confirmed** Cultural Heritage Management Plan, prepared in consultation with the **Murujuga Key Stakeholders**, at any time; and

- (2) must submit to the **CEO** a revision of the **Confirmed** Cultural Heritage Management Plan prepared in consultation with the **Murujuga Key Stakeholders** as and when directed by the **CEO** in writing.
- 4-11 Any revision of the **Confirmed** Cultural Heritage Management Plan submitted under conditions 4-10 must satisfy the requirements of conditions 4-5(1) to 4-5(7).

5 Marine Environmental Quality

5-1 For the purposes of this condition, the **Marine Objective** is:

- (1) manage discharges to the marine environment to maintain water and sediment quality, protect the environmental values and achieve the levels of ecological protection identified in Figure 3 and Figure 4 of Schedule 1.
- 5-2 The proponent must ensure implementation of the proposal achieves the **Marine Objective**.
- 5-3 Subject to, and to the extent that it is not inconsistent with, condition 5-2, the proponent must implement the North West Shelf Project Extension Marine Environmental Quality Management Plan (Revision 4, G2000RF1401194403, November 2021) until the **CEO** confirms in writing that a revision of that plan submitted under condition 5-4 meets the requirements of conditions 5-4(1) to 5-4(8).
- 5-4 Within 12 months of the issue of this Statement, or such greater time approved in writing by the **CEO**, the proponent must revise in consultation with the **Murujuga Key Stakeholders**, and submit to the **CEO** a revision of the North West Shelf Project Extension Marine Environmental Quality Management Plan (Revision 4, G2000RF1401194403, November 2021) that:
- (1) identifies **Marine Environmental Values** relevant to the Mermaid Sound to be protected;
 - (2) specifies project specific and spatially defined **Environmental Quality Objectives** that describe what must be achieved to protect each **Marine Environmental Value** identified in condition 5-4(1);
 - (3) specifies management actions to be implemented to demonstrate compliance with the **Marine Objective** and the **Environmental Quality Objectives** under condition 5-4(2);
 - (4) specifies **Environmental Quality Criteria** that are scientifically based limits of acceptable change to a measurable environmental quality indicator to protect of the **Marine Environmental Values** identified under condition 5-4(1), **Environmental Quality Objectives** identified under condition 5-4(2) and the **Marine Objective**;

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- (5) specifies monitoring methodology and rationale including site locations, parameters and timing to measure the effectiveness of management actions against **Environmental Quality Criteria**;
 - (6) sets out reasons for selection or adoption of the **Environmental Quality Criteria**, monitoring program and management actions included in the Marine Environmental Quality Management Plan, including discussion of other options considered;
 - (7) specifies a process for:
 - (a) investigation to determine the cause of the **Environmental Quality Criteria** not being met; and
 - (b) revision of management actions and changes to activities, in the event that the Marine Objective and **Environmental Quality Criteria** are not achieved;
 - (8) provides the format and timing for reporting to demonstrate that the **Marine Objective** has been met for the reporting period in the Compliance Assessment Report required by condition 8-6 including but not limited to:
 - (a) verification of the implementation of management actions; and
 - (b) reporting on the effectiveness of management actions against **Environmental Quality Criteria**.
- 5-5 The proponent must implement the most recent version of the **Confirmed** Marine Environmental Quality Management Plan until the **CEO** has confirmed by notice in writing that the proponent has demonstrated that the **Marine Objective** has been met.
- 5-6 If the proponent's monitoring, tests, surveys or investigations indicate exceedance of **Environmental Quality Criteria** specified in the **Confirmed** Marine Environmental Quality Management Plan, the proponent must:
- (1) report the exceedance in writing to the **CEO** and the **Murujuga Key Stakeholders** within twenty-one (21) days of the exceedance being identified;
 - (2) investigate to determine the cause of the **Environmental Quality Criteria** being exceeded if known, or analysis of likely causes if not known;
 - (3) provide a further report to the **CEO** and the **Murujuga Key Stakeholders**, within ninety (90) days of the exceedance being reported as required by condition 5-6(1) which must include:
 - (a) the findings of the investigation required by condition 5-6(2);

- (b) a description of the cause of **Environmental Quality Criteria** being exceeded if known, or analysis of likely causes if not known; and
- (c) details of revised and/or additional management actions or changes to activities that will be implemented to prevent exceedance of the **Environmental Quality Criteria**.

5-7 If the proponent's monitoring, tests, surveys or investigations indicate that one or more management action(s) specified in the **Confirmed** Marine Environmental Quality Management Plan have not been implemented, the proponent must:

- (1) report the failure to implement the management action(s) in writing to the **CEO** and the **Murujuga Key Stakeholders** within seven (7) days of identification;
- (2) investigate to determine the cause of the management action(s) not being implemented;
- (3) investigate to determine potential environmental harm and/or alteration of the environment that occurred due to the failure to implement management action(s);
- (4) provide a report to the **CEO** and the **Murujuga Key Stakeholders** within twenty-eight (28) days of the failure to implement management actions being identified, which must include:
 - (a) the findings of the investigation required by condition 5-7(2);
 - (b) a description of the cause for failure to implement management action(s) if known, or analysis of likely cause(s) if not known;
 - (c) details of changes to activities to be implemented to prevent future failure to implement management action(s); and
 - (d) details of measures implemented or to be implemented to prevent, control or abate the environmental harm which may have occurred.

5-8 Without limiting condition 5-3 and 5-5 (implementation of the plan) and notwithstanding compliance with condition 5-6 (response to exceedance) and condition 5-7 (response to failure to implement management action(s)), the proponent must not cause or allow:

- (1) a failure to implement one or more management actions specified in the **Confirmed** Marine Environmental Quality Management Plan, if the relevant **Environmental Quality Criteria** have been exceeded;
- (2) the exceedance of an **Environmental Quality Criteria** specified in the **Confirmed** Marine Environmental Quality Management Plan

(regardless of whether management actions have been or are being implemented); and/or

- (3) a failure to comply with the requirements of the **Confirmed** Marine Environmental Quality Management Plan.

5-9 The proponent:

- (1) may submit to the **CEO** a revision of the **Confirmed** Marine Environmental Quality Management Plan, prepared in consultation with the **Murujuga Key Stakeholders** at any time; and
- (2) must submit to the **CEO** a revision of the **Confirmed** Marine Environmental Quality Management Plan, prepared in consultation with the **Murujuga Key Stakeholders**, as and when directed by the **CEO** in writing.

5-10 Any revision of the **Confirmed** Marine Environmental Quality Management Plan submitted under condition 5-9 must satisfy the requirements of conditions 5-4(1) to 5-4(8).

6 Environmental Performance Report

6-1 The proponent must submit an Environmental Performance Report to the Minister and the **Murujuga Key Stakeholders** every five years.

6-2 The first Environmental Performance Report must be submitted within three (3) months of the expiry of the five (5) year period commencing from the date of issue of this Statement, or such other time as may be approved in writing by the **CEO**.

6-3 Each Environmental Performance Report must report on:

- (1) trends in air emissions from the proposal that have the potential to impact rock art and/or human health; and
- (2) trends in the quality of discharges from the proposal that have the potential to impact on the marine environment.

6-4 The Environmental Performance Report must include:

- (1) a comparison of the trends of the emissions identified in condition 6-3 at the end of the five year period against the emissions at the beginning of the five (5) year period;
- (2) a comparison of the trends of the emissions identified in condition 6-3 at the end of the five (5) year period against the emissions identified in first Environmental Performance Report submitted in accordance with condition 6-2; and
- (3) proposed **Adaptive** management and continuous improvement strategies.

6-5 The Environmental Performance Report may be in whole or part prepared in conjunction with other proponents and government agencies where there are cumulative impacts from proposals.

7 Decommissioning and Rehabilitation

7-1 For the purposes of this condition, the **Decommissioning and Rehabilitation Objective** is:

(1) ensure the proposal is decommissioned and rehabilitated in an ecologically sustainable manner.

7-2 At least five years prior to the forecasted completion of the operational phase of the proposal, or at a time as and when directed by the **CEO** in writing, the proponent must, in consultation with the **Murujuga Key Stakeholders**, prepare and submit a Decommissioning and Rehabilitation Plan to the **CEO** for approval, on advice of the Department of Biodiversity, Conservation and Attractions and the **DPLH**, that:

(1) sets out measures that will be implemented to ensure that the **Decommissioning and Rehabilitation Objective** is achieved.

7-3 The proponent must implement the most recent version of the **Confirmed** Decommissioning and Rehabilitation Plan until the **CEO** has confirmed in writing that the proponent has demonstrated that the **Decommissioning and Rehabilitation Objective** has been met.

7-4 After the submission of the Decommissioning and Rehabilitation Plan, the proponent must include an update on the forecasted completion of the operational phase and decommissioning of the proposal in each subsequent Compliance Assessment Report required by condition 8-6.

7-5 The proponent:

(1) may submit to the **CEO** a revision of the **Confirmed** Decommissioning and Rehabilitation Plan, prepared in consultation with the **Murujuga Key Stakeholders** the Department of Biodiversity, Conservation and Attractions and the **DPLH** at any time; and

(2) must submit to the **CEO** a revision of the **Confirmed** Decommissioning and Rehabilitation Plan, prepared in consultation with the **Murujuga Key Stakeholders** the Department of Biodiversity, Conservation and Attractions and the **DPLH** as and when directed by the **CEO** in writing.

7-6 Any revision of the **Confirmed** Decommissioning and Rehabilitation Plan submitted under condition 7-5 must satisfy the requirement of condition 7-2(1).

8 Compliance Reporting

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- 8-1 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 8-6.
- 8-2 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.
- 8-3 The proponent must assess compliance with conditions in accordance with the **Confirmed** Compliance Assessment Plan.
- 8-4 All Compliance Assessment Reports must be retained until the proposal is fully implemented (including decommissioning and rehabilitation) or such other period agreed in writing by the **CEO**.
- 8-5 Subject to the conditions of this Statement the proponent must advise the **CEO** of any potential non-compliance within seven (7) days of that non-compliance being known to the proponent.
- 8-6 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 at another time agreed in writing by the **CEO**.
- 8-7 Each 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.

8-8 The proponent:

- (1) may submit to the **CEO** a revision of the **Confirmed** Compliance Assessment Plan at any time; and
- (2) must submit to the **CEO** a revision of the **Confirmed** Compliance Assessment Plan as and when directed to do so by the **CEO** in writing.

8-9 Any revision of the **Confirmed** Compliance Assessment Plan submitted under condition 8-8 must satisfy the requirements of conditions 8-2(1) to 8-2(6).

8-10 The proponent must implement the latest revision of the **Confirmed** Compliance Assessment Plan .

9 Public Availability of Data

9-1 Subject to condition 9-2 and the conditions of this Statement, within a reasonable time period approved by the **CEO** in writing and for the life of the proposal (including decommissioning and rehabilitation) 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 and implementation of this proposal.

9-2 If any data referred to in condition 9-1 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, including an explanation for why the proponent considers the data should not be made publicly available.

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
Adaptive	Means having the ability or tendency to adapt in response to evidence in a manner which is most effective at achieving the specified outcomes.
Air Quality Standards	<ul style="list-style-type: none"> • National Environment Protection (Ambient Air Quality) Measure • National Environment Protection (Air Toxics) Measure

Acronym or Abbreviation	Definition or Term
	<ul style="list-style-type: none"> • Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016
Authorised Offsets	<p>Units representing GHG Emissions issued under one of the following schemes and cancelled or retired in accordance with any rules applicable at the relevant time governing the cancellation or retiring of units of that kind:</p> <ol style="list-style-type: none"> a) Australian Carbon Credit Units issued under the <i>Carbon Credits (Carbon Farming Initiative) Act 2011</i> (Cth); b) Verified Emission Reductions issued under the Gold Standard program; c) Verified Carbon Units issued under the Verified Carbon Standard program; or d) other offset units that the Minister has notified the proponent in writing meet integrity principles and are based on clear, enforceable and accountable methods.
BTEX	Benzene, toluene, ethylbenzene and xylene
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 their delegate.
Certified Improvement	<p>An improvement to technology and/or processes approved by the CEO as an improvement that was or would be unlikely to occur in the ordinary implementation of the proposal (disregarding the effect of these conditions), and which is the subject of a report that:</p> <ol style="list-style-type: none"> a) describes the improvement; b) demonstrates that the improvement was or would be unlikely to occur in the ordinary implementation of the proposal (disregarding the effect of these conditions); and c) has been reviewed by a suitably qualified peer reviewer, who has been approved by the CEO, and who confirms that he or she agrees with the conclusions set out in the report.
Confirmed	Means, at the relevant time, in relation to a plan required to be made and submitted to the CEO , the plan that the CEO confirmed, in writing, meets the requirements of the relevant condition.

Acronym or Abbreviation	Definition or Term
Cultural Heritage Government Body	<p>Means:</p> <ol style="list-style-type: none"> a) the person appointed Registrar of Aboriginal Sites under the <i>Aboriginal Heritage Act 1972 (WA)</i> and b) upon transition day as defined in the <i>Aboriginal Cultural Heritage Act 2021 (ACH Act)</i> both: <ol style="list-style-type: none"> i. the Chief Executive Officer of the Department of the Public Service of the State principally responsible for the administration of the ACH Act; and ii. the Aboriginal Cultural Heritage Council established under section 20 of the ACH Act or any successor entity appointed under the Act as amended or replaced from time to time.
DAWE	The Australian Government Department of Agriculture, Water and the Environment or any successor department or agency assisting in the administration of the <i>Environmental Protection and Biodiversity Conservation Act 1999 (Cth)</i> as amended or replaced from time to time.
DPLH	<p>The Western Australian Department of Planning, Lands and Heritage or any successor department or agency assisting in the administration of the:</p> <ul style="list-style-type: none"> • <i>Aboriginal Heritage Act 1972 (WA)</i> as amended or replaced from time to time, or the • <i>Planning and Development Act 2005 (WA)</i> as amended or replaced from time to time.
DomGas	Gas supplied to the domestic market.
Emissions Intensity	Proposal GHG Emissions per tonne of LNG produced.
Environmental Quality Criteria	Environmental Quality Criteria represent scientifically based limits of acceptable change to a measurable environmental quality indicator that is important for the protection of the associated Marine Environmental Value.
Environmental Quality Objectives	Environmental quality objectives are high level management objectives that describe what must be achieved to protect each Marine Environmental Value. They are measurable and should be incorporated into the key objectives for environmental quality monitoring and management plans.
Greenhouse gas or GHG	Has the meaning given by section 7A of the National Greenhouse and <i>Energy Reporting Act 2007 (Cth)</i> or, if that definition is amended or repealed, the meaning set out in an

Acronym or Abbreviation	Definition or Term
	Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
GHG Emissions or CO₂-e	Greenhouse gas emissions expressed in tonnes of carbon dioxide equivalent (CO ₂ -e) as calculated in accordance with the definition of 'carbon dioxide equivalence' in section 7 of the <i>National Greenhouse and Energy Reporting Act 2007</i> (Cth), or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
ha	Hectare.
International industry best practice	A method, process, or technique employed within a particular industry that has consistently shown through research and experience results superior to those achieved by applying other means, and can be used as a benchmark.
Operational life of proposal	Issue date of this Statement up to 31 December 2070.
LNG	Liquefied Natural Gas.
Marine Environmental Values	<p>In the marine environment the environmental values that would apply throughout WA coastal waters:</p> <ul style="list-style-type: none"> • ecosystem health; • fishing and aquaculture; • recreation and aesthetics; • industrial water supply; and • cultural and spiritual.
Murujuga	The Ngarluma-Yaburara name for the Dampier Archipelago including the Burrup Peninsula and surrounds.
Murujuga Key Stakeholders	<p>Means the following:</p> <ul style="list-style-type: none"> • Murujuga Aboriginal Corporation; and • Ngarluma Yindjibarndi Foundation Ltd.
Murujuga Rock Art Monitoring Program	The State Government managed program to monitor, evaluate and report on changes and trends in the integrity or condition of the Murujuga rock art and whether the rock art is being subject to accelerated change – specifically to determine whether anthropogenic emissions are accelerating the natural weathering of the rock art.
Mtpa	Million tonnes per annum.
Net GHG Emissions	Proposal GHG Emissions for a period less any reduction in GHG Emissions represented by the cancellation or retirement of Authorised Offsets which comply with the Timing and Reporting Requirements .

Acronym or Abbreviation	Definition or Term
Non-Reservoir Emissions	Proposal GHG Emissions other than Reservoir Emissions .
Non-Reservoir Emissions Intensity	Non-Reservoir Emissions per tonne of LNG produced from the proposal
NWSJV	North West Shelf Joint Venture.
NO_x	Oxides of nitrogen.
Proposal GHG Emissions	GHG Emissions released to the atmosphere as a direct result of an activity or series of activities that comprise/s or form/s part of the proposal.
Practicable	As defined in the <i>Environmental Protection Act 1986</i> as amended or replaced from time to time.
Reservoir Emissions	Proposal GHG Emissions that were separated (from natural gas or products produced from extracted hydrocarbons) in an acid gas removal unit and released unused and unprocessed.
Reservoir Emissions Intensity	Reservoir GHG Emissions per tonne of LNG produced from the proposal.
SO_x	Sulfur oxides.
Timing and Reporting Requirements	<p>The Timing and Reporting Requirements are that the Authorised Offsets:</p> <ul style="list-style-type: none"> a) were cancelled or retired between 1 January of the relevant period until 31 March in the year after the period ends (or such other date within that calendar year as agreed in writing by the CEO); b) have been identified as cancelled or retired in the relevant report as required by condition 2-11(1)(b)(iv); c) have not been identified as cancelled or retired in any prior report as required by condition 2-11(1)(b)(iv); and d) have not been used to offset any GHG Emissions other than Proposal GHG Emissions; and e) were not generated by avoiding Proposal GHG Emissions.
Total Emissions Intensity	Proposal GHG Emissions per tonne of LNG produced from the proposal.
tpa	Tonnes per annum.

Acronym or Abbreviation	Definition or Term
VOCs	Volatile organic compounds.

Figures (attached)

Figure 1 North West Shelf Project Extension Proposal development envelope.

Figure 2 North West Shelf Project Extension Proposal onshore development envelope and King Bay Supply Base development envelope.

Figure 3: Jetty outfall levels of ecological protection.

Figure 4 Administration drain levels of ecological protection.

Schedule 1

Co-ordinates defining the areas shown in Figures 1, 2, 3 and 4 are held by the Department of Water and Environmental Regulation (DWER) under the following reference numbers:

- North West Shelf Project Extension Proposal development envelope – DWERDT296281
- Levels of ecological protection DWERDT506981
- Jetty outfall and Administrative drain DWERDT573558.

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



Figure 1: North West Shelf Project Extension Proposal development envelope



Figure 2: North West Shelf Project Extension Proposal onshore development envelope and King Bay Supply Base development envelope

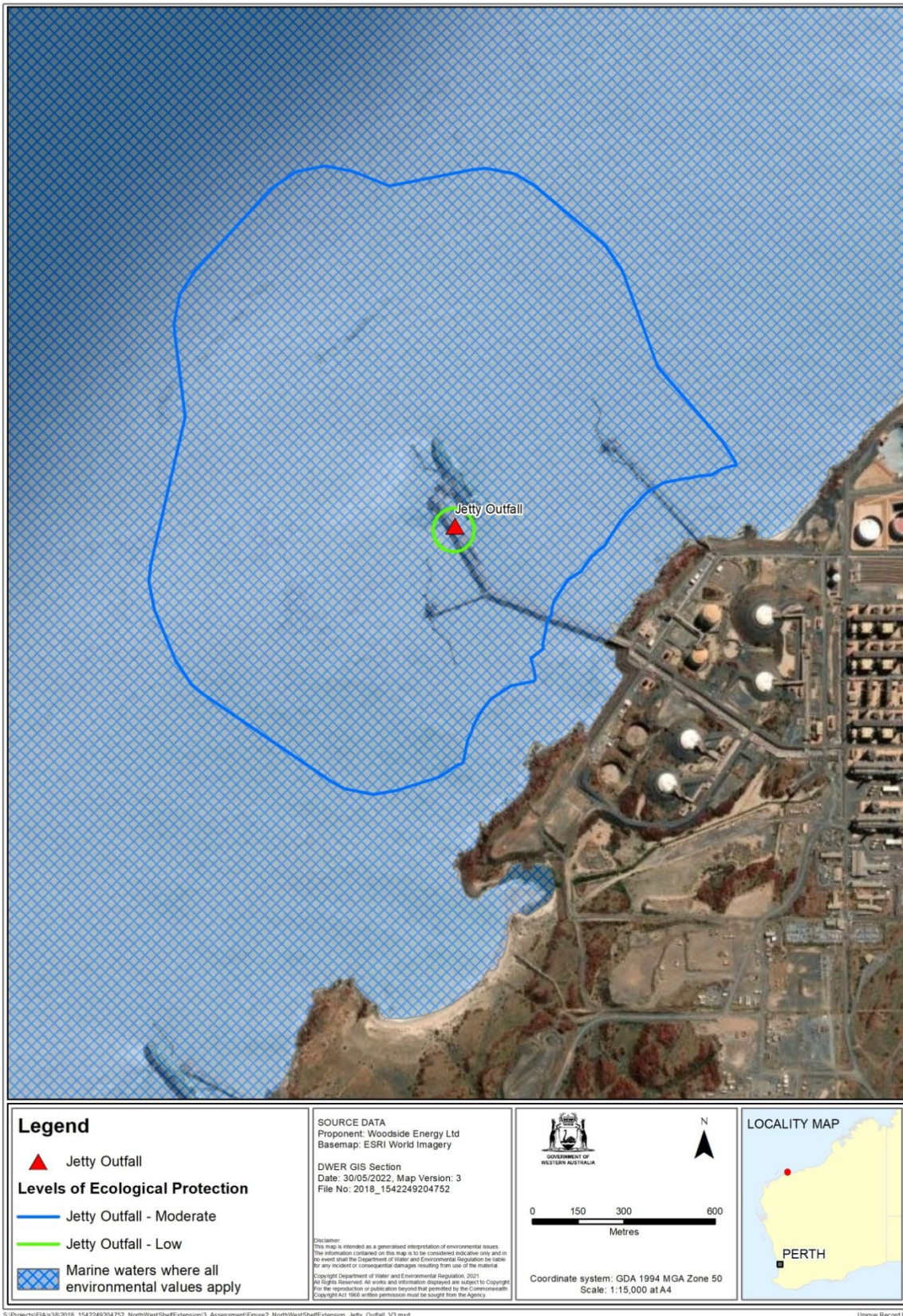


Figure 3: Jetty outfall levels of ecological protection

Note: all environmental values will be protected in marine waters. For ecosystem health a high level of ecological protection will be met, except where indicated.

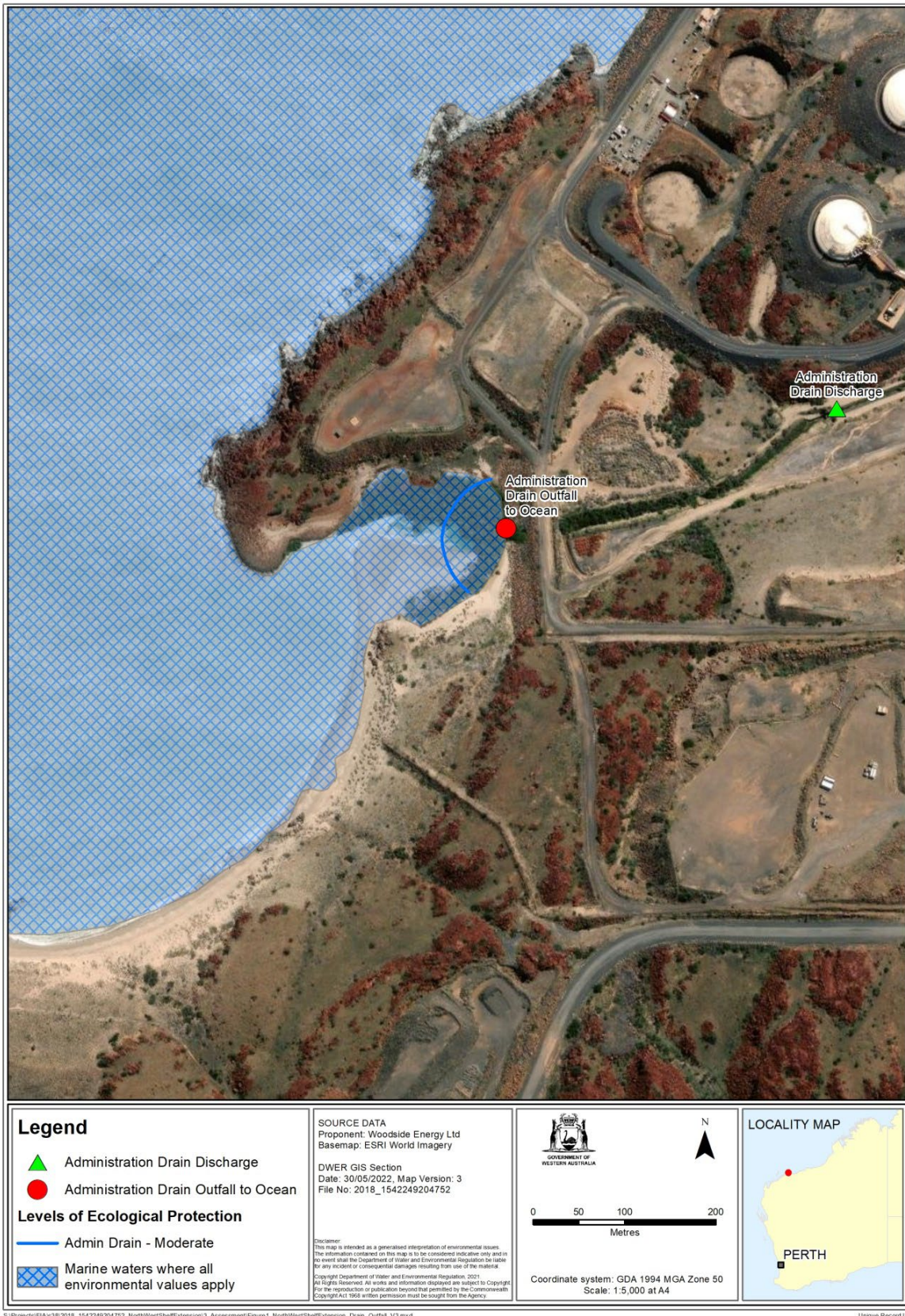


Figure 4: Administration drain levels of ecological protection

Note: all environmental values will be protected in marine waters. For ecosystem health a high level of ecological protection will be met, except where indicated.

Appendix B: Decision-making authorities

Table B1: Identified relevant decision-making authorities for the proposal

Decision-making authority	Legislation (and approval)
1. Minister for State Development	<i>State Agreement Act</i> - <i>North West Gas Development (Woodside) Agreement Act 1979</i>
2. Minister for Mines and Petroleum	<i>Petroleum Pipelines Act 1969</i> - Petroleum (Submerged Lands) (Environment) Regulations 2012 - Petroleum Pipelines (Environment) Regulations 2012
3. Minister for Aboriginal Affairs	<i>Aboriginal Heritage Act 1972</i> - s. 18 consent to impact a registered Aboriginal heritage site
4. Pilbara Ports Authority	<i>Port Authorities Act 1999</i> - s. 28 lease/licence/easement of land within control of Port Authority (term within 5 years)
5. Chief Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety	<i>Dangerous Goods Safety Act 2004</i> - Dangerous Goods Safety Regulation 2007 (storage and handling of dangerous goods)
6. Chief Executive Officer, Department of Water and Environment Regulation	<i>Environmental Protection Act 1986</i> - Part V works approval and licence

Note: In this instance, agreement is only required with DMAs 1 to 3 since these DMAs are Ministers.

Appendix C: Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

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.</i></p> <p><i>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; and</i></p> <p><i>b) an assessment of the risk-weighted consequences of various options.</i></p>	<p>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the Extension Proposal on the environmental factors of greenhouse gas emissions and air quality impacts on rock art.</p> <p><u>Greenhouse gas emissions</u></p> <p>The EPA notes that climate change as a result of cumulative GHG emissions has the potential to cause serious damage to WA's environment. The specific impacts of any single proposal's GHG emissions are not able to be known with certainty at this time. However, the EPA has not used this as a reason for postponing assessment of the Extension Proposal's contribution to the State's GHG emissions or recommending practicable conditions to reduce emissions in order to minimise the risk of environmental harm associated with climate change.</p> <p>The net scope 1 GHG emissions over the 50-year life would be up to 128.2 Mt of CO₂-e (with the recommended conditions). The proponent has provided a GHG emissions reduction trajectory (based on five-year targets) towards net zero by 2050 consistent with the Paris Agreement and IPCC 1.5 report, a continuous improvement approach and has proposed the use of offsets for emissions reduction targets in accordance with the mitigation hierarchy (Woodside 2021b). The EPA considers that this is generally consistent with the GHG Guideline (EPA 2020a).</p> <p>The EPA considers it is reasonable to require the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions released the atmosphere from the issue date of the Statement to 2029. From 2030, the proponent's proposed emissions reduction targets will exceed the equivalent amount of reservoir carbon dioxide in the feed gas (based on the estimate of 1.64 Mtpa provided in the proponent's GHGMP).</p> <p>The EPA has recommended condition 2 which requires the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions released to the atmosphere until 2029, achieve and report on specific emissions limits which will achieve net zero GHG emissions by 2050, implementation and review of the GHGMP in consultation with NYFL and MAC.</p> <p><u>Air quality/social surrounds (rock art)</u></p>

EP Act principle	Consideration
	<p>The EPA considers there may be a threat of serious or irreversible damage to the rock art within Murujuga from industrial air emissions (in particular NO_x from the Extension Proposal) accelerating the natural weathering.</p> <p>There is a lack of full scientific consensus about whether cumulative industrial air emissions are adversely affecting rock art on Murujuga. The EPA notes that the outcome of some scientific studies and monitoring is currently contested. The specific impacts of any single proposal's air emissions are not able to be known with full scientific consensus at this time. There is also a lack of full scientific consensus about the potential impacts of the Extension Proposal's emissions of NO_x at this time.</p> <p>Consistent with the precautionary principle, the EPA has adopted an overall cautious approach and has carefully evaluated options to avoid serious or irreversible impact to the rock art, including whether air emission minimisation measures proposed by the proponent are sufficient to meet the EPA's objectives so that the Extension Proposal avoids degradation of the rock art, or whether it should recommend that the Extension Proposal not be implemented.</p> <p>The EPA acknowledges the proponent's commitment to reduce NO_x emissions from the Extension Proposal by 40% by the end of 2030. The EPA has recommended a condition requiring this reduction in NO_x emissions.</p> <p>The MRAS will include a risk based Environmental Quality Management Framework (EQMF) and will establish associated Environmental Quality Objectives (EQOs) and Environmental Quality Criteria (EQCs) to inform the protection of rock art and reduce the risk of adverse consequences of cumulative industrial emissions to rock art. The MRAS will also include the long term Murujuga Rock Art Monitoring Program (MRAMP) and the associated Murujuga Ambient Air Quality Monitoring Network (MAAQMN) to monitor the condition of rock art, and ambient air quality, including the deposition of atmospheric pollutants. The recent Study of the Cumulative Impacts of Air Emissions in the Murujuga Airshed (Ramboll 2022) will inform the MRAMP and assist in the establishment of the MAAQMN.</p> <p>The EPA expects that the results obtained from the MRAMP will enable the level of risk of degradation of the rock art from cumulative air emissions from industrial activities to be determined. The EPA also expects that data contributing to interim results of the MRAMP, anticipated in 2023 will facilitate the development of air quality standards. The air quality standards will include environmental quality objectives and environmental quality standards for the purpose of avoiding the cumulative risks of adverse impact of the rock art within the Murujuga Cultural Landscape. The EPA has recommended the Extension Proposal be required to be implemented in compliance with these standards.</p>

EP Act principle	Consideration
	<p>Given the significant environmental values associated with the rock art, the EPA is not presently satisfied the proponent's measures, even if coupled with other minimisation measures, will ensure the Extension Proposal is implemented in a way which will be sufficiently consistent with the EPA's environmental objectives for air quality and social surroundings.</p> <p>The EPA has therefore considered whether it should recommend that the proposal not be implemented, or whether measures which are additional to those proposed by the proponent can be recommended to sufficiently reduce the potential for inconsistency with the EPA's environmental objectives for air quality and social surroundings.</p> <p>The EPA has considered the following additional measures:</p> <ul style="list-style-type: none"> • Requiring the proponent to achieve an air quality outcome to ensure that no air emissions from the Extension Proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates. • Requiring the proponent to minimise air emissions from the proposal, including reducing NOx emissions by 40% by 31 December 2030. • Requiring the proponent to maintain regional air quality in accordance with the NEPM standards and other applicable guidelines. • Requiring the proponent to specify monitoring trigger criteria and threshold criteria to ensure that the air quality outcome is achieved. • Contingency measures would be required to be developed and implemented to ensure the air quality outcome is met if the monitoring trigger criteria and threshold criteria are exceeded. • Requiring the proponent to achieve compliance with any detailed air quality standards to ensure that there are no adverse impacts accelerating the weathering of rock art within the Murujuga beyond natural rates. The EPA expects that this will include environmental quality objectives and environmental quality standards derived from the results of the MRAMP. • Requiring the proponent to include a trajectory of the proposed air emissions reductions for the life of the Extension Proposal. • Requiring the proponent to review the AQMP within twelve months of the issue date of the statement. • Requiring the proponent to review the AQMP within six months of a notification of when any air quality standards are amended in the future.

EP Act principle	Consideration
	<ul style="list-style-type: none"> • Requiring the AQMP to be independently peer reviewed prior submission to DWER to provide sufficient rigor with regard to monitoring and management of the Extension Proposal. • Requiring that the NYFL and MAC to be consulted by the proponent on any revisions to the AQMP. <p>The EPA is satisfied that these additional measures, if implemented, would mean that the Extension Proposal is not likely to be inconsistent with the EPA’s objectives and consideration of these measures is consistent with consideration of the matters in the precautionary principle.</p> <p>The EPA considers recommending the Extension Proposal be implemented with conditions which reflect the above measures would be a reasonably proportionate response in order to prevent degradation of the rock art and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA’s objectives and the precautionary principle.</p> <p>The EPA is not satisfied that the Extension Proposal could be implemented in a way which was likely to be consistent with its objectives without these recommended conditions. Without these recommended conditions, the EPA would recommend the Extension Proposal not be implemented.</p>
<p>2. The principle of intergenerational equity</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>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the Extension Proposal on the environmental factors of greenhouse gas emissions, air quality and social surroundings (rock art).</p> <p><u>Greenhouse gas emissions</u></p> <p>The EPA has noted that GHG emissions pose a risk to future generations, however, also notes that the proponent has provided a trajectory to net zero emissions by 2050 consistent with the Paris Agreement and IPCC 1.5 report, and to use offsets should these targets not be met by continuous improvement.</p> <p>The EPA has recommended condition 2 which requires the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions released to the atmosphere until 2029, achieve and report on specific emissions limits which will achieve net zero GHG emissions by 2050, implementation and review of the GHGMP in consultation with NYFL and MAC.</p> <p><u>Air quality/social surroundings (rock art)</u></p> <p>Consistent with the principle of intergenerational equity, the EPA has considered whether there are practicable measures that can be recommended to ensure that the health and diversity of the environmental values associated with the rock art can be maintained for the benefit of future generations. The EPA advises</p>

EP Act principle	Consideration
	<p>that it is unlikely that the rock art, if impacted, could be rehabilitated, and so maintenance of the rock art for future generations requires consideration of cautious and preventative measures.</p> <p>The EPA acknowledges the proponent's commitment to reduce NO_x emissions from the Extension Proposal by 40% by the end of 2030. However, given the significant environmental values associated with the rock art, the EPA is not satisfied the proponent's measures, even if coupled with other minimisation measures, will ensure the Extension Proposal is implemented in a way which will be sufficiently consistent with the EPA's environmental objectives for air quality and social surroundings.</p> <p>The EPA has therefore considered whether it should recommend that the Extension Proposal not be implemented, or whether measures which are additional to those proposed by the proponent can be recommended to sufficiently reduce the potential for inconsistency with the EPA's environmental objectives for air quality and social surroundings.</p> <p>The EPA is satisfied that these additional measures (outlined above in the assessment of Precautionary Principle), if implemented, would mean that the Extension Proposal is not likely to be inconsistent with the EPA's objectives and consideration of these measures is consistent with the principle of intergenerational equity.</p> <p><u>Social surroundings</u></p> <p>The EPA notes that direct impacts to the National Heritage Listed Area and the 134 sites of cultural heritage value identified within the onshore development envelope will be avoided. The EPA considers that, subject to the implementation of appropriate objectives and management measures, to avoid and minimise accidental indirect impacts to these sites and maintain the connection to country for traditional owners and custodians, the Extension Proposal is likely to be consistent with the maintenance of sites of cultural heritage value 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>The EPA has considered this principle in its assessment of greenhouse gas emissions, air quality and marine environmental quality.</p> <p>The proponent has undertaken baseline studies to understand and assess potential threats to biological diversity and ecological integrity. The EPA notes that the proponent has identified measures to avoid or minimise impacts in accordance with the mitigation hierarchy. The EPA has considered these measures during its assessment (provided in this report).</p> <p><u>Greenhouse gas emissions</u></p>

EP Act principle	Consideration
	<p>The EPA has noted the magnitude of the Extension Proposal's GHG emissions and has considered the proposed emissions reduction over the life of the proposal to reduce the risk of biological diversity and ecological integrity being adversely affected by climate change.</p> <p><u>Air quality</u></p> <p>The EPA has noted the magnitude of the proposal's air emissions and has considered the proponent's commitments to reducing air emissions from the proposal to reduce the risk of biological diversity and ecological integrity being adversely affected.</p> <p><u>Marine Environmental Quality</u></p> <p>The EPA notes that impacts to marine environmental quality and subsequent impacts to benthic communities and habitats, and marine fauna would be limited within 600 m of the Jetty Outfall and 70 m in No Name Bay. A limited number of individuals (e.g. mangroves, oysters, mud welks) may be impacted within these areas.</p> <p>The EPA considers that the proposed water quality monitoring program and contingency management measures within the Marine Environmental Quality Management Plan will protect the established environmental values and maintain ecosystem integrity and levels of ecological protection.</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, including the use of natural resources and assets and the ultimate disposal of any waste.</i></p>	<p>In considering this principle, the EPA notes that the proponent will bear the costs relating to meeting environmental objectives, implementing the Extension Proposal to achieve environmental objectives, and management and monitoring of environmental impacts during the life of the Extension Proposal. The EPA has had particular regard to this principle in considering air emissions, greenhouse gas emissions and marine environmental quality.</p> <p><u>Greenhouse gas emissions</u></p> <p>The proponent will be responsible for bearing the costs of implementing measures to reduce and offset GHG emissions, including the costs of adopting practicable measures in the future to further reduce and offset GHG emissions to achieve net zero along trajectory to net zero by 2050.</p> <p><u>Air quality</u></p> <p>The EPA advises that the proponent will be responsible for bearing the costs of air pollution control technology that will be used for the Extension Proposal, including cost of adopting advances in air pollution control technology in the future to further reduce air emissions and comply with air emission standards to minimise the risks of industrial air emissions to rock art.</p>

EP Act principle	Consideration
<p>(4) <i>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 minimize costs to develop their own solution and responses to environmental problems.</i></p>	<p><u>Marine Environmental Quality</u></p> <p>The proponent will be responsible for bearing the costs of implementing the water quality monitoring program and contingency management measures within the Marine Environmental Quality Management Plan to protect the established environmental values and maintain ecosystem integrity and levels of ecological protection.</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>The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment of greenhouse gas emissions, air quality and marine environmental quality.</p> <p><u>Greenhouse gas emissions</u></p> <p>The EPA has recommended condition 2 which requires the proponent to avoid, reduce and/or offset the total quantity of reservoir emissions released to the atmosphere until 2029. The EPA has also recommended conditions requiring the proponent to achieve and report on specific emissions limits which will achieve net zero GHG emissions by 2050.</p> <p><u>Air quality/social surroundings (rock art)</u></p> <p>The EPA has recommended conditions to ensure the Extension Proposal is required to adopt practicable measures to ensure continuous improvement to ensure air emissions are not inconsistent with its objectives for air quality and social surroundings.</p> <p><u>Marine environmental quality</u></p> <p>The EPA has recommended conditions requiring the proponent to manage discharges to the marine environment to ensure environmental values and ecological protection are maintained.</p>

Appendix D: Other environmental factors

Table D1: Evaluation of other environmental factors

Environmental factor	Description of the Extension 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			
Marine fauna	<p>Marine fauna could be impacted by:</p> <ul style="list-style-type: none"> • planned wastewater discharge from the jetty outfall and administration drain • adverse changes to marine water quality due to unplanned ship discharges • turbidity from maintenance dredging • shipping movements. 	Public submitters considered that planned wastewater discharges could impact the health of marine fauna of cultural significance.	<p>Marine fauna was not identified as a preliminary key environmental factor when the EPA decided to assess the Extension Proposal.</p> <p>The ERD (Woodside 2019a) reported the following:</p> <ul style="list-style-type: none"> • ChEMMS testing showed contaminant levels in oyster tissue were below relevant guideline values in the Food Standards Australia New Zealand, maximum safe eating values in No Name Bay • impacts to less mobile species like oysters and mudwelks would be limited within the (LEPA/MEPA) zones of impact around the discharge points and will therefore only impact a limited number of individuals • mobile species and individuals such as fish and turtles are unlikely to be exposed to sufficient concentrations to be impacted. <p>The Extension Proposal is not expected to result in an increase of shipping vessel movements per week.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • the information provided in the ERD and outlined above • the Marine Environmental Quality condition (condition 5) recommended in section 2.4 above which will ensure the marine environmental quality is maintained and therefore protect marine fauna from the impact of wastewater discharges

Environmental factor	Description of the Extension Proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			<ul style="list-style-type: none"> unplanned discharges are regulated through the Petroleum (Submerged Lands) (Pipelines) Regulations 2007 and the Petroleum (Submerged Lands) (Environment) Regulations 2021 the short term (about two weeks every five to ten years) nature of turbidity from maintenance dredging the Extension Proposal is not expected to result in an increase of shipping vessel movements per week, <p>the EPA considers it is unlikely that the Extension Proposal would have a significant impact on marine fauna.</p> <p>Accordingly, the EPA did not consider marine fauna to be a key environmental factor at the conclusion of its assessment.</p>
<p>Benthic communities and habitats</p>	<p>Benthic communities and habitats may be impacted by:</p> <ul style="list-style-type: none"> planned wastewater discharge from the jetty outfall and administration drain adverse changes to marine water quality due to unplanned ship discharges turbidity from maintenance dredging. 	<p>No submissions were made.</p>	<p>Benthic communities and habitats were not identified as a preliminary key environmental factor when the EPA decided to assess the Extension Proposal.</p> <p>The ERD (Woodside 2019a) states that ChEMMS testing for impacts:</p> <ul style="list-style-type: none"> showed no changes to the health of the nearest mangrove community to the development envelope adjoining sandy beaches near No Name Bay did not identify any significant anthropogenic impact to coral health as a result of the North West Shelf Project to date. <p>The ERD also notes that the closest occurrence of seagrass is located 1.8 km from the development envelope.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> the information provided in the ERD and outlined above the short term (about two weeks every five to ten years) nature of turbidity from maintenance dredging the Marine Environmental Quality condition (condition 5) recommended in section 2.4 above which will ensure the marine environmental quality is maintained and therefore protect benthic

Environmental factor	Description of the Extension 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>communities and habitats from the impact of wastewater discharges</p> <ul style="list-style-type: none"> unplanned discharges are regulated through the Petroleum (Submerged Lands) (Pipelines) Regulations 2007 and the Petroleum (Submerged Lands) (Environment) Regulations 2021, the EPA considers it is unlikely that the Extension Proposal would have a significant impact on benthic communities and habitats. <p>Accordingly, the EPA did not consider benthic communities and habitats to be a key environmental factor at the conclusion of its assessment.</p>
People			
Human health	<p>Extension Proposal does not involve radioactive activities or emissions of radiation.</p> <p>Air emissions could cause indirect impacts to human health.</p>	Public submitters considered that air emissions would cause air pollution that impacts public health.	<p>Human health was not identified as a preliminary key environmental factor when the EPA decided to assess the Extension Proposal. Human Health was incorporated into the key environmental factor of air quality in the ESD.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> no radioactive emissions public concerns focused on potential health impacts as a result of air emissions the significance considerations in the Statement of Environmental Principles, Factors and Objectives and aims of EIA (EPA 2021), <p>the EPA considers it is unlikely that the Extension Proposal would have a significant impact on Human Health (radiation).</p> <p>Accordingly, the EPA did not consider Human Health (radiation) to be a key environmental factor at the conclusion of its assessment.</p> <p>Impacts relating to human health (air emissions) is addressed in section 4.2 (air quality) above.</p>

Appendix E: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

EPA policies

Environmental factor guideline – Air quality (EPA 2020b)

Environmental factor guideline – Greenhouse gas emissions (EPA 2020a)

Environmental factor guideline – Marine environmental quality (EPA 2016b)

Environmental factor guideline – Social surroundings (EPA 2016a)

Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual, (EPA 2021c).

Statement of environmental principles, factors, objectives and aims of EIA (EPA 2021)

Technical guidance – Protecting the quality of Western Australia’s marine environment, (EPA 2016c).

EPBC Act policies

Australia’s National Heritage – Applying the Principles (Australian Government 2008).

Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth of Australia 2016)

Appendix F: List of submitters

7-day comment on referral

A total of 133 submissions were received on the referral not including four duplicate submissions. The 113 submissions included 7 from organisations and 126 from individuals.

Public review of proponent information

The total number of submissions received was 19,869. This is comprised of:

19,789 total proforma submissions (excluding 14 duplicates)

65 submissions via the consultation hub including 28 uploads

15 submissions via other pathways.

Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
10/12/2018	EPA decided to assess – level of assessment set	
06/06/2019	Environmental Scoping Document released for public review	27
20/06/2019	Public review period for Environmental Scoping Document closed	2
29/08/2019	EPA approved Environmental Scoping Document	10
16/12/2019	EPA accepted Environmental Review Document	15
18/12/2019	Environmental Review Document released for public review	2 days
12/02/2020	Public review period for Environmental Review Document closed	8
11/11/2021	EPA accepted proponent's Response to Submissions	91
08/12/2021	EPA received final information for assessment	4
17/3/2022	EPA completed its assessment	10
27/6/2022	EPA provided report to the Minister for Environment	15
30/06/2022	EPA report published	3 days
21/07/2022	Close of appeals period	3

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

In this case, the EPA did not meet its timeline objective to complete its assessment and provide a report to the Minister.

Appendix H: Contemporising of Ministerial statements 320, 334, 482 and 536

The recommended conditions for the significant amendment of an approved proposal (the Extension Proposal) were developed in accordance with section 40AA(3) of the EP Act and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2021c) and includes a review of the following implementation conditions of the approved proposal (North West Shelf Project):

- Ministerial statement 536: North West Shelf Gas Project Additional Liquefied Natural Gas Facilities Burrup Peninsula, issued on 11 February 2000 – which allowed the construction of LNG process trains 4 and 5 and the processing of natural gas and associated fluids from NWSJV field resources to produce up to 18.5 million tonnes per annum (Mtpa) of LNG
- Ministerial statement 482: Second Offshore Trunkline and Domgas Debottlenecking North-West Shelf, issued on 14 July 1998 – which allowed the construction of a second trunkline and load out facilities
- Ministerial statement 334: Additional Facilities Within Onshore Treatment Plant Liquefied Petroleum Gas Extraction & Export Burrup Peninsula (782/851), issued on 11 January 1994 – which allowed a change to dredge spoil disposal from No Name Creek to marine disposal
- Ministerial statement 320: Additional Facilities Within Onshore Treatment Plant Liquefied Petroleum Gas Extraction & Export Burrup Peninsula (782), issued on 24 August 1993 – which allowed the construction of two LPG storage tanks and a ship jetty.

Ministerial statement 536, 482, 334 and 320 are considered in Tables A, B, C and D respectively.

Table H1: Consideration of Ministerial statement 536

Ministerial statement 536 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 1 Implement the proposal as documented in schedule 1 of statement 536	N/A	Delete condition and replace with a consolidated contemporary style condition	EPA recommends condition 1 is replaced with a new condition setting the maximum limits on proposal characteristics which will ensure the implementation of the proposal is consistent with the EPA's objectives. This condition reflects contemporary conditions setting approach recommended by the EPA.
Condition 2 Implement the environmental management commitments as documented in schedule 2 of statement 536	N/A	Delete condition	Condition 2 relates to environmental management commitments attached to Ministerial Statement (MS) 536. The EPA has reviewed each proponent commitment and considers that they fall into four categories: <ul style="list-style-type: none"> • are not relevant to environmental management and therefore are redundant (commitments 1 to 17, 19, 25, 26, 27 and 28). • duplicate requirements addressed by the proposed implementation conditions as proposed to be amended (commitments 18, 20 to 22 and 29) • have been fully implemented (commitments 23 and 24).
Condition 3 Environmental Management System – develop and implement	N/A	Delete condition	Proponent developed a Health, Safety and Environment Management Operating Standard (HSEMOS) in 2016, which aligned with ISO140001. The latest MS563 compliance assessment report indicates that the HSEMOS is being implemented. The HSEMOS complies with Woodside's Health Safety Environment and Quality Policy (2021) which relates to the health and safety of the workforce. This condition has been removed as it relates to the health and safety of the workforce which is legislated under the <i>Work Health and Safety Act 2020</i> .

Ministerial statement 536 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 4 Greenhouse Gas Emissions – preparation, implementation and publication of a management plan	Greenhouse gas emissions	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 2).
Condition 5 Decommissioning and Rehabilitation – preparation and implementation of a management plan	N/A	Delete condition and replace with a consolidated contemporary style condition	The condition requires the Decommissioning and Rehabilitation Management Plan is submitted at least six months prior to decommissioning. The requirement for a decommissioning and rehabilitation plan is still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 7).
Condition 6 Performance review	N/A	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 6).
Condition 7 Proponent – requirement for notification of change of proponent	N/A	Delete condition	No change of proponent has been required. This condition is no longer required as section 381 of the EP Act and Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021 (Western Australian Government 2021) set out the responsibilities and administrative requirements for the change of proponent/person responsible for the proposal.
Condition 8 Commencement – provision of evidence that the proposal has commenced within five years of the date of statement 536	N/A	Delete condition	The proponent confirmed that the proposal as defined in MS 536 substantially commenced in April 2004. This condition has been completed.

Ministerial statement 536 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 9 Compliance and Auditing	N/A	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant and will be retained still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 8).

Table H2: Consideration of Ministerial statement 482

Ministerial statement 482 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 1 Implement the proposal as documented in schedule 1 of statement 482	N/A	Delete condition and replace with a consolidated contemporary style condition	EPA recommends condition 1 is replaced with a new condition setting the maximum limits on proposal characteristics which will ensure the implementation of the proposal is consistent with the EPA's objectives. This condition reflects contemporary conditions setting approach recommended by the EPA.
Condition 2 Implement the environmental management commitments as documented in schedule 2 of statement 482	N/A	Delete condition	Condition 2 relates to environmental management commitments attached to Ministerial Statement (MS) 482. The EPA has reviewed each proponent commitment and considers that they fall into four categories: <ul style="list-style-type: none"> • are not relevant to environmental management and therefore are redundant (commitments 67 to 69) • duplicate requirements addressed by the proposed implementation conditions as proposed to be amended (commitments 56, 59, 61, 71 and 72) • have been fully implemented (commitment 1 to 55, 57, 58, 60, 63, 65, and 69) • are managed under another regulatory instrument in a way which the EPA is satisfied can mitigate the potential impacts from the proposal on the environment:

Ministerial statement 482 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
			<ul style="list-style-type: none"> ○ commitment 61 – the Environmental Licence issued under Part V of the EP Act administered by the DWER ○ commitment 62 – the storage of hydrocarbons is managed under the <i>Dangerous Goods Safety Act 2004</i> and the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007 ○ commitment 64 – the health and safety of the workforce is legislated under the <i>Work Health and Safety Act 2020</i> ○ commitment 66 - proponent will continue to implement the State Waters Trunklines EP to reduce impacts to sediments from unplanned discharges of hydrocarbon oils. The State Waters Trunklines EP has been prepared in accordance with the Petroleum (Submerged Lands) (Pipelines) Regulations 2007 and the Petroleum (Submerged Lands) (Environment) Regulations 2012 and approved by the Department of Mines, Industry, Regulation and Safety ○ commitment 70 - Discharges from vessels are performed in accordance with the Australian Government's Australian Marine Orders.
Condition 3 Environmental Management System – develop and implement	N/A	Delete condition	<p>This condition has been removed as the trunkline that relates to MS 482 has been constructed/implemented.</p> <p>Correspondence from Woodside confirms that construction of the wharf and jetty (7 October 2003) and Domgas debottlenecking facility (4 December 2003) were not constructed.</p>
Condition 4 Environmental Management Plan for Load-out Facilities – preparation, implementation and	Coastal processes	Delete condition	The requirements of this condition relate to the design and construction of the jetty and wharf. The proponent confirmed in 2003 that these facilities would not be built under MS 482.

Ministerial statement 482 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
publication of a management plan			
Condition 5 Performance review	N/A	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 6).
Condition 6 Proponent – requirement for notification of change of proponent	N/A	Delete condition	No change of proponent has been required. This condition is no longer required as section 381 of the EP Act and <i>Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021</i> (Western Australian Government 2021) set out the responsibilities and administrative requirements for the change of proponent/person responsible for the proposal.
Condition 7 Commencement – provision of evidence that the proposal has commenced within five years of the date of statement 482	N/A	Delete condition	The proposal as defined in MS 482 substantially commenced prior to 14 July 2003. This condition has been completed.
Condition 8 Compliance and Auditing	N/A	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant and will be retained still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 8).

Table H3: Consideration of Ministerial statement 334

Ministerial statement 334 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 1 Implement the environmental management commitments	N/A	Delete condition	<p>Condition 1 relates to environmental management commitments attached to Ministerial Statement (MS) 334. The EPA has reviewed each proponent commitment and considers that they fall into four categories:</p> <ul style="list-style-type: none"> • are not relevant to environmental management and therefore are redundant (commitment 3.2) • duplicate requirements addressed by the proposed implementation conditions as proposed to be amended (commitments 3.1 and 3.3) • have been fully implemented (commitments 1.1 to 2.8 and 3.5) • are managed under another regulatory instrument in a way which the EPA is satisfied can mitigate the potential impacts from the proposal on the environment: <ul style="list-style-type: none"> ○ commitment 34 – emergency response plans are required under the <i>Dangerous Goods Safety Act 2004</i> and the <i>Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007</i>.

Table H4: Consideration of Ministerial statement 320

Ministerial statement 320 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
Condition 1 Implement the environmental management commitments	N/A	Delete condition	<p>Condition 1 relates to environmental management commitments attached to Ministerial Statement (MS) 320. The EPA has reviewed each proponent commitment and considers that they fall into four categories:</p> <ul style="list-style-type: none"> • are not relevant to environmental management and therefore are redundant (commitment 3.2) • duplicate requirements addressed by the proposed implementation conditions as proposed to be amended (commitments 3.1 and 3.3) • have been fully implemented (commitments 1.1 to 2.8 and 3.5) • are managed under another regulatory instrument in a way which the EPA is satisfied can mitigate the potential impacts from the proposal on the environment: <ul style="list-style-type: none"> ○ commitment 34 – emergency response plans are required under the <i>Dangerous Goods Safety Act 2004</i> and the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007.
Condition 2 Implement the proposal as documented in material provided to the EPA	N/A	Delete condition and replace with a consolidated contemporary style condition	<p>EPA recommends condition 2 is replaced with a new condition setting the maximum limits on proposal characteristics which will ensure the implementation of the proposal is consistent with the EPA's objectives.</p> <p>This condition reflects contemporary conditions setting approach recommended by the EPA.</p>
Condition 3 Hazards Control Plan – develop and implement a hazard control	N/A	Delete condition	<p>This condition has been removed as hazardous facilities are managed under the managed under the <i>Dangerous Goods Safety Act 2004</i> and the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007.</p>

Ministerial statement 320 conditions	Environmental factor	Proposed change	Assessment and evaluation of proposed changes
plan and safety management system			
Condition 4 Dredging – minimisation of impacts to coral spawning areas	Benthic Communities	Delete condition	Dredging has been undertaken and CheMMS monitoring indicated that impacts were not material.
Condition 5 Ballast Disposal – report on the environmental impacts of the disposal of ballast water by ships loading LPG and condensate.	Marine Environmental Quality	Delete condition	This condition has been removed as the item has been completed and any future discharge of ballast is managed by the Pilbara Ports Authority.
Condition 6 Proponent – requirement for notification of change of proponent	N/A	Delete condition	No change of proponent has been required. This condition is no longer required as section 38I of the EP Act and <i>Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021</i> (Western Australian Government 2021) set out the responsibilities and administrative requirements for the change of proponent/person responsible for the proposal.
Condition 7 Time limit on approval – provision of evidence that the proposal has commenced within five years of the date of statement 320	N/A	Delete condition	The proponent confirmed that the proposal as defined in MS 320 substantially commenced. This condition has been completed.
Condition 8 Compliance and Auditing	N/A	Delete condition and replace with a consolidated contemporary style condition	The requirements of this condition are still relevant and will be retained still relevant and will be retained consistent with contemporary conditions setting approach recommended by the EPA (recommended condition 8).

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