Supplementary Environmental Report

→ GEMCO Excess Water Disposal Project

30 January 2026

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Publication statement

This supplementary environmental report (SER) was produced by suitably qualified and experienced impact assessment professionals within the GHD Environment Team based in Northern Australia (NT and QLD), in collaboration with a range of technical specialists within GHD's national and global business on behalf of Groote Eylandt Mining Company (GEMCO) (the Proponent). A listing of the key technical consultants, their qualifications and experience in the environmental field is provided in Table 1.

Table 1 GHD key technical consultants

Key technical specialist	Specialist area	Role	Qualifications	Experience
Anna Boden	Marine Ecology & Environmental Impact Assessment	Reviewer	Bachelor of Science (Marine Science and Biology) Master of Applied Science (Environmental Science)	20+ years
Brioni Armstrong	Environmental Impact Assessment	Author	Bachelor of Science (Environmental Science) Postgraduate Diploma (Environment and Sustainability) Postgraduate Diploma (Environmental Health)	13+ years
Rosanna Materazzo	Environmental Impact Assessment	Author	Bachelor of Environmental Science	1 year
Tom Sullivan	Marine Modelling	Author	Bachelor of Engineering (Environmental) with Honours	14+ years

Technical inputs and quality assurance and quality control reviews from relevant technical specialists have been provided throughout the development of this SER. This SER has been developed based on an established and robust technical and quality review process. The process started with technical specialists undertaking research (desktop/field), investigations and engagement with Anindilyakwa Land Council (ALC) and Northern Territory Department of Lands, Planning and Environment (DLPE) in relation to submissions received and additional information requested after the referral stage. This information was then collated into corresponding chapters and/or supporting technical appendices. Documentation was then reviewed internally by the relevant subject matter experts, who have sufficient project knowledge, technical experience and authority.

Following this process the information was submitted to South32 and GEMCO project team members for their review and comment. Review comments received have been addressed to the satisfaction of all stakeholders (GHD Technical Specialists, South32 and GEMCO project team members) prior to submission of this SER to the Northern Territory Environment Protection Authority (NT EPA) for assessment.

Executive summary

Overview

Groote Eylandt Mining Company (GEMCO) (the Proponent) proposes the development of the Excess Water Disposal project (the Proposal). GEMCO operates an open cut, strip-mining operation on Groote Eylandt. Deeper mining and the progression of mining towards the coast has resulted in greater groundwater intrusion and an increase in the salinity of the water in the quarries. To address these issues, the Proposal involves both onshore works (pipeline and pumps) and tidal/marine works (pipeline and diffusers) to redirect and release excess water from the existing GEMCO mine.

The Proposal was referred to the Northern Territory Environment Protection Authority (NT EPA) on 11 March 2025. A public consultation period occurred between 22 August 2025 and 19 September 2025. The NT EPA received one submission from the public and four submissions from government authorities:

– Anindilyakwa Land Council (ALC)
– Department of Lands, Planning and Environment (DLPE)
– Department of Climate Change, Energy, the Environment and Water (DCCEEW)
– Aboriginal Areas Protection Authority (AAPA).

On 28 October 2025, the NT EPA informed GEMCO of their decision that the method of environmental impact assessment is a supplementary environmental report (SER). On 20 November 2025, the NT EPA issued a direction to include additional information in the SER:

– To address the submissions received in relation to the referral information
– To include additional information regarding effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment.

Further consultation with the NT EPA, DCCEEW, DLPE and ALC has been undertaken in response to the submissions and *Notice of Direction*. This consultation has informed the development of the SER. In addition, the SER also includes updated Proposal information which has been considered in the impact assessment presented. This approach was confirmed with NT EPA and DLPE in the meeting on 4 December 2025.

Key issues

As outlined in the NT EPA's *Notice of Decision and Statement of Reasons*, the key issues raised in the submissions received by the NT EPA were:

– Insufficient information to accurately determine the significance of impacts on the marine environmental quality and marine ecosystems from continuous discharge, including the influence of:
    - Vertical mixing of discharge waters during high wave conditions
    - Increased turbidity from discharge waters and whether this has been adequately accounted for in plume dispersal modelling
    - Accumulation of metals and metalloids present in discharge waters and the potential for dispersal, biomagnification and bioaccumulation
    - Cumulative impacts from this proposed action combined with existing, ongoing port operations, effluent discharges and other human activities
– The adequacy of benthic habitat mapping, including:
    - Surveys not undertaken during the optimal seagrass growth period, potentially underestimating peak seagrass extent and density
    - Considerations of natural variations in seagrass extent, density, and benthic communities
– Uncertainty of the presence of, and potential impacts on Aboriginal sacred sites within the anticipated Zone of Influence
– Concern about whether consultation undertaken is sufficient to ensure that affected communities and individuals understand the proposed action and its potential impacts, especially regarding traditional fisheries.

In the NT EPA's *Notice of Decision and Statement of Reasons* for the SER as an assessment method, the NT EPA considers that the Proposal has the potential to significantly impact two themes and three environmental factors (Sea: Marine Ecosystems, Sea: Marine Environmental Quality, and People: Culture and Heritage). For each of these factors supplementary information has been provided in this SER. A fourth factor has been reviewed in the SER (Land: Terrestrial Ecosystems) to confirm that the impact assessment undertaken in the referral and associated mitigation measures proposed remain relevant given the minor changes that have arisen through design progression.

Supplementary information

To support the NT EPA with evidence-based decision-making additional studies have been conducted, providing the best available evidence upon which the outcomes of the SER have been based. Impact assessment undertaken in the referral and in this SER has considered the severity (including scale, duration and magnitude) of the predicted impacts, alongside the importance and sensitivity of the environmental value components.

Supplementary information presented in the SER includes:

- Results from additional field studies including marine benthic surveys and sediment assessment
- Results from additional modelling including:
  - Vertical mixing of discharge water during high wave conditions
  - Modelling of potential cumulative interaction between mine discharge water and effluent discharge from the existing sewage treatment plant
  - Dispersion modelling of suspended sediments and deposition during discharge
- Noise and vibration assessment for impact piling
- Semi-quantitative cumulative shipping noise assessment.

Table 2 presents an overview of the key findings from these supplementary studies.

Section 2.6 of the Referral Report outlines how the Proposal adheres to the principles of environment protection and management under Part 2 of the *Environmental Protection Act 2019* (EP Act). This information remains valid and has been carried across to the SER. Embedded within the design of the Proposal, and the impact assessment presented in the referral and the SER are the principles of ecologically sustainable development and management hierarchies. Where there is uncertainty in information informing the impact assessment, the precautionary principle has been adopted; aligned with this, the modelling that has underpinned impact assessment has been based on conservative, worst case scenarios. The Proposal has been designed to avoid adverse environmental impacts, with management and mitigation measures proportional to identified impact pathways embedded in the delivery approach.

Table 2 Key findings of additional studies

Additional Studies	Key findings / outcomes
Additional field surveys	– Results of four surveys presented enabling understanding of seasonality of benthic communities, including during peak seagrass growing periods. – The study confirmed previous observations of marine habitats within the survey area, as presented in the referral, including coral communities, macroalgae, and seabed composition. – Per the November 2025 survey undertaken during the peak growing period, the marine footprint contains 0.77 ha of sparse seagrass consisting of three species: *Halophila ovalis, Halophila spinulosa* and *Halophila uninervis*. Denser patches of seagrass are located 200-800 m south of the marine footprint. – Sediments to be disturbed have low acid forming potential.
Modelling of vertical mixing of discharge waters during high wave conditions	– The mixing zone slightly reduced in size in the hydrodynamic model inclusive of wave action. – The surface mixing zone for potential indirect effects extends approximately 630 m north and 460 m southeast of the diffuser. – The surface mixing zone for potential direct effects extends approximately 400 m north/northwest and 300 m southeast of the diffuser. – There is no predicted mixing zone for metals and metalloids exposure.

Additional Studies	Key findings / outcomes
	– There is no predicted mixing zone at the seabed for any of the assessed dilution targets due to the buoyant nature of the plume. – The inclusion of waves in the model has no negative impact on the area of dilution, rather the mixing zone has slightly reduced in size, and therefore the impact assessment conclusions presented in the Referral Report remain valid.
Modelling of potential cumulative impacts due to the interaction of mine discharge and sewage discharge	– Modelling was undertaken using highly conservative assumptions, therefore presenting worst-case scenario. – There is limited interaction between the mine discharge and sewage discharge. – Where interaction was observed this did not result in meaningful changes to predicted mixing zones.
Dispersion modelling of suspended sediment and deposition during discharge activities	– Modelling was undertaken in accordance with the guidance from the Western Australian Marine Science Institute's (WAMSI's) Dredge Science Node (DSN), as well as the WA EPA's (2021) *Technical Guidance – Environmental impact assessment of marine dredging proposals*, which is also heavily informed by the findings of the DSN. The outputs from the DSN are considered to be leading practice technical guidance for marine dredging by the NT EPA, as noted in the *Draft Marine Dredging Guideline* (NT EPA, 2023). – Zones of Influence, moderate impact and high impact were defined based on the WA EPA's (2021) technical guidance document. Thresholds that defined these zones were tested against approaches used for NT EPA approved dredging projects (KBR, 2023; INPEX 2022). The approach applied in this SER is considered more environmentally conservative than these studies. Modelling of the three zones was undertaken based on the thresholds selected: • No zones of moderate impact or zones of high impact were predicted to occur. • The Zone of Influence, as predicted by the 95th percentile depth-average SSC was predicted to exceed 1 mg/L above ambient conditions up to 1,250 m north and 220 m southeast of the diffuser. However, on average, increases in suspended sediment concentrations are predicted to be negligible. – The median depth-averaged suspended sediment concentration (SSC) throughout the entire simulated period was not predicted to exceed 1 mg/L above ambient conditions. Therefore, on average, increases in SSC are predicted to be negligible and are unlikely to be observable by the human eye. – Cumulative impacts are considered negligible as there is no significant increase in suspended sediment concentrations at the sewage treatment plant outlet. – Maximum deposition thickness is localised around the end of the Milner Bay jetty structure. Maximum net deposition occurs in localised areas north and south of the diffuser. The risk of impact to sediment quality from deposition of sediments from the diffuser is considered to be negligible. – An assessment of the potential for deposited metal/metalloid solids from the mine discharge to accumulate to toxic levels within the seabed has been carried out, concluding that 18 years of sustained sediment deposition at the modelled rates would be required before a metal/metalloid (silver) accumulates to toxic levels within the sediments. This assumes no losses via biological uptake or large erosion events occur in this time. Further, the areas of toxicity under this unlikely scenario would be localised to the western end of the Milner Bay jetty structure, which is already a disturbed environment due to the port and shipping operations. – In summary, the results of the modelling indicate that impacts to benthic communities and sediment quality related to the discharge of suspended sediments are unlikely. Nonetheless, a marine monitoring strategy inclusive of an adaptive management program has been proposed.
Noise and vibration assessments for impact piling and cumulative impacts of shipping noise	– Impact piling has the potential to impact marine fauna; mitigation and management measures aligned with industry standard will be implemented. – Noise radiated from project-related vessels is considered minimal and less or comparable to existing port traffic. Gradual exposure to continuous noise such as from additional shipping vessels is generally less harmful and less likely to disturb marine fauna.

Management and mitigation measures

Management and mitigation measures proposed in the referral have been revisited considering the supplementary information provided. Where appropriate existing measures have been revised, and new measures proposed. New measures include:

– Management and mitigation measures for underwater noise impacts associated with impact piling
– Design and implementation of a marine monitoring strategy that includes:
    - Marine water quality monitoring, including a real time adaptive management program, with preliminary thresholds proposed
    - Monitoring of benthic communities, including primary producers (corals and seagrasses) and infauna
– Proposed application for an Authority Certificate to confirm potential for presence of sacred sites, and adaptation of works as required
– Updates to the unexpected finds procedure based on feedback provided by DLPE Heritage Branch.

For ease of reference a collated set of measures proposed in the Referral Report and the SER have been provided in Appendix D.

Residual impacts

– The residual impacts on the environmental values and sensitivities relevant to all environmental factors were assessed by considering both the direct and indirect effects of the Proposal, as well as the effectiveness of the proposed mitigation measures. The assessment considered the severity (including scale, duration and magnitude) of the predicted impacts, alongside the importance and sensitivity of the environmental value components. Consideration was also given to the potential for cumulative impact, including connections and interactions between factors. Based on this assessment, with the implementation of the identified avoidance and mitigation measures, it was determined that there will be no significant residual impacts on all factors assessed.
– Further, the Proposal allows the reduction in the current approved practice of discharging stored site water to land; this is considered to be a net environmental benefit and is particularly important as future groundwater ingress to the quarries is predicted to increase.

Key conclusions

– The detailed assessment presented in the referral and in this SER has determined that through the implementation of the proposed avoidance and mitigation measures the Proposal is unlikely to have a significant impact on environment or heritage values.
– The assessment further determined that the NT EPA's environmental objectives for the identified environmental factors can be met.

This report is subject to, and must be read in conjunction with, the limitations assumptions and qualifications contained throughout the Report.

Acronyms and Abbreviations

Table 3 Acronyms and abbreviations

Acronym / abbreviation	Description
µPa	Micropascal
AAPA	Aboriginal Areas Protection Authority
AASS	Actual Acid Sulfate Soils
AIMS	Australian Institute of Marine Science
ALC	Anindilyakwa Land Council
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASC NEPM	National Environment Protection (Assessment for Site Contamination) Measure
ASS	Acid Sulfate Soils
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
dB	Decibels
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DGV	Default Guideline Value
DLI	Daily Light Integral
DLPE	Department of Lands, Planning and Environment
DO	Dissolved Oxygen
DSN	Dredge Science Node
EC	Electrical Conductivity
EP Act	*Environment Protection Act 2019* (NT)
EP Regulations	*Environment Protection Regulations 2020* (NT)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
GBRMPA	Great Barrier Reef Marine Park Authority
GDE	Groundwater Dependent Ecosystem
GEMCO	Groote Eylandt Mining Company
ha	hectare
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
Hz	Hertz
IECA	International Erosion Control Association
IMS	Invasive Marine Species
IPA	Indigenous Protection Area
LAT	Lowest Astronomical Tide

Acronym / abbreviation	Description
MEA	Marine Ecology Assessment
MEMP	Marine Environmental Monitoring Program
MFO	Marine Fauna Observer
MMP	Mining Management Plan
NIMPIS	National Introduced Marine Pest Information System
NLC	Northern Land Council
NR Maps	Natural Resource Maps (NT)
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
NTPS LCG	Northern Territory Planning Scheme 2020 Land Clearing Guidelines
NTU	Nephelometric Turbidity Units
OEMP	Operational Environmental Management Plan
PASS	Potential Acid Sulfate Soils
pH_F	field pH
pH_{FOX}	field oxidised pH
PMS	Pump Management System
PSU	Practical Salinity Unit
PTS	Permanent Threshold Shift
QA/QC	Quality Assurance / Quality Control
QLD	Queensland
RAAF	Royal Australian Air Force
Referral Report	Environmental Referral Report dated 6 March 2025
REMP	Receiving Environmental Monitoring Program
RFI	Request For Information
RPD	Relative Percent Difference
SDS	Safety Data Sheet
SER	Supplementary Environmental Report
SL	Source Levels
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SPL	Special Purpose Lease
SSC	Suspended Sediment Concentration
STP	Sewage Treatment Plant
TDS	Total Dissolved Solids
TEA	Terrestrial Ecology Assessment
TEK	Traditional Ecological Knowledge
TPWC Act	*Territory Parks and Wildlife Conservation Act 1976* (NT)
TSF	Tailing Storage Facility
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
UCH Act	*Underwater Cultural Heritage Act 2018* (NT)

Acronym / abbreviation	Description
VENM	Virgin Excavated Natural Material
WA EPA	Western Australia Environmental Protection Authority
WAMSI	Western Australian Marine Science Institution
WM Act	*Weeds Management Act 2001* (NT)
WMPC Act	*Waste Management and Pollution and Control Act 1998* (NT)
ZoHI	Zone of High Influence
ZoI	Zone of Influence
ZoMI	Zone of Moderate Influence

Key terms

Table 4 Definitions of key terms

Term	Definition
The Proposal	All aspects of the GEMCO Excess Water Disposal project not currently approved within the GEMCO Mining Management Plan (MMP). The internal movement of water, including water extraction from mine pits, is an existing approved activity and not included within the Proposal.
Project area	Area directly and indirectly impacted by the Proposal as far as can be feasibly predicted. The Project area comprises the construction and operational footprint, plus the mixing zone as predicted by the modelling undertaken for the Proposal.
Construction footprint	Area directly impacted by the construction of the Proposal including both onshore and offshore areas.
Marine footprint	The marine footprint for the purpose of this assessment is defined as the area within the marine environment where the construction activities are proposed to occur and within which the pipeline will be placed, i.e. the area of the marine environment that will be directly impacted by the Project.
Marine environment	The marine environment is defined as all marine and coastal habitats up to the Highest Astronomical Tide (HAT) boundary.
Study area	Construction footprint plus 10 km buffer (marine survey) and 5 km buffer (terrestrial survey). Used during desktop investigations to assess the likelihood of occurrence of conservation listed species.
Survey area	This is the area that was subject to field assessment for the Proposal. The survey area comprises the Project area, plus habitat to the north and south of the Project area.

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1. Introduction

Groote Eylandt Mining Company (GEMCO) (the Proponent) proposes the development of the Excess Water Disposal project (the Proposal).

The Proposal was referred to the Northern Territory Environment Protection Authority (NT EPA) on 11 March 2025. A public consultation period occurred between 22 August 2025 and 19 September 2025. The NT EPA received one submission from the public and three submissions from government authorities. Submissions were received from:

– Anindilyakwa Land Council (ALC)
– Department of Lands, Planning and Environment (DLPE)
– Department of Climate Change, Energy, the Environment and Water (DCCEEW)
– Aboriginal Areas Protection Authority (AAPA).

A decision was made by the NT EPA on 28 October 2025, that a standard environmental impact assessment is required in accordance with section 55 of the *Environment Protection Act 2019* (NT) (EP Act) and regulation 57(2)(b)(i) of the *Environment Protection Regulations 2020* (NT) (EP Regulations). The method of environmental impact assessment was determined to be a supplementary environmental report (SER) in accordance with regulation 57(2)(b)(ii).

GEMCO subsequently received a *Notice of Direction* to include additional information in the SER from the NT EPA, dated 20 November 2025. This direction was given under regulations 119(2) and 121(2) of the EP Regulations and directed GEMCO to:

– Prepare an SER to address the submissions received in relation to the referral information
– Include additional information regarding effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment (Table 5).

Table 5 Extract from NT EPA's Notice of Direction dated 20 November 2025

Topic	Comment	Additional Information	Section
SEA: Marine environmental quality			
Dispersal and mixing of discharge waters	The SER is to address the submissions made on the referral including provision of updated hydrodynamic modelling. The hydrodynamic modelling in the referral did not account for the effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment. This may lead to an underestimation of the zone of influence.	Provide hydrodynamic modelling accounting for the effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment. Discuss any change to the zone of influence, including how it may change the potential for dispersal, biomagnification or bioaccumulation of metals and metalloids, or change the predicted cumulative impacts of the proposed action combined with effluent discharges.	Section 10

The NT EPA considered the Proposal has the potential to significantly impact two themes and three environmental factors (Table 6). The supplementary information provided within this SER document has been prepared in accordance with the NT EPA's *Environmental Impact Assessment Guidance for Proponents: Preparing a Supplementary Environmental Report (SER) Version 2.0 (March 2025).*

This SER is supplementary information to the referral and is to be read in conjunction with the referral documentation submitted in March 2025 and the two responses to the Requests for Information (RFIs). It should be noted that some information in this SER supersedes the information provided in the referral.

Table 6 Extract from NT EPA's Notice of Decision and Statement of Reasons dated 28 October 2025

Theme	Environmental Factors from NT EPA's Statement of Reasons	Section in SER
SEA	**Marine ecosystems** The marine habitat around Groote Eylandt is considered high value and supports extensive seagrass beds and several species of conservation significance, including turtles and dolphins. The habitat also supports commercial and recreation fishing activities, and traditional hunting practices. The Proponent has surveyed the areas within the proposed area of influence and has identified that the area is of a lower ecological value than the surrounding areas. However, the submission from the DLPE states that there is insufficient information to demonstrate that the results of the surveys reflect the extent and density of benthic habitat within the area of influence. Submissions on the referral consider that the surveys were not undertaken during the optimal time to assess peak seagrass extent and density, and were undertaken four months after ex Tropical Cyclone Megan when seagrasses are likely to have been diminished.	Section 7.1
	Marine environmental quality The proponent has provided plume dispersal modelling. However, submissions from DLPE and the ALC consider that the modelling did not account for the influence of: – vertical mixing of discharge waters during high wave conditions – increased turbidity from discharge waters and tidal and seasonal variations of turbidity – the expected increasing salinity of discharge waters affecting the buoyancy of the plume. Changes to the plume dispersion model may also affect the conclusions in the referral regarding the: – likelihood for the accumulation of metals and metalloids present in discharge waters and the potential for dispersal of increased concentrations, and biomagnification and bioaccumulation (where applicable) – cumulative impacts from this proposed action combined with existing, ongoing port operations, effluent discharges and other human activities. It is anticipated that the proposed action would impact on the marine environmental quality and marine ecosystems, however there is insufficient information to determine the significance of those impacts. It is also unclear whether the potential impacts from the proposed action can be mitigated through other statutory decision-making processes, including through an environmental (mining) licence required by the mining regulatory framework of the EP Act. The significance of impacts and the ability to meet the NT EPA's factor objectives for marine environmental quality and marine ecosystems is uncertain.	Section 7.2
PEOPLE	**Culture and heritage** There is potential for significant impacts to sacred sites if there are any present in the areas that may be impacted by the proposed action. The submission from the AAPA notes that there are no Authority Certificates within the proposed action area and the predicted marine Zone of Influence, including for this proposed action. This means there is uncertainty regarding the presence of any sacred sites, and if present, how they could be impacted by the proposed action. Additional culture and heritage values may be present in the area impacted by the proposed action as raised by the ALC. The significance of impacts and the ability to meet the NT EPA's factor objective for culture and heritage is uncertain.	Section 7.3

2. Proposal description

The Proposal has been described in Sections 1 and 2 of the Environmental Referral Report (Referral Report). Since the submission of the Referral Report, the Proposal was further developed with the design of the pipeline moving from conceptual to final, and further development of the construction methodology. This progression has resulted in minor modifications of the design and the construction methodology. A summary of design changes is presented in Table 7, with further details provided in Sections 2.1 to 2.7. An assessment of how these changes impact on the environment and how this compares to the previous assessment outcomes is provided in Sections 7 to 10 and associated appendices.

Table 7 Summary of changes to the Proposal

Change	Details
Minor realignment of terrestrial pipeline	Minor realignment of the pipeline and the associated corridor was required to: – Avoid two memorial sites along Rowell Highway – Avoid mineral lease MLN2 (powerline easement) – Realignment of pipeline at Special Purpose Lease (SPL) 383. Further details provided in Section 2.1.
Adjusted disturbances	The further development of the construction methodology and consultation with GEMCO operational personnel on the maintenance and access requirements for the pipeline requires a widening of disturbance corridors along sections of the pipeline alignment. Refer to Section 2.2 for further information.
Changes in nearshore outfall structures	The land-based pressure break tank and the outfall sump described in Section 3.1 of the Referral Report and the associated disturbance have been replaced with optimised engineered structures. Refer to Section 2.3 for further information.
Temporary works within marine footprint	The updated outfall construction methodology identified the need for additional works consisting of a temporary work platform. Refer to Section 2.4 for further information.
Further refinement of construction methodology of pipeline within marine footprint	The marine disturbance beyond the sheet piled coffer dam requires shallow trenching to ensure grade and secure the pipeline. The updated design now also includes articulated concrete mattresses for scour protection and confirms the use of clean fill, where required. Refer to Section 2.5 for further information.
Potential impact piling within marine footprint	Additional geotechnical information indicates that impact piling may be required to achieve required pile driving depths at some locations. Refer to Section 2.6 for further information.
Proposed construction commencement date	The proposed construction commencement date (March 2026) no longer applies due to changes to timelines associated with environmental approvals. Refer to Section 2.7 for further information.

2.1 Minor realignment of terrestrial pipeline

Minor realignment of the pipeline and the associated corridor is required to:

– Avoid two memorial sites along Rowell Highway
– Avoid mineral lease MLN2 (powerline easement)
– Realignment of pipeline at SPL383.

The pipeline intersects the same vegetation communities as those presented in the Referral Report. Figure 1 provides an overview of the areas of the pipeline subject to realignment. Further development of the pipeline design identified opportunities to optimise surface water management by merging some drainage features with other “obstacles” requiring one less pipeline crossing.

2.1.1 Avoidance of two memorial sites along Rowell Highway

During 2025, the ALC advised that there are two memorial sites adjacent to the Rowell Highway and requested that these sites be avoided. A buffer applies for these sites. Following the ALC's advice, GEMCO redesigned the pipeline alignment, and the pipeline has now been located outside the provided buffer. The additional length of the deviation will result in some additional disturbance within the off-lease area (NT Portion - Parcel number 1632). Note: These sites are not considered sacred sites under the *Northern Territory Aboriginal Sacred Sites Act 1989* (NT).

2.1.2 Avoidance of mineral lease MLN2

Mineral lease MLN2 is being avoided as it is a powerline easement. The crossing of the pipeline across the Rowell Highway was moved further south due to the need to avoid MLN2. No significant change in disturbance is required due to the crossing relocation, however some additional disturbance for a construction corridor adjacent to MLN2 within the off-lease area (NT Portion - Parcel number 1632) will be required.

2.1.3 Realignment at SPL383

The pipeline near the port needs to be realigned due to the original pipeline alignment being too close to mining activities at SPL383, and further design of the marine section of the pipeline identified a need for optimising the alignment between the onshore and offshore sections.

Paper Size ISO A3

0 200 400 600 800 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

N

SOUTH32

GHD

South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Project No. 12624084
Revision No. A
Date 23/01/2026

Realignment of pipeline

FIGURE 1

Data source: GA -stream, road (2025); South32 - realigned pipeline (2026), original pipeline (2025), imagery (2024); World Imagery: Vantor; Imagery_Offline: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
Created by: mvandermerwe

2.2 Adjusted disturbances

Progression of design from conceptual to final has included further consultation with operational and maintenance teams and further development of the construction methodology. This update has resulted in adjustments to the terrestrial and marine disturbance areas. The key changes are:

- **Construction footprint – terrestrial:** Further refinement of the construction methodology and the operational requirements of the pipeline identified that additional areas will be required adjacent to the pipeline to enable safe installation of the pipeline, to allow access for maintenance of the infrastructure and to maintain an adequate fire break. Therefore, an additional widening of the existing disturbance corridor along the Rowell Highway is proposed. The additional terrestrial disturbance area is 6.18 ha, increasing the total terrestrial disturbance to 29.48 ha.
- **Marine footprint:** A widening of the near shore marine footprint (30 to 35 m width, tapering towards 30 m at the diffusers) to allow for temporary works (platform and coffer dam) to be constructed. The additional marine disturbance area is 0.15 ha, increasing the total marine disturbance to 2 ha.

The location and extent of the terrestrial and marine disturbance areas are shown in Figure 2 and Figure 3. The Project Area remains within the same land parcels and vegetation communities which were assessed in the Referral Report.

Paper Size ISO A3

0 200 400 600 800 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

N

SOUTH32

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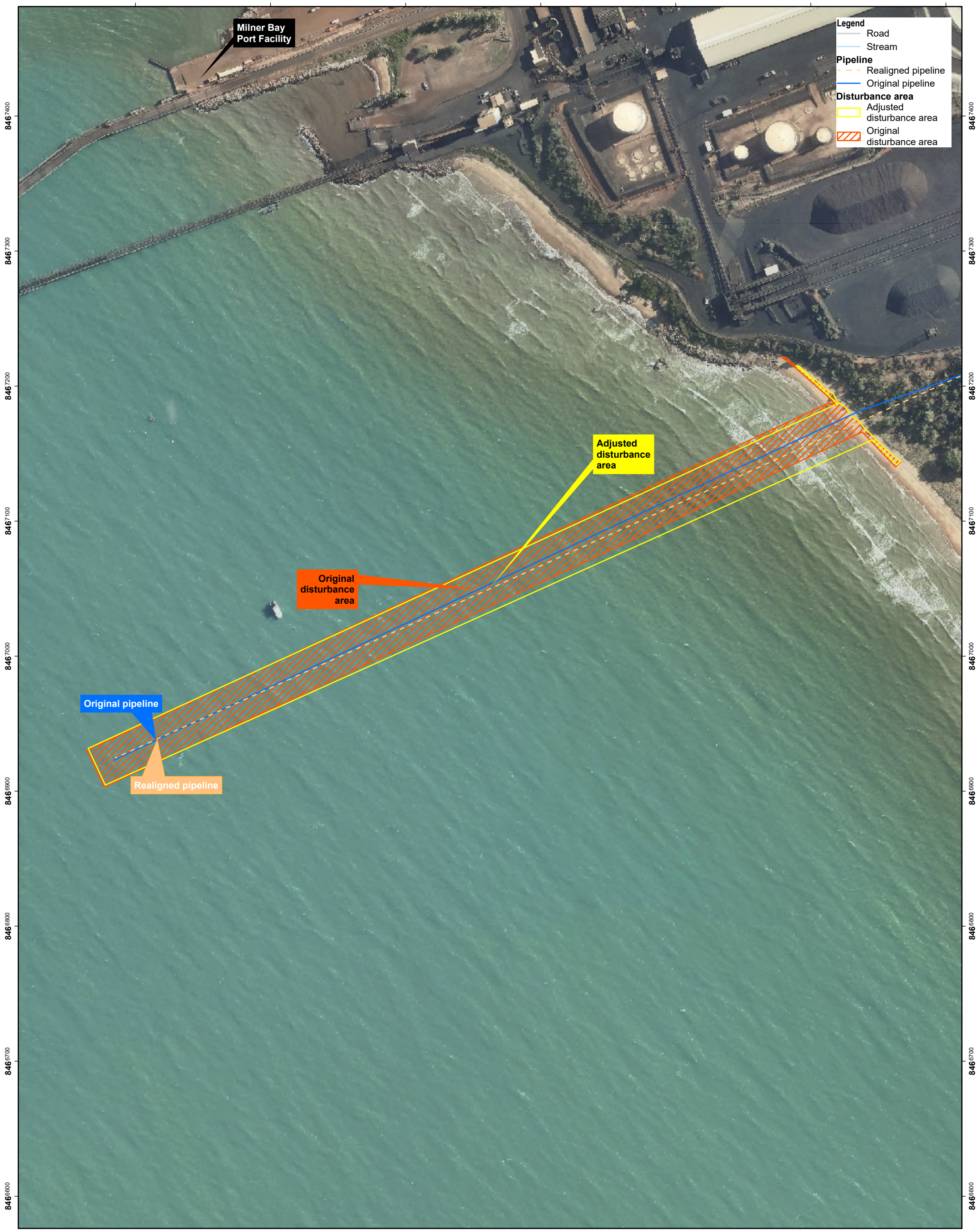
South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Project No. **12624084**
Revision No. **A**
Date **23/01/2026**

Construction footprint - terrestrial

FIGURE 2

Data source: GA - road, stream (2024); South32 - adjusted disturbance area (2026), original disturbance area (2025), imagery (2024); World Imagery: Vantor; Imagery_Offline: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
Created by: mvandermerwe



Paper Size ISO A3

0 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

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GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Project No. **12624084**
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Construction footprint - marine

FIGURE 3

Data source: GA: road, stream (2024); South32 - realigned pipeline, adjusted disturbance area (2026), original pipeline, original disturbance area (2025), imagery (2024); World Imagery: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community; Imagery_Offline: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

2.3 Changes in nearshore outfall structures

The design proposed in the Referral Report included a pressure break tank and an outfall sump near the offshore section of the Proposal. Progression of design has identified an alternative to the arrangement near the marine section of the pipeline. The updated design for the marine outfall now includes a surge control structure at the top of the foredune (formerly break tank location). This structure has twin 6 m open ended vertical pipes connected to each of the land pipelines to control surges and prevent vacuums in the outfall pipe. This structure replaces the break tank shown in the concept study which informed the Referral Report. The outfall sump will be replaced by a buried de-aeration system which is incorporated into the outfall pipeline down the beach. This change will lead to a reduction in visual impacts in the nearshore area.

2.4 Temporary works within marine footprint

Progression of the construction methodology of the Proposal identified that an additional temporary work platform within the marine footprint is required to install the sheet piles and to facilitate the installation of the pipeline in the nearshore area.

The original proposal in the referral was to conduct the intertidal section of the installation works from the shore and the remaining marine section from a jack-up barge. However, the shallow nearshore profile of the seabed does not allow for the barge to access the nearshore section of the pipeline. Therefore, during the development of the design, it was identified that the temporary installation of a work platform is a suitable solution. The temporary work platform area will provide an access point from which an excavator is able to undertake sheet piling and trenching activities in the nearshore area.

The platform is proposed to be constructed from sand from project excavations within the marine footprint. Additional clean material will be sourced from a sandstone quarry within the Western Leases.

At the completion of the trenching works, the material forming the temporary work platform will be removed, and the beach profile will be reinstated. Material from the temporary work platform may be used to backfill the trench to bury the installed pipeline. Any excess material will be placed at the port's existing onshore dredge spoil area.

The temporary work platform will require a small increase in the marine footprint to the south of the original marine footprint of the Proposal (0.15 ha) (refer to Figure 3).

2.5 Further refinement of construction methodology of pipeline within marine footprint

Since the submission of the Referral Report in March 2025, the offshore pipeline design and construction methodology were developed further. The following changes are proposed:

- **Shallow trenching beyond the sheet-piled coffer dam.** The Referral Report noted that trenching outside the coffer dam may be required; this requirement has now been confirmed. The pipeline will be placed in a trench that is half the height of the pipeline (refer to Figure 4). This element will maintain the design grade requirements of the pipeline, and with the addition of anchor blocks, will help secure the location of the pipe. Trenched material is proposed to be side cast prior to the laying of the pipe. Following pipe installation, the majority of the side cast material will be reinstated as backfill. Any additional material will be left in situ. All bed excavation works outside the coffer dam will be conducted within silt curtains and the effectiveness of this control will be monitored.
- **Addition of scour protection overlying the buried pipeline.** Where the pipeline is proposed to be buried in the nearshore area, scour protection in the form of articulated concrete mattresses will be placed over the buried pipeline to prevent erosion and movement of the pipeline in extreme storm events.
- **Quarried sands (clean fill) used to supplement bedding material.** The bedding material for the trench in the intertidal and surf zone (approximately 200 – 300 m) will be sourced as clean fill from a sandstone quarry in the Western Leases, should material excavated within the trench prove unsuitable for bedding material around the pipe.

As per the mitigation measures outlined in the Referral Report, all bed excavation works will be undertaken either within the coffer dam or within silt curtains.

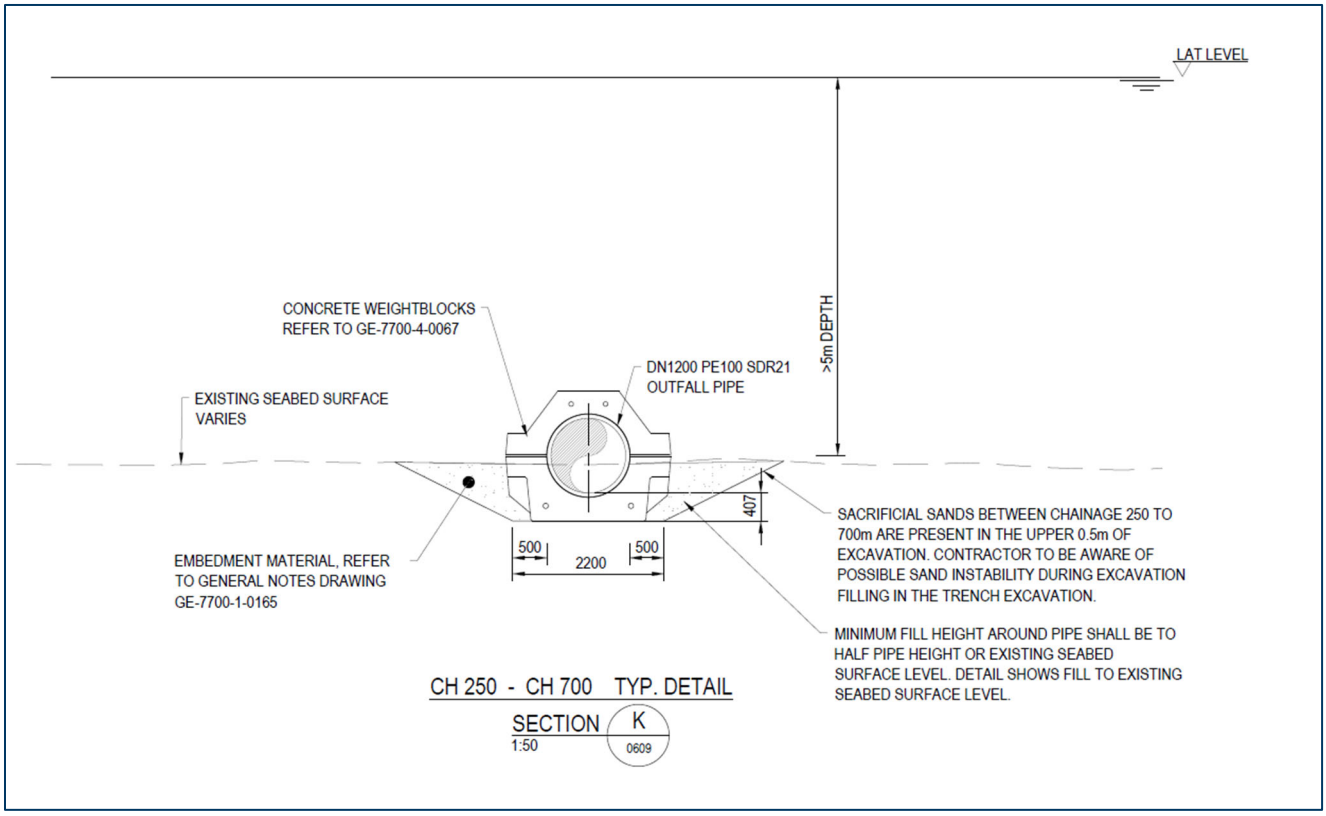


Figure 4 Typical cross section of pipe configuration in waters deeper than 5 m LAT

2.6 Potential impact piling within marine footprint

The noise and vibration impact assessment in the Referral Report assumed that any piles within the marine footprint would be installed via vibratory piling. It was noted in the report that, should impact piling become necessary, an underwater noise impact assessment would be undertaken to identify appropriate mitigation measures.

The results of a geotechnical investigation conducted following submission of the Referral Report and subsequent further development of the pipeline construction methodology identified that impact piling may be required given the presence of a hard laterite layer in the upper geotechnical profile.

This change in methodology required an update to the noise and vibration impact assessment which is presented in Section 7.1 and Appendix C.

The Proposal requires steel piles along the outfall alignment with a diameter of 0.25 and 0.61 m. It is proposed that piling would commence using a preferred vibratory hammer method and only be followed by a hydraulic impact hammer should adverse ground conditions be encountered.

2.7 Proposed construction commencement date

Due to a change in the approvals timeline, construction of the Proposal is no longer able to commence in March 2026 as proposed in the Referral Report. The start date for commencement of site works is contingent on the receipt of all relevant approvals. This date is currently anticipated to be August 2026, but may change, if approvals are delayed further.

3. Alternatives

Alternatives to the Proposal were addressed in the Referral Report. The consideration of alternatives in this SER is limited only to matters raised in submissions or in a direction to provide additional information in the SER from the NT EPA. Two matters relating to alternatives were raised in the submission by the ALC:

– Potential alternatives for excess water management considered at GEMCO
– Installation of pipeline using horizontal directional drilling (HDD).

3.1 Alternatives to ocean outfall

The ALC commented in their submission that without an understanding of the viability and ecological impacts of potential alternatives to putting water from the mining operations into the surrounding environment, the ocean outfall proposal cannot be completely evaluated.

GEMCO has considered alternatives to the Proposal and described these alternatives in section 2.3 of the Referral Report. GEMCO has liaised with the ALC on their comments following their submission to provide further context (refer to Sections 4 and 5). In addition, GEMCO will update its operational water management plan to incorporate the management of discharge of excess water to the marine environment. This update will be done in consultation with the ALC.

3.2 Horizontal directional drilling

The ALC queried in their submission why HDD was not considered as an alternative to open excavation within the marine footprint.

On 27 November 2025, GEMCO engaged further with the ALC on this query and explained that that the use of avoidance techniques on the scale of HDD is not considered feasible for the scale of the project and would not typically be required for low value habitat features such as open soft sediment substrate. GEMCO considers that the potential environmental impacts from HDD are not proportionate to the benefits from its use and that the proposed mitigation measures are proportionate to the proposed works.

Specifically, the length along which the pipeline is buried is relatively short and would require a major setup on land and drilling of a short distance through the intertidal and surf zone (200-300 m). The challenges to mobilise equipment to Groote Eylandt and to adapt it to conduct works of that scale are considered significant.

4. Stakeholder engagement

Stakeholder engagement undertaken prior to submission of the Referral Report to the NT EPA is presented in Section 4 of the Referral Report. Table 8 provides a summary of the engagement conducted since the submission of the Referral Report, and Table 9 provides a summary of the consultation conducted in response to stakeholder submissions on the Referral Report and the NT EPA's direction to include additional information.

Table 8 Stakeholder engagement conducted since submission of the Referral Report

Stakeholder	Date	Summary of engagement
ALC	22 April 2025	The final Referral Report submission documentation was shared with the ALC's Interim Chief Executive Officer (CEO).
	5 June 2025	GEMCO held a meeting with the ALC's Interim CEO and the ALC's Environmental Impact and Community Engagement Advisor to discuss further engagement with Traditional Owners on the Proposal. The meeting attendees discussed the format, timing and content of possible engagement with the Traditional Owners. The ALC was supportive of facilitating further engagement with Traditional Owners.
	24 June 2025	GEMCO held a technical presentation session with the ALC's Interim Chief Executive Officer, Environmental Impact and Community Engagement Advisor, Manager - Anindilyakwa Land and Sea Rangers and the ALC's environmental consultants on the impact assessment process and outcomes for the Excess Water Disposal Project. Following the meeting, GEMCO received a request for further information from the ALC on 7 August 2025. The requested information was provided to the ALC on the same day.
	15 July 2025	ALC advised they held a community meeting with Traditional Owners on 15 July 2025. The meeting was to inform Traditional Owners prior to the NT EPA submission period for the Referral Report. The ALC advised that 16 Traditional Owners were in attendance at that meeting and that feedback was positive.
	22 September 2025	The ALC provided a copy of their submission on the Referral Report to the NT EPA to GEMCO. In response, GEMCO requested the opportunity to address the items raised with the ALC and to work collaboratively to achieve a sustainable water management strategy at GEMCO.
	27 November 2025	Meeting with ALC and their environmental consultants to review and resolve matters highlighted in their submission made on the referral. Refer to Table 10 for further details. This meeting was followed up with GEMCO sharing with the ALC the agreed resolutions and responses to the ALC's comments that were proposed for inclusion in this SER.
Northern Land Council (NLC)	25 August 2025	The ALC suggested that GEMCO liaise with the NLC on the Proposal. A letter was sent to NLC to inform them that approval for the Proposal is being sought through a referral to NT EPA, and the Proposal information and impact assessment is on public display until 15 September 2025. No response to this letter from the NLC was received.

Table 9 Stakeholder engagement conducted in response to submissions received on the Referral Report and NT EPA direction to include additional information

Stakeholder	Date	Summary of engagement
DCCEEW	15 September 2025	GEMCO held a meeting with DCCEEW to discuss the Proposal and associated potential impacts. A letter was issued to DCCEEW following the session to clearly articulate the self-assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) as presented within the Referral Report. GEMCO also confirmed that it would not be referring the Proposal to DCCEEW based on the outcomes of the self-assessment presented in the Referral Report. Outcomes of the consultation were adopted in the responses to submissions provided in Section 5, Table 10 and Appendix B.
ALC	27 November 2025	Targeted consultation was undertaken with the ALC and their environmental consultant to discuss the ALC comments received on the Referral Report submission.

Stakeholder	Date	Summary of engagement
		Outcomes of the consultation were adopted in the responses to submissions provided in Section 5, Table 10.
DLPE NT EPA	4 December 2025	GEMCO held a meeting with representatives of the NT EPA and DLPE following receipt of the DLPE's submissions and NT EPA's *Notice of Direction* to provide additional information. The topics of discussion included: – Proposed response to the additional information requested in the *Notice of Direction* – The concurrent assessment process of an environmental (mining) licence application and referral – Proposed response to key comments. Outcomes of the consultation were adopted in responses in Section 5, Table 10 and Section 10.

GEMCO is committed to continuous and ongoing engagement on the Proposal with the Traditional Owners and the ALC. This engagement aims to ensure that Traditional Owners are informed and are given the opportunity to be involved in the Proposal. GEMCO has an External Affairs team with dedicated resources that provide ongoing facilitation of this process.

More specifically, GEMCO is planning to:

– Negotiate with the ALC an access agreement for off-lease portions of the Proposal
– Liaise with Traditional Owners during the application process for an Authority Certificate
– Continue to engage on Traditional Fisheries in response to commitments made in a meeting with ALC on 27 November 2025
– Present data collected under GEMCO's ongoing monitoring programs.

In addition, specific engagements and updates on the Proposal will also continue to be provided to the ALC during the quarterly Mining Liaison Committee meetings.

5. Responses to submissions

The NT EPA published a statutory notice on 22 August 2025 to invite public comment on the Referral Report; the submission period closed on the 19 September 2025. The Referral Report received four submissions consisting of one public submission and three submissions by government authorities: ALC, AAPA, DCCEEW, and DLPE (which consisted of 10 divisions / branches within the Department). Table 10 provides a summary of the submissions and responses.

Table 10 Summary of submissions and responses

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
ALC	SEA: Marine environmental quality	**Turbidity** Sensitive benthic receptors, such as seagrasses and corals, either directly adjacent to or within the Project Area, and along the western coastline, can be highly susceptible to stress, damage and mortality from turbidity and sedimentation events. Monitoring data (2008-2023) from the discharge source water indicates that the 80th percentile value exceeds the turbidity trigger value, with the maximum values over 160 times the trigger. There is no understanding of the extent of habitat that may be affected during periods of discharge with elevated levels of turbidity, associated sedimentation and potential contamination. Without turbidity modelling, the potential impacts to these receptors and the extent to which they may occur cannot be adequately assessed.	Figure 27 of the Marine Discharge Modelling Report (Appendix B of the Referral Report) illustrated the extent of the plume to achieve the target dilution (20 NTU) on the modelled turbidity level of 119.93 NTU of the outlet concentration, based on a 6-fold dilution target, is in the immediate vicinity of the diffuser. Although turbidity modelling was not directly undertaken for the Referral Report, the forecasts of dilution support minimal turbidity impacts during operational outlet discharges on the marine environment. Potential impacts associated with turbidity were assessed in the Referral Report via review of the dilution modelling undertaken for the Proposal. In consultation with the ALC on 27 November 2025, this was a key discussion item. Key outcomes of this consultation included: – Turbidity modelling (specifically, modelling of total suspended solids (TSS)) would be undertaken for the SER – Commitment to implementation of management and control measures required for discharge water – Commitment to an operational monitoring program to monitor discharge water quality and receiving environment (operational management committed in the Referral Report, Receiving Environment Monitoring Program (REMP) provided in Appendix E. In response to the discussion with the ALC, GEMCO conducted further modelling and the updated discharge modelling report is attached in Appendix A. The report includes maps showing the predicted extent of suspended sediments and sediment deposition. Following completion of this modelling, the marine impact assessment was reviewed and updated. Details of the impact assessment are included in Section 7.1 and Section 7.2. The outcomes of this additional suspended sediment modelling did not change the scale of the impacts that have already been assessed for the Proposal. This has provided further confidence that the underlying assumptions in the Referral Report are valid. Further details are provided in Section 7.2 and Appendix A. To address concerns around turbidity impacts on the receiving environment, a marine turbidity monitoring program has been designed to be implemented prior to marine construction. The proposed monitoring program is detailed in Appendix E and will involve the collection of time-series data to extrapolate upon the existing turbidity dataset. Turbidity data is part of the long-term data collection program with GEMCO having data spanning 2010-2025. However given the nature of turbidity, there are limitations associated with this existing data

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			set due to bias resulting from sampling method (e.g. bias towards lower results due to turbidity analysis conducted during good weather when it is safest for boat operation). It is expected that time-series data collection will remove this bias as data will be able to be collected through all tidal and storm influenced fluctuations in turbidity levels, resulting in a dataset that captures a more representative range of background turbidity levels. In addition, a marine survey was conducted in November 2025 to provide further survey coverage over the peak seagrass abundance period in accordance with the NT Guidelines for assessment of impacts on marine biodiversity (NT EPA 2025) and in consultation with NT EPA to supplement the baseline information for the receiving environment conditions and further inform the assessment of potential turbidity impacts. This is documented in Section 7.1. Operational monitoring and controls for the discharge water were committed to within the Referral Report. These have been further defined in Section 7.1 and 7.2 to provide additional detail and confidence in the measures proposed to be implemented.
	SEA: Marine ecosystems	**Benthic habitat** **Issue 1:** Discrepancies in the text benthic habitat descriptions and both habitat map figures. **Issue** 2: Limited data on benthic communities during wet season. **Issue 3:** No separate control site(s) outside of the Project Area.	**Issue 1** The discrepancies identified by the ALC have been addressed in Section 7.1. **Issue 2** GEMCO conducted an additional survey of benthic communities in November 2025. The impact assessment has been updated with the additional benthic habitat information and provided in Section 7.1. This update also resolves discrepancies noted by the ALC. Additional survey data from October 2024, as part of GEMCO field programs, was added. Therefore, data from a total of four surveys has been incorporated in the SER: – Survey 1: September 2023 – Survey 2: June 2024 – Survey 3: October 2024 – Survey 4: November 2025. The objective of these field programs was to understand the environmental values that have the potential to be impacted by the proposed activity to meet the requirements of a referral to the NT EPA. **Issue 3** Regarding the concern around establishment of control sites, a referral to the NT EPA requires an understanding of the potential impacts to environmental factors. The field programs that were implemented for the

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			Proposal were designed to understand the environmental values of the marine ecosystems that had the potential to be impacted. Control sites are not typically applicable to impact assessment. Control sites are used to contextualise results of a monitoring program. The monitoring programs proposed for the project include appropriate control sites (far-field reference location), as detailed in Appendix E. Regional understanding has been incorporated based on the Mapping Markada project and other scientific studies of the region. Work undertaken for GEMCO field programs in October 2024 also looked at sites within Bartalumba Bay which provide further regional context. This information was not available at the time of preparing the Referral Report but has been incorporated into the SER (refer to Section 7.1).
	SEA: Marine environmental quality	**Discharge water chemistry** Metals and metalloids with 95th percentile or maximum values over the recommended benchmark values include aluminium, cobalt, copper, iron, nickel, silver and zinc. Potential impacts to the marine environment from elevated metals and metalloids concentrations in discharge water have not been assessed.	Within the referral, 17 metals/metalloids analytes were evaluated in the marine discharge modelling (Appendix B of the Referral Report). Of these 17, only three metals had 95th percentile discharge concentrations greater than the adopted marine trigger values. These metals were aluminium (Al), iron (Fe) and zinc (Zn). Out of the three metals, aluminium had the highest required dilution (14-fold), which is lower than that of nitrate (42-fold), which was the basis for defining the extent of the mixing zone for potential indirect effects, and salinity (35-fold) which was the basis for potential direct effects. High levels of conservatism are embedded in the model to provide confidence that the predictions capture all potential impacts. The predicted 99th percentile extent of dilution lower than 14-fold (the target for aluminium), is highly localised around the diffuser (within a 22 m radius of the diffuser). In other words, for 99% of the time, the simulation predicted that aluminium exceeding the adopted threshold was confined to within 22 m distance from the diffuser. Potential impacts related to aluminium toxicity are therefore not expected to extend to sensitive receptors beyond the immediate vicinity of the diffuser. It follows that the spatial extent of exceedances of iron and zinc are therefore even more localised, given these metals have lower dilution targets. Based on the above the likelihood of impacts from metals and metalloids on sensitive receptors is considered to be low. However, further discussion on bioaccumulation, including modelling of sedimentation from discharge water has been presented within the SER (refer to Section 7.2) to provide further justification behind this assessment. Updates to mixing zones have also been provided in updated modelling undertaken in response to queries relating to vertical mixing. It is noted that Default Guideline Values (DGVs) for aluminium and iron were added to the ANZG (2018) guidance in December 2025. These

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			have been applied for work undertaken in the SER, as detailed in Appendix A, and have resulted in updates to required dilutions for these metals.
	SEA: Marine ecosystems	**Traditional Fisheries** **Key issues** There is little consideration for Traditional Fisheries as a whole, and whilst there has been consultation with Traditional Owners in 2023, this was limited. The Marine Ecology Assessment (MEA) does not adequately consider impacts the project may have on Traditional Fisheries and does not sufficiently incorporate important Traditional Owner knowledge of the Project Area. Without a proper and complete consultation process Traditional Owner activities in the Project Area are not fully understood, which could lead to associated risk to human health. Additionally, Traditional Owner knowledge, passed on through proper consultation will supplement benthic habitat survey data and use of the marine and shoreline areas by mobile marine fauna. **Recommended Solution** Undertake appropriate and thorough Traditional Owner consultation that incorporates their knowledge to supplement data gaps from project surveys and previous scientific research from around the island. This process will also inform Traditional Owners of the impacts that the Project will have on the Project Area.	GEMCO discussed this issue regarding Traditional Fisheries with the ALC on 27 November 2025. GEMCO advised that during consultation with the Traditional Owners in October 2023, GEMCO consulted with senior Bara and Jaragba men on Country regarding fishing and traditional foraging activities in the Project area. At that time, the Traditional Owners stated that they do not use the port area or launch boats from the jetty. The areas north and south of the port are being used for boating and fishing. No concerns regarding the Proposal impacting on traditional fishing were raised at that meeting or during any subsequent engagement with the ALC (refer to Referral Report and Section 4 in this document). GEMCO will continue to engage on Traditional Fisheries in response to the commitments made to the ALC in the meeting of 27 November 2025.
	SEA: Marine environmental quality	**Sediment Excavation Section** **Key Issues** Sediment surveys and the risk assessment completed for Potential Acid Sulfate Soils (PASS) are inadequate. No sediments were collected from within the Project Area, whilst sediment samples that were collected were only from the surface of the substratum and may not be representative of all sediments which are proposed to be excavated. Hence there was a failure to account for potential contaminants and PASS both within the proposed excavation area and to depths that would be excavated for emplacement. The conclusion that risk of contamination from mobilisation of acid sulfate soils (ASS) is low is not justified by any evidence.	GEMCO conducted a geotechnical investigation of the marine footprint of the Proposal in March 2025 (following submission of the referral). This investigation also screened sediment samples from various depths for actual acid sulfate soils (AASS) and PASS. The results from this investigation were not available at the time of referral and therefore not captured in the Referral Report. Results for acid forming potential from an unrelated GEMCO project conducted in the port area in November 2022 are also provided for consideration of acid forming potential in the marine footprint. Details of the results from both testing events are presented in Section 7.2. Both assessments determined that there is low acid forming potential in the marine sediments.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		There are indications a few km from the Project Area that acid sulfate soils are potentially contributing to the extremely low pH, (approximately 2.7) of a seasonally enclosed waterway. **Recommended Solution(s)** A targeted sediment survey must occur within the Project Area extending to the depth of excavation. This would allow the risk to both the marine environment and landward deposition of sediment to be properly assessed, and appropriate controls to be implemented if necessary, identifying potential risks to the nearshore environment.	
	SEA: Marine ecosystems	**Protected matters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)** Since the preparation of the MEA, both the Australian snubfin dolphin (*Orcaella heinsohni*) and Australian humpback dolphin (*Sousa sahulensis*) were gazetted as Vulnerable under the EPBC Act.	The potential for impact on the uplisted species has been assessed against the Significant Impact Guidelines for Vulnerable species and no overall changes to the conclusions or the proposed management and mitigation measures are required. The uplisting and the updated impact assessment have been discussed with DCCEEW as part of a presentation on the project on 15 September 2025 (refer to Section 4). This SER includes the updated significant impact assessments for these species (refer to Appendix B).
	SEA: Marine environmental quality	**Marine discharge modelling** The modelling has been based on freshwater being discharged into the environment. There is limited understanding presented in the MEA about recent trends in salinity increases of the discharge water quality. If salinity continues to increase over the project life, model assumptions of a buoyant plume with no interaction with the seabed may become less accurate and increased risks of potential impacts to seabed biota may occur. Impacts from salinity in discharge water not being considered in hydrodynamic model.	The marine discharge modelling (Appendix B of the Referral Report) of salinity assumed a worst-case from an osmotic stress perspective (i.e. freshwater with zero salinity [0 PSU] discharged into a saline marine environment of approximately 35 PSU represents the greatest deviation from ambient salinity). For this scenario, a 34.6-fold dilution would be required to achieve a salinity that was within the typical ambient salinity range (i.e. equal to the 20th percentile of background salinity). If salinity in the mine discharge water increases, the difference between discharge salinity and ambient marine salinity will decrease, meaning lower dilution will be required to achieve the salinity target. The plume buoyancy will also marginally reduce, which may result in a slight increase in the vertical depth of the plume which will further increase the dilution achieved due to greater vertical mixing. The combination of these two factors (lower salinity dilution target, increased dilution) will reduce the spatial extent of the salinity mixing zone. Therefore, the modelling presented within the referral is considered to be conservative. The increase in mine discharge water salinity is not anticipated to exceed 3 PSU. This value is still very low relative to ambient marine salinity (median of 35.6 PSU). An increase in discharge salinity to 3 PSU

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			will reduce the dilution target from 35 dilutions (target for 0 PSU) to 32 dilutions (target for 3 PSU), while the plume behaviour is expected to be very similar due to the high buoyancy. As a point of reference, the density of water at 0 PSU is 997 kg/m^3, while at 3 PSU it increases marginally to 999 kg/m^3, both of which are meaningfully lower than ambient seawater at approximately 1,024 kg/m^3. Therefore, a discharged plume at 3 PSU is expected to behave in a very similar manner to a discharged plume at 0 PSU (i.e. similar vertical mixing), while the dilution target will lower. Consequently, it is considered that the scenario of forecast increase in discharge water salinity will result in a reduction in the mixing zone size compared to the conservative simulated case of 0 PSU discharge. The proposed benthic communities monitoring program (refer to Appendix E) will consider any potential impact on benthic habitat from a less buoyant plume. Salinity from NH2 quarry will be regularly monitored. Impact assessment in Section 7.1 has therefore not been updated in response to this comment. However, modelling and subsequent impact assessment has been updated in response to a DLPE comment regarding the impact of waves on vertical mixing of the plume.
	SEA: Marine ecosystems	**Construction impacts** **Issue 1:** The MEA is not clear on the activities within the disturbed area. **Issue 2**: The MEA is not specific with respect to construction details in marine environment including timing and the duration. **Issue 3**: It appears that this option was selected due to costs considerations, without consideration of an alternative method, such as HDD, which would provide the best option to avoid and minimise impacts to the seabed and marine habitat.	**Issue 1:** All construction activities are within the proposed disturbance area. **Issue 2:** Construction activities within the marine environment are anticipated to run for approximately 8 months (refer to Section 3.2.3 of Referral Report). The commencement date of the works is dependent on when approvals can be obtained. This date is currently anticipated to be August 2026, but may change, if approvals are delayed further **Issue 3**: As discussed in Section 3.2, the use of avoidance techniques on the scale of HDD is not considered feasible for the scale of the Proposal and would not typically be required for low value habitat features such as open soft sediment substrate. Rather, mitigation measures nominated for the Proposal are proportionate to the proposed works.
	SEA: Marine ecosystems	**Construction impacts – infauna** The MEA states that impacts to infauna communities were considered to be localised, short-term and low risk. This appears to be based on an assumption that the disturbed infauna community will be common species that are abundant throughout the wider locality, however, there has been no infauna sampling within the	The absence of direct infauna information does not mean that the potential for impact on the habitat that supports the infauna community is not able to be assessed and understood. The MEA report (Appendix D of the Referral Report) states that the benthic infauna habitat within the marine footprint is not considered to be unique or of high ecological value, and that representative habitat is abundant throughout the broader study area. This is based on field observations from other GEMCO field programs.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		Study Area, including within the Project Area. Without this study this assumption cannot be made.	The statements regarding impacts expecting to be localised and short term are valid and would not change if there was information available relating to infauna species. In response to the ALC's comments however, GEMCO conducted infauna sampling in November 2025. The results are proposed to be shared with the ALC during GEMCO's ongoing consultation.
	LAND: Terrestrial ecosystems	**Terrestrial ecology assessment** **Issue 1:** Consideration of freshwater habitats and biota is extremely limited in the Terrestrial Ecology Assessment (TEA). **Issue 2:** The TEA identifies that a 'suitably qualified GEMCO staff member' will undertake pre-clearance surveys and there is no definition of the qualifications or experience of this staff member. This activity is important and needs the qualification needs to be stated. **Issue 3:** A formal Fauna Management Plan or Unexpected Threatened Species Finds Procedure should be prepared as part of the TEA.	**Issue 1** Freshwater habitat and biota were assessed on the basis of two ecological surveys conducted through the Project area in April 2024 and August 2024. The April survey was focussed on vegetation communities while the August survey included systematic searches and the establishment of baited fauna cameras along waterways for Mertens' water monitor in addition to conducting habitat assessments. The survey did not record the Mertens' water monitor along the proposed alignment and the habitat within the construction footprint is considered low quality for this species as the waterways appear to be largely dry during the dry season, providing scattered pools with limited foraging resources for the lizards. Mertens' water monitors are highly mobile and would have the capacity to move away from any works areas while the pipeline is being constructed. The majority of drainage lines in the construction footprint are ephemeral and were dry or held small pools of standing water during field surveys. It is acknowledged within the Referral Report (Section 6.1.3.4) that while construction will be preferentially conducted when the watercourses are not flowing, if water is present additional controls would be required to be implemented for management of aquatic ecology values, including: – Minimisation of dimensions of temporary barriers to minimum practicable for site and purpose – Method of dewatering must not cause fish to become trapped or stranded – If fish salvage is required consultation with an aquatic ecologist on appropriate control measures for the particular situation. Construction within the freshwater habitats will be conducted quickly with underground pipeline installation proposed to be completed, watercourses reshaped to match original grades and flow controls removed (if required) within less than a week per watercourse. Works within watercourses will be further subject to secondary approvals for "Permit to Interfere with a Waterway" from the NT Government.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			Issue 2 A suitably qualified GEMCO staff member is a member of the GEMCO environmental team, who holds as a minimum a degree in an environment related discipline (e.g. environmental science). In addition to holding the suitable qualifications, the staff member will be experienced in the identification of vegetation and ecosystems on Groote Eylandt. These team members already conduct pre-clearance surveys at GEMCO. **Issue 3** A Construction Environmental Management Plan (CEMP) will be developed and implemented and include the management and mitigation measures relating to impacts flora and fauna including unexpected threatened species finds procedure.
	SEA: Marine ecosystems	**Underwater noise** The MEA needs to compare the expected construction noise levels against the presented noise exposure criteria tables within the MEA, as this is critical information for the interpretation of findings. Potential impacts to the swim bladder fauna group have not been addressed.	The issues raised have been addressed in the Noise and Vibration Impact Assessment Report (Appendix H of the Referral Report) and cross referenced only in the MEA (Appendix D of the Referral Report). The noise and vibration assessment was updated during the SER to assess the impacts from impact piling. The additional assessment has been presented in Appendix C.
	SEA: Marine ecosystems	**Northern prawn fishery** Reports states that Project Area is within the Northern Prawn Fishery closure area, which is incorrect. An assessment of potential impacts on this fishery has not been conducted.	The Project area definition includes both the Project construction footprint (direct impact area) and the predicted mixing zone. A small portion of the Project area is positioned outside of the Northern Prawn Fishery closure area. This area is the northern most portion of the mixing zone representing the worst-case scenario for 42-fold dilution of nitrogen. Potential impact pathways for nitrogen to the Prawn Fishery are related to eutrophication. Given the tidal flushing observed at the Milner Bay area this impact pathway is considered negligible. The construction footprint is wholly within the closure area. Potential impacts on prawn fisheries are considered negligible. Additional information is included in Section 7.1

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
	SEA: Marine ecosystems	**Biosecurity** MEA did not use National Introduced Marine Pest Information System (NIMPIS) for assessment of marine pests.	The mitigation measures within the Referral Report for biosecurity are aligned with industry standard, informed by Australian biosecurity requirements. GEMCO acknowledge that risks associated with white colonial sea squirt may be different to molluscs. All potential impact pathways relevant to the Proposal have been reviewed and proposed measures are considered appropriate for the white colonial sea squirt. Section 7.1 captures the NIMPIS information within the SER, however this has made no overall impact on the impact assessment.
	Multiple factors	**Impact management and mitigation measures** Detailed management plans must be established, to ensure that all risks associated with the project can be and will be appropriately managed.	A commitment to management plans is found in Table 3 of the Referral Report. A complete list of mitigation measures is presented in Appendix D.
	SEA: Marine ecosystems	**Alternatives to ocean outfall** Without an understanding of the viability and ecological impacts of potential alternatives to putting water from the mining operations into the surrounding environment, the Ocean Outfall proposal cannot be completely evaluated.	As outlined in responses to RFI (RFI Response 1), the discharge of excess mine water via an ocean outfall forms an integral part of the mine water management strategy, as it provides an environmentally sustainable solution to water management at the mine. GEMCO will be able to adaptively manage excess water by utilising ocean outfall in combination with bush discharge and riverine discharge, which allows the mine to meet production requirements. Water discharge options will be selected based on excess water volumes, mine water demand, and mine progression. Water management and future mine water scenarios have been discussed in detail in the two responses to the NT EPA's request for further information. In addition, GEMCO will update its operational water management plan to incorporate the management of discharge of excess water to the marine environment. This update will be done in consultation with the ALC.
AAPA	PEOPLE: Culture and heritage	**Alternative discharge to Angurugu River** The report states that alternative option 8b, comprising a discharge to Angurugu River, was rejected. However, this option is the subject of an application for an Authority Certificate. The proponent should clarify whether the discharge to Angurugu River will remain an option for excess water disposal.	The discharge of excess water to the Angurugu River remains an option for GEMCO. Approvals for this option were pursued by GEMCO, as it allows for a near-term solution for excess water management. The current waste discharge licence for riverine discharge allows for a maximum of 700 L/s (ca. 22 GL/a) of water to be discharged to the river. This option was not pursued for the Proposal, as one of the objectives of the Proposal was to identify a long-term solution for water discharge which would allow up to 80 GL/annum of water and more saline water to be removed from the pits onsite. GEMCO has determined that the sustainable discharge to Angurugu River is no more than 22 GL/a, which is insufficient to meet discharge requirements for all excess water at

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			GEMCO. In addition, GEMCO also required a sustainable solution for discharging increasingly saline water.
	PEOPLE: Culture and heritage	**Authority Certificate** The report states that the proponent will conduct works in accordance with existing site Authority Certificates. However, the proponent does not hold an Authority Certificate for the activities described in this Referral.	GEMCO confirms that they currently do not hold an Authority Certificate for the proposed activities. However, GEMCO is in the process of applying for an Authority Certificate for the Proposal.
	PEOPLE: Culture and heritage	**Factors excluded in assessment** The report states that no significant impact is expected for the Culture and Heritage factor. There is some uncertainty in this assessment regarding the existence of an Authority Certificate for the activities described in this Referral Report.	GEMCO is in the process of applying for an Authority Certificate for the Proposal.
	PEOPLE: Culture and heritage	**AAPA database** Table 2 indicates that there are no registered places in the AAPA database. Note that AAPA's database comprises Aboriginal sacred sites identified during research for Authority Certificates. There are no Authority Certificates within the project area and the predicted marine plume area.	GEMCO is in the process of applying for an Authority Certificate to manage the risk of potential damage to sacred sites (if any) within the construction footprint.
DLPE – Flora and Fauna Division	LAND: Terrestrial ecosystems	**Groundwater dependent ecosystems** The Referral Report states that as the extraction of groundwater from the dewatering of pits is an existing activity approved under the current Mining Management Plan, groundwater impact assessment was not considered to be in scope (p.4). Whilst the activity of extracting and disposing of groundwater is currently approved, the methods by which the water is to be disposed is being altered, and as such, the Flora and Fauna Division considers it would have been appropriate to include an assessment of potential impacts to groundwater and groundwater dependent ecosystems (GDEs). It is anticipated that the Mining Management Plan will need to be amended and resubmitted for approval and/or a waste discharge licence granted to include the additional disposal method. The Flora and Fauna Division notes that the Proponent's 'RFI Response 2 - 15 August 2025' (available from the NT EPA website) includes	The groundwater monitoring locations shown in Figure 5-5 of the RFI Response 2 are the groundwater bores for the environmental groundwater monitoring program approved under the existing MMP. The purpose of these bores is the identification of environmental impacts of mining activities on groundwater. GEMCO's groundwater bore network also includes: – Dewatering monitoring bores (telemetry) – Monitoring bores around tailings storage facilities (TSF) – Bores monitoring effects from bush discharge – Production bores – Exploration bores. There are currently 46 dewatering monitoring bores that are able to monitor groundwater levels within the upper aquifer, orebody and lower aquifer, while selected bores are monitored for electrical conductivity (EC). Data is collected continuously and can be accessed via telemetry. Part of the dewatering network is currently not in operation; however, certain bores are planned to be re-commissioned. GEMCO is planning to expand this monitoring network.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		information regarding groundwater extraction and GDEs. Appendix E of that response provides two groundwater drawdown contours (current and predicted) which shows that the predicted groundwater drawdown is minimal in areas that are most likely to contain GDEs. Therefore, the Flora and Fauna Division considers that significant impacts on GDEs from the project are unlikely. It appears that groundwater levels are monitored around the mine footprint at 15 bores which are all relatively close together (RFI response 2, Appendix C, Table 5-12 and Figure 5-5). Current groundwater monitoring occurs on a quarterly to annual basis (depending on location). A more spatially extensive monitoring regime with more frequent sampling would provide greater confidence that any potential impacts on GDEs can be adaptively managed. **Recommendation:** Groundwater monitoring to be expanded beyond the immediate mine footprint and daily monitoring of bores using data loggers is implemented to provide a more robust dataset, provide confidence that impacts to groundwater are within acceptable levels, and enable management measures to be implemented promptly should a negative trend be detected.	The ongoing information gathered from the dewatering bores will support the adaptive water management approach outlined by GEMCO in the Referral Report and responses to the RFIs.
	LAND: Terrestrial ecosystems	**Flora / sensitive and/or significant vegetation** The proponent states that a search of NT Government Natural Resource Maps (NR Maps) did not identify any sensitive/significant vegetation (Main report, p.61). NR Maps does show patches of dry rainforest within, and in proximity to, the proposed pipeline route. Also, several of the vegetation communities identified and mapped in Figure 9 of the TEA Report (particularly those dominated by Melaleuca species) would likely be defined as wetlands for the purposes of the Northern Territory Planning Scheme Land Clearing Guidelines (NTPS LCG). The proponent correctly states that riparian vegetation is considered to be a sensitive and/or significant vegetation type in the NT. Given the relatively small amount of clearing required (Terrestrial Ecology Report, Table 3, p.6), and the proposed location of the pipeline in proximity to an already modified area adjacent to the Rowell Highway,	The progression of design has resulted in an increase in clearing footprint of 6.18 ha. The additional clearing is required for construction and asset protection following further development of design and identification of operational needs. This increased clearing has been assessed in Section 8 to not result in a significant impact. The increased clearing footprint remains: – Within the same land parcels presented in the Referral Report – Within the surveyed extent – Within the same vegetation communities presented within the Referral Report.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		the Flora and Fauna Division considers the overall risk to sensitive and/or significant vegetation to be low. The Division considers the management and mitigation measure outlined by the proponent that vegetation clearing should be “no wider than is necessary to facilitate the construction of the pipeline and the associated infrastructure” (Main report, p.64) is appropriate.	
	LAND: Terrestrial ecosystems	**Fauna / threatened species habitat** The Terrestrial Ecology Report notes that the Masked Owl (Vulnerable, *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) and EPBC Act was detected in the area during previous surveys undertaken in 2021 and that 68 potential habitat trees were recorded. Whilst none of those trees are within the proposed construction footprint, the Report notes that other hollow-bearing trees are, but that none exhibited hollows of sufficient size for the Masked Owl (p.35). The Flora and Fauna Division considers that, whilst these trees may not currently be suitable for Masked Owls, their suitability may develop over time should they remain. Also, these trees may provide habitat for other threatened species that may occur at the location (e.g. Northern Brushtail Possum, Vulnerable, EPBC Act). The Division notes that the referral states that the on-ground layout should be ‘micro-sited’ to avoid vegetation and features as a mitigation measure (Main Report, p.64). **Recommendation:** The CEMP specifies that trees with hollows are avoided where possible, particularly those identified in Figure 12 of the Terrestrial Ecology Assessment Report (p.29).	The avoidance of trees with hollows will be addressed within the CEMP. It will specify that trees with hollows are to be avoided where possible.
	LAND: Terrestrial ecosystems	**Fauna / impacts from pipeline trenching** The proponent states that, “any open-air trench should not be left exposed for longer than 48 hours” and that, “the trench is to be inspected at least once during any 24-hour period (ideally immediately post dawn)” (p.65). The Flora and Fauna Division supports such an approach; however, to further reduce the risks and impacts of animal entrapment the Flora and Fauna Division recommends the following best practice measures are included in the CEMP.	The pipeline will be mostly above ground, and the largest trench is 200 m long. Most of the trenches will be less than 60 m long and kept open for a minimum amount of time (pipe laying is intended to take place immediately after trenching). These recommendations will be considered within the CEMP.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		Recommendations: – The total length of open trench and the length of time any section of trench is open is minimised – Trench plugs and ramps are installed at maximum intervals of 500 m as recommended by studies on entrapment of fauna in trenches – Fauna shelters are installed with at least one per 500 m interval between trench plugs and optionally include funnel traps to help trap and subsequently remove animals – Inspections of the entire length of open trenches are undertaken at least twice daily, the first within 2 hours of first light and the second mid to late afternoon. Additional checks during the middle of the day are recommended in exposed areas during hot periods – An adequate number of qualified fauna handlers are available to inspect and clear the entire length of open trench each day, within the conditions of their wildlife permits.	
	SEA: Marine environmental quality	**Unquantified wave influence on plume mixing** The hydrodynamic modelling explicitly excluded wave influence. While the discharge plume is predicted to be buoyant, it is acknowledged that "Increased vertical mixing of the plume may occur under certain high wave conditions, which may result in short-term exposure of benthic habitats at the seabed to the plume". The ecological consequences of this potential exposure are not assessed. **Recommendation**: Hydrodynamic modelling be updated to include high wave conditions and explicitly assess the duration and ecological consequences of short-term exposure of benthic habitats to the plume under these scenarios, as high energy conditions are likely to be frequent during wet seasons.	The influence of waves was excluded in the previous modelling study due to the sheltered nature of the site (behind Groote Eylandt) and the anticipated effect of waves introducing additional mixing/dilution via vertical circulation of the plume. On this basis, the exclusion of waves was therefore considered conservative. Wave modelling has now been included in the modelling framework during the development of the SER. Waves were simulated over the entire year of 2022 and included in the dilution modelling assessment (as well as additional sediment plume dispersion modelling). The wave conditions over 2022 are reasonably well aligned with the long-term average, encompassing wave heights that span the typical range. The updated mixing zone and plume behaviour resulted in a minor decrease to the extent of the mixing zone compared to the original modelling scenario. Further, no increase to impacts at the seabed relative to the original modelling was predicted. This has been incorporated into the assessment in Section 7.1 and the updated Marine Discharge Modelling Report prepared for the SER is presented in Appendix A.
	SEA: Marine environmental quality	**Impact beyond the mixing zone – model validation** Given that the flushing and/or dispersal zone have been predicted via modelling effort, an extension and/or at	A monitoring program will be designed and implemented to validate the dilution modelling mixing zone. This is outlined in Appendix E.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		least an evaluation of monitoring (water and sediment) sites within and beyond the mixing zone is recommended to support the predictive capacity of modelling, fate of discharge and effectiveness of dilution. The June 2024 monitoring is 'constrained' to the project area and extending these sites to account for the predicted scope of the mixing zone and beyond is important particularly for any validation process. **Recommendation:** Water and sediment monitoring be undertaken at sites within and beyond the mixing zone to validate the model during project construction and operation in an appropriate water quality management plan.	GEMCO commit to implementation of the monitoring program through construction and operation as defined in Appendix E.
	SEA: Marine environmental quality	**Potential for re-mobilisation of historical sediment contamination** During the 2024 sampling effort, "High RPDs [Relative Percent Differences] were found during quality assurance / quality control (QA/QC) for sediment data (Nitrate, Total Oxidised N and Chromium)". Similarly, water quality sampling for metals faced matrix interference, leading to adjusted LORs (Limits of Reporting). These shortcomings in the 2024 data prevent reliable comparison MEMP baseline conditions, specifically relating to metal concentrations in water and sediment. Metal/metalloid analytes in marine water samples did not exceed the relevant Australian and New Zealand Environment and Conservation Council (ANZECC)/Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) guidelines during the MEMP. Similarly, the median and 80th percentiles of metal analytes with prescribed DGV were below the DGV in marine sediment samples during the MEMP. As such, the Flora and Fauna Division considers the risk of remobilising contaminants to be low, however future water and sediment sampling should attempt to resolve QA/QC or technical challenges to ensure all monitoring of water and sediment is comparable to long-term MEMP data. Much of the focus was on the June 2024 sampling effort in the project area and only a summary of the MEMP data presented. The MEMP data presumably should provide a longer dataset if commenced post the	Measures to manage QA/QC will be outlined in the CEMP and OEMP.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		Australian Institute of Marine Science (AIMS) survey in 2012 and includes the northern and southern control sites. **Recommendation:** Future monitoring of water and sediment quality under the CEMP and Operational Environmental Monitoring Plan (OEMP) attempts to resolve QA/QC issues and technical challenges to ensure all data can be reliably compared to baseline conditions as monitored under the MEMP.	
	SEA: Marine environmental quality	**Turbidity thresholds for the CEMP** A CEMP is proposed for impact mitigation. The development of the monitoring program proposes to adopt turbidity amongst other key water quality parameters. Suitable thresholds for turbidity should be supported by appropriate data, ideally time-series collection, to account for tidal and seasonal variation. **Recommendation:** Suitable local turbidity datasets that capture tidal and seasonal variation are sourced or generated to support the calculation of turbidity thresholds for the CEMP.	To address concerns around turbidity impact on the receiving environment a marine monitoring program has been designed to be implemented post-submission of this SER report (e.g., implementation prior to construction phase). This program is detailed in Appendix E and will involve the collection of time-series data to extrapolate upon the existing turbidity dataset. Turbidity data is part of the long-term data collection program with GEMCO having data spanning 2010-2025, however given the nature of turbidity there are limitations associated with this existing data set due to bias resulting from sampling method (e.g., bias towards lower results due to turbidity analysis conducted during good weather when it is safest for boat operation). It is expected that time-series data collection will remove this bias as data will be able to be collected through all tidal and storm influenced fluctuations in turbidity levels, resulting in a dataset that captures a more representative range of background turbidity levels to inform the turbidity threshold for construction. Refer to Section 7.2 for further discussion on turbidity and underwater light monitoring and control measures during construction.
	SEA: Marine ecosystems	**Noise and vibration – potential for impact piling** The current noise assessment is based on vibratory piling but acknowledges that, "If information becomes available which suggests that impact piling may be necessary, additional measures to manage the potential noise impacts to marine fauna will be implemented". The full noise impact from this potentially more damaging method has not been modelled. **Recommendation:** Full noise modelling for impact piling be undertaken if this method is a possibility. Additionally, a detailed mitigation plan specifically for impact piling scenarios should be provided.	The noise and vibration assessment was updated during the SER to assess impact piling. The updated noise and vibration assessment to account for impact piling is attached in Appendix C. Detailed mitigation measures are presented in Section 7.1, Appendix C and Appendix D.
	SEA: Marine ecosystems	**Sub-optimal seagrass survey timing**	An additional seagrass sampling event was conducted in November 2025 to provide further survey coverage over the peak abundance

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		The winter survey technical memorandum states that "Surveys conducted during the summer months, typically November, are best to determine seagrass presence". The "summer" survey was conducted in September, which may not be the optimal time to assess peak seagrass extent and density. **Recommendation**: A re-evaluation of seagrass presence and density be conducted during the optimal growth period (typically November) or, alternatively, detailed justification be provided for the sufficiency of the current September survey data to represent peak seasonality.	period (per the NT Guidelines for assessment of impacts on marine biodiversity (section 5.2.3.3) (NT EPA 2025) to supplement the baseline information for the receiving environment conditions and further inform the impact assessment of turbidity impact. In addition, information from additional survey works by GEMCO has been made available to the Proposal since the submission of the Referral Report. This additional survey date from October 2024 has also been incorporated into the assessment of Marine Ecosystems. This is documented in Section 7.1 and 7.2, and Appendix B of the SER. Seagrass monitoring will form part of the proposed Marine Environment Monitoring Program (MEMP) (refer to Appendix E).
	SEA: Marine ecosystems	**Cumulative Impacts – Narrow Definition and Assessment** The referral consistently states, "No other Proposals have been identified by GEMCO that would occur in the same footprint at the same time. Therefore, there is no potential for cumulative impacts from other activities". The NTEPA "**Guidelines for assessment of impacts on marine biodiversity**" define cumulative impacts more broadly to include existing pressures. The Marine Ecology Assessment Report acknowledges existing disturbances from Port operations, including maintenance dredging, shipping activity/vessel movement and effluent discharge from Alyangula sewage treatment plant (STP). A key rationale for choosing the Milner Bay Port location is its "existing disturbance" from historical and current Port operations. This implies that the project is layering on an already stressed environment, which inherently highlights the need for cumulative impact assessment. Despite this, the assessment of cumulative impacts in the Referral Report does not address construction or operational impacts in the context of these existing pressures. This narrow definition minimises the identification of broader, long-term, or large-scale cumulative effects. **Recommendations:** A broader and more integrated assessment of cumulative impacts be undertaken, explicitly analysing the interplay between project-specific stressors and existing, ongoing background environmental pressures from all Port operations and other human activities.	The SER provides an updated cumulative assessment that considers all current pressures in the context of the Proposal's potential impact pathways. This includes: – Updated modelling of the potential cumulative interaction between mine discharge water and treated effluent discharge from the existing STP outlet location – Consideration of the potential influence of vessel movements on plume mixing zones – Semi-quantitative assessment of cumulative noise from vessel movements associated with planned construction activities and existing shipping noise – Assessment of activities such as port operations including planned dredging, as well as activities proposed under the Winchelsea Island Manganese Mine project (noting this project does not currently have approvals in place).

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
	SEA: Marine environmental quality	**Effluent discharge** The Port already has an existing effluent discharge point from the Alyangula STP. The cumulative impact of the new mine water discharge alongside existing effluent discharge has been addressed in the first RFI, however is focussed on analytes where the mixing zone interacts with that of the sewage outfall (nitrate and salinity). As per the recommendation above "Unquantified Wave Influence on Plume Mixing", the inclusion of wave influence may alter the expected mixing zone for these and other analytes and require updated cumulative impact assessment. **Recommendation:** Explicit modelling and assessment of the cumulative interaction between the new mine water discharge and existing effluent discharge be provided within the context of updated mixing zones, inclusive of wave influence. Loading from existing effluent must be considered with the excess water disposal proposal. Additional nutrient load should be accounted for and modelled.	Potential for cumulative impacts of the treated effluent discharge from the existing STP outlet location has been explicitly modelled for the SER. This has been included within the updated marine discharge model that also incorporates waves. The updated Marine Discharge Modelling Report is attached in Appendix A and findings incorporated into the assessments in Section 7.1 and 7.2.
	SEA: Marine ecosystems	**Cumulative Shipping Noise - Noise and Vibration** The report states that "the potential increase in sound exposure levels due to additional vessel movements has not been assessed any further in this report" due to existing high traffic, and therefore baseline noise levels in the area have not been derived. This limits the understanding of cumulative noise impacts. **Recommendation:** A quantitative assessment of cumulative noise impacts from all project-related vessel movements (construction and operation), in conjunction with existing Port traffic, be undertaken.	An assessment of cumulative shipping noise impact was undertaken for the Proposal during the SER and is reported in Appendix C. This semi-quantitative assessment considers the current GEMCO port traffic and the change that construction would result in. Current shipping at the GEMCO port can be summarised as one tanker per month, one ore carrier approximately every three days and two to three barges per week. Construction of the Project would require support vessels such as small watercraft, barges and jack-up barges and a pipe-laying vessel. Noise radiated from the small watercraft, barges and jack-up barges is considered minimal, whereas noise from a pipe-laying vessel would be similar to that of trenching activities. Noise radiated from project-related vessel movements during construction is considered minimal, and is likely to be comparable to, or even less than, the noise generated by existing port traffic. Generally, doubling the number of noise sources results in only a modest increase in overall noise levels. Gradual exposure to continuous noise sources, such as additional shipping vessels during construction of the Proposal, is generally regarded as being less harmful and less likely to startle or stress marine fauna than rapid-onset impulsive noise sources like piling (Hamernik et al., 1993; Hamernik et al., 2003). This has been updated within the Marine Ecosystems assessment in Section 7.1.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
DLPE - Land Resources Division – Weed Management Branch	LAND: Terrestrial Ecosystems	**Weed management and biosecurity** – The CEMP should refer to the requirements under the *Weeds Management Act 2001* (WM Act) including general duties and statutory weed plans – Consider giving greater consideration to biosecurity and weed hygiene, and if approved the following should be included in a permit: • The proponent must ensure that all vehicles and machinery are free of weeds, weed seeds, soil and vegetative matter, prior to entering or exiting the site. Vehicles must avoid driving through weeds already present on-site to prevent further spread. Vehicles and machinery exhibiting such material must be thoroughly washed down before entering/departing • Any works that cause disturbance to vegetation and soils will create conditions favourable for the growth of weed species and weed control will be required following disturbance caused by exploration and/or extraction. Weed control prior to seed set should be carried out in all areas affected by these works • Guidelines for the prevention of weed spread are outlined in 'Preventing Weed Spread is Everybody's Business', which highlights the areas of risk for all activities associated with weed spread. The document details the pathways through which weeds are spread and provides actions to reduce weed spread. Proponents seeking to develop land for any purpose should address these actions – A weed management plan should be developed to ensure compliance with the WM Act and statutory weed plans – The declared weed Buffel Grass (Cenchrus ciliaris) has been recorded in the project area and not listed in the document.	A weed management plan has been developed by GEMCO for their operations at Groote Eylandt. This plan will be reviewed prior to construction commencing and applied to the Proposal.
DLPE - Environment and Heritage Division -	PEOPLE: Culture and heritage	**Procedure for the discovery of unexpected Aboriginal archaeological finds requires revision** It is strongly recommended that Section 5.4 is rewritten to reflect the legislative obligations of the proponent	The unexpected finds protocol in Appendix G of the Referral Report has been superseded by the Unexpected Finds protocol presented in Appendix D. This has been updated as recommended by DLPE to:

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
Heritage Branch		regarding the discovery of Aboriginal and Macassan archaeological places and objects, including ancestral remains. A template unexpected finds protocol that can be adapted for this purpose can be provided on request. It is recommended that the contact details for the Heritage Branch be updated to include the relevant email address, heritage.branch@nt.gov.au in addition to the phone number. It is recommended that an additional subsection regarding the discovery of underwater cultural heritage places and objects during construction is included in this section, reflecting the underwater construction phases of this project. These places and objects would fall under the auspices of the *Heritage Act 2011*, being within 3 nm of the coastline.	– Reflect the legislative obligations of the proponent regarding discovery on Aboriginal and Macassan archaeological places and objects, including ancestral remains – Include the contact email for Heritage branch – Include a subsection for discovery of underwater cultural heritage places and objects.
	PEOPLE: Culture and heritage	**Misunderstanding of the regulation of the Commonwealth Underwater Cultural Heritage Act 2018 (UCH Act)** It is recommended that Section 2.3.2 is rewritten to reflect the arrangement between the Australian Government and Northern Territory Government regarding the management of underwater cultural heritage under the UCH Act (Commonwealth). It is advised that the Heritage Branch has no recorded underwater places or objects within the proposed construction area or close enough to the predicted mixing zone to be at risk of impact from the dewatering. This advice (as of 16 September 2025) can be included in the revised report for this project.	The Section 2.3.2 of Appendix G of the Referral Report has been superseded by the below text. Maritime archaeology of cultural significance is protected under the UCH Act (Consequential and Transitional Provisions) (previously known as the Historic Shipwrecks Act 1976). The UCH Act protects Australia's shipwrecks, sunken aircraft and other underwater cultural heritage including Australia's Aboriginal and Torres Strait Islander Underwater Cultural Heritage in Commonwealth waters. The UCH Act is a Commonwealth Act administered by DCCEEW. The Heritage Branch of the NT DLPE represent DCCEEW as the authorised delegate for underwater cultural heritage in the Northern Territory, to the edge of the Australia's Exclusive Economic Zone. The Heritage Branch maintains a closed database of heritage places in both Northern Territory and Commonwealth Waters containing significantly more data than is captured in the Australasian Underwater Cultural Heritage Database. Under Part 2 of the UCH Act, all shipwrecks, aircraft, and associated artefacts that have been underwater for 75 years or more are considered historical items and accorded protections. Shipwrecks and aircraft that have been underwater less than 75 years, and other types of underwater cultural heritage, can be protected through individual declaration based on an assessment of heritage significance. The Australasian Underwater Cultural Heritage Database was searched on 20 May 2024. There were no shipwrecks, sunken aircraft and other underwater cultural heritage registered within the Project area.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
			The Heritage Branch advised on 16 September 2025 that the Heritage Branch has 'no recorded underwater places or objects within the proposed construction area or close enough to the predicted mixing zone to be at risk of impact from the water discharge'.
DLPE - Crown Land Estate	N/A	**Crown Land Licence** GEMCO will need to obtain a Crown Land Licence for the construction and operation of the excess water pipeline in the marine area.	The Access Authority covers the marine section for the construction and operation of the project. GEMCO proposes to engage with Crown Land Estate to confirm this approach.
DLPE – Land Resources Division – Land Management Branch	N/A	**Erosion and Sediment Control Plan** Prior to the commencement of works, an Erosion and Sediment Control Plan (ESCP) must be developed in accordance with the DLPE ESCP Procedures. The ESCP must be certified by a suitably qualified and experienced professional. The certified ESCP must be submitted to eia.ntepa@nt.gov.au. All works relating to this permit must be undertaken in accordance with the certified ESCP. Should the ESCP require amendment, the revised ESCP must be certified by a suitably qualified and experienced professional. The revised certified ESCP must be submitted to eia.ntepa@nt.gov.au.	GEMCO will prepare an ESCP prior to the commencement of construction works. The ESCP will be certified by a suitably qualified and experienced professional. The certified ESCP will be implemented for the Proposal.
DLPE – Vegetation Assessment Unit	N/A	**Vegetation clearing** The Referral Report notes that "approximately 10.44ha of native vegetation clearing is proposed and will only occur when existing clearing extents (and approved under a Mining Management Plan) cannot accommodate the proposed development". The report notes (at Table 14) that there is a potential for clearing of native vegetation of approximately 0.54 hectares to be required off the Mining Lease. Pursuant to the *Planning Act 1999*, consent is required for the clearing of native vegetation of more than one hectare (ha) in aggregate of land, which is subject to the Clearing of Native Vegetation overlay (the NT Planning Scheme Part 3 overlays). Applications for permits to clear native vegetation on unzoned land are also assessed against the requirements of the NTPS LCG. The Planning Scheme provides exceptions for the clearing of native vegetation that is required or controlled under any Act in force in the Territory, which would include the EP Act.	All clearing of vegetation will be on land covered by an environmental (mining) licence; therefore, it is understood that the *Planning Act 1999* does not apply. As such, GEMCO will not obtain a development permit for clearing vegetation on unzoned land under the *Planning Act 1999*.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		Where clearing is required on land not covered by an environmental (mining) licence, a development permit under the *Planning Act 1999* may be required.	
DLPE – Mining Division	N/A	**Environmental (mining) licence** Should the proposal proceed, it will also require an environmental (mining) licence to be granted under the EP Act. Given the nature of the proposal, a tailored condition licence will likely be required. The proposal is located within current mineral interests associated with the GEMCO Mine, operated by GEMCO and subject to deemed mining licence DML0126-01. These include MLN951, MLN956, and MLN2, as well as SPL383. The proposal also includes areas outside of granted mineral interests. The proposal indicates that GEMCO will obtain land access tenure as required for any off-lease areas prior to construction commencing. Any required tenure applications should be submitted to the Department of Mining and Energy prior to submission of an application for an environmental (mining) licence. The proposal has detailed dewatering activities, ocean discharge of mine wastewater and construction of a pipeline across waterways of varying stream order. Under the EP Act, conditions imposed on an environmental (mining) licence may authorise or regulate the environmental impacts associated with dewatering, discharge of waste to water, and interference with a waterway. If conditioned under an environmental (mining) licence, separate authorisation for these activities may not be required under the *Water Act 1992*. The proponent is strongly encouraged to contact the Mining Division on (08) 8999 6528 to discuss the proposed works prior to submitting an application for an environmental (mining) licence.	GEMCO is proposing to apply for an environmental (mining) licence under the EP Act. GEMCO is in the process of preparing an application for an access authority to gain land tenure for off-lease areas. GEMCO will submit tenure applications for off-lease areas will be submitted to the Department of Mining and Energy prior to submission of an application for an environmental (mining) licence. The advice regarding the authorisation of dewatering, discharge of waste to water, and interference with a waterway through the environmental (mining) licence is noted and will be considered in the approvals strategy for the Proposal. GEMCO has met with representatives from DLPE's Mining Division on 4 December 2025 to discuss the application for an environmental (mining) licence and its integration into the referral process.
DLPE – Mining Division	N/A	**Insufficient information of cumulative impacts** The proposal includes insufficient information to determine the extent of the cumulative impact associated with the existing GEMCO mine and surrounding marine environment. Further assessment	The SER provides an updated cumulative assessment that considers all current pressures in the context of the Proposal's potential impact pathways. This includes: – Updated modelling of the potential cumulative interaction between mine discharge water and treated effluent from the existing STP outlet location

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		will be required under the EP Act to determine potential environmental and cumulative impacts.	– Consideration of the potential influence of vessel movements on plume mixing zones – Semi-quantitative assessment of cumulative noise from vessel movements associated with planned construction activities and existing shipping noise – Assessment of activities such as port operations including planned dredging, as well as activities proposed under the Winchelsea Island Manganese Mine project (noting this project does not currently have approvals in place).
DLPE – Environmental Regulation Division – Environment Operations Unit	N/A	The action may require an approval and/or licence under other NT legislation administered by Environment Division such as the *Water Act 1992* and the *Waste Management and Pollution and Control Act 1998* (WMPC Act). If the proponent will collect, transport, store, recycle or treat listed wastes on a commercial or fee for service basis as part of the development or operations of the activity, then an Environment Protection Approval or Licence will be required to authorise the activity under the WMPC Act. If the activity requires the discharge of waste to water or could cause water to be polluted, then a waste discharge licence under the *Water Act 1992* will be required.	GEMCO will conduct works in accordance with the environmental (mining) licence and other permits approvals required for the Proposal.
	N/A	All persons are required to comply at all times with the General Environmental Duty under section 12 of the WMPC Act. A non-exhaustive list of environmental issues that should be considered to meet requirements under NT law are listed below: **Dust**: The proposed activities have the potential to generate dust, particularly during the dry season. The proponent must ensure that nuisance dust and/or nuisance airborne particles are not discharged or emitted beyond the boundaries of the premises. **Noise**: The proponent is to ensure that the noise levels from the proposed premises comply with the latest version of the NT EPA Northern Territory Noise Management Framework Guideline available online. **Erosion and Sediment Control (ESC):** The proponent must ensure that pollution and/or environment harm do not result from soil erosion.	It is proposed that a CEMP will be developed and implemented to ensure that environmental impacts from construction activities will be avoided or mitigated in accordance with the General Environmental Duty. The CEMP will include the details on the management of the issues raised including: – Dust emissions – Noise emissions – Waste – Storage and handling of hazardous materials – Contamination – Environmental nuisance. An ESCP will be developed and implemented for the Proposal.

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		ESC measures should be employed prior to and throughout the construction stage of the development. Larger projects should plan, install and maintain ESC measures in accordance with the current International Erosion Control Association (IECA)'s best practice guidelines and specifications. Where sediment basins are required by the development, the NT EPA recommends the use of at least Type B basins, unless prevented by site specific topography or other physical constraints. Basic advice for small development projects is provided by the NT EPA document: Guidelines to Prevent Pollution from Building Sites and Keeping Our Stormwater Clean. **Storage:** If an Environment Protection Approval or Environment Protection Licence is not required, the proponent should store liquids only in secure bunded areas in accordance with VIC EPA Publication 1698: Liquid storage and handling guidelines, June 2018, as amended. Where these guidelines are not relevant, the storage should be at least 110% of the total capacity of the largest vessel in the area. Where an Environment Protection Approval or Environment Protection Licence is required, the proponent must only accept, handle or store at the premises listed waste, including asbestos, as defined by the WMPC Act, in accordance with that authorisation. **Site Contamination:** If the proposal relates to a change of land use or if the site is contaminated, including as a result from historical activities such as cyclones, a contaminated land assessment maybe required in accordance with the *National Environment Protection (Assessment for Site Contamination) Measure*. The proponent is encouraged to refer to the information provided on the NT EPA website, and the NT Contaminated Land Guidelines. **Waste Management - Import and Export of Fil**l: The proposed activities have the potential to generate fill and/or involve the importation of fill for use on-site. Untested fill material may already be present on the site. All fill imported or generated and exported as part of the activity must either be certified virgin excavated	

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		natural material (VENM) or be sampled and tested in line with the NSW EPA Guidelines. All imported fill material must be accompanied by details of its nature, origin, volume, testing and transportation details. All records must be retained and made available to authorised officers, upon request. The proponent should also consider the following NT EPA fact sheets: How to avoid the dangers of accepting illegal fill onto your land, and Illegal Dumping - What You Need to Know. **Odour or Smoke**: The proposed activities may have the potential to create odours and/or smoke. The proponent must ensure that nuisance odours or smoke are not emitted beyond the boundaries of the premises	
DLPE – Water Resources Division	N/A	The proposed works intersect several identified waterways and may therefore require a permit to interfere with a waterway if they will materially affect the bed, banks, or flows. Gazette S35, dated 30 June 1992, may also apply if the works meet the definition of road drainage works, culverts, bridges, or urban stormwater drainage works, provided they are constructed to an engineering standard accepted by the relevant public authority. In addition, if wastewater is to be discharged, the proponent may be required to obtain a waste discharge licence.	GEMCO proposes that NT licences and permits will be obtained for aspects of the Proposal as required.
DLPE – Lands and Planning Division – Development Assessment Services	N/A	Any subdivision to create one or more lots for the purpose of a lease exceeding 12 years, including for the installation of pipelines and associated infrastructure, will require a planning permit. This requirement is subject to the condition that the proposed pipeline is not located within the Rowell Highway Road corridor.	GEMCO will meet with DLPE to discuss the requirement for a planning permit and its application process (if required).
DCCEEW	Matters of National Environmental Significance	The department notes the project intersects with known occurrences of the following protected matters under the EPBC Act: – Listed threatened species and communities – Listed migratory species. The department also notes the Referral Report includes a self-assessment against the Australian Government's *Significant Impact Guidelines 1.1 — Matters of National Environmental Significance*. This self-assessment noted that, following the application of avoidance and	GEMCO met with representatives of DCCEEW on 13/09/25 and confirmed in a letter to DCCEEW dated 30/09/2025 that it does not intend to refer the Proposal under the EPBC Act. The reason stated was that, as part of the Referral Report, GEMCO undertook a self-assessment of protected matters under the EPBC Act in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* and the outcome of the self-assessment was that there were no triggers for referring the Proposal to the DCCEEW for assessment. With the changes to design through design progression the matters of national environmental significance were reconsidered and assessments

Stakeholder	Environmental Factor	Issues raised in submission	Response and actions taken
		mitigation measures, the proposal is unlikely to result in significant impacts to nationally protected matters, and no referral is proposed under the EPBC Act. The proponent has indicated they would advise whether they intend to refer under the EPBC Act in due course.	updated as required. These updated significant impact assessments are provided in Appendix B and Section 8.1. The revised self-assessment continues to support the decision to not refer under the EPBC Act.

6. Environmental impact assessment

In the *Notice of Decision and Statement of Reasons* dated 28 October 2025, the NT EPA advised that they consider that the Proposal has the potential to have a significant impact on environmental values associated with three environmental factors:

– Marine ecosystems
– Marine environmental quality
– Culture and heritage.

Table 5 presents the statements on environmental factors provided in the *Notice of Direction* and Table 6 presents the statements on environmental factors provided in the *Notice of Decision and Statement of Reasons*.

Section 2.6 of the Referral Report provides an assessment regarding how Sections 42 and 43 of the EP Act have been applied to the Proposal. Statements made in the Referral Report are applicable to the environmental impact assessment undertaken in this SER.

6.1 Additional studies to inform impact assessment

Additional surveys and studies have been conducted since the Referral Report was submitted to inform impact assessment and address the submissions received.

– Marine benthic survey undertaken in November 2025
– Modelling of vertical mixing of discharge water during high wave conditions
– Modelling of potential cumulative impacts associated with the existing GEMCO mine and surrounding marine environment
– Dispersion modelling of turbidity
– Noise and vibration assessment for impact piling
– Semi-quantitative cumulative shipping noise assessment
– Assessment of the potential effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment.

6.2 Risk assessment framework

An environmental risk assessment was undertaken for the Referral Report to identify the potential environmental impacts and mitigation measures from activities associated with the Proposal. Some of these risk assessments have been updated in the SER due to additional studies being undertaken in response to the submissions received and the additional information requested by the NT EPA. The assessment process undertaken for updated risk assessments is consistent with AS/NZS ISO 31000:2018 Risk management – Principles and guidelines (ISO, 2018), as applied for the Referral Report.

6.2.1 Methodology

Likelihood and consequence definitions applied in this assessment of residual impact are outlined in Table 11 and Table 12. The overall residual risk category was determined through application of the risk matrix provided in Table 13, which considers both likelihood and consequence. It is noted that residual risk considers the successful application of all identified mitigation measures included in this SER and accompanying technical reports.

Table 11 Likelihood of occurrence criteria

Likelihood	Definition
A. Almost certain	Could be expected to occur more than once in a year
B. Likely	Could be incurred over a 1 - 2 year timeframe

Likelihood	Definition
C. Possible	Could be incurred over a 5 year timeframe
D. Unlikely	Could be incurred over a 5 - 20 year timeframe
E. Rare	Less than once in 20 years

Table 12 Consequence category definition

Consequence level	Environment	Community
1	Low level impact/s to land, biodiversity, ecosystem services, water resources or air.	Low-level social impacts. Low-level infringement of cultural heritage or minimal disturbance to heritage structures. Minimal impact on human rights.
2	Minor impact/s to land, biodiversity, ecosystem services, water resources or air.	Minor medium-term social impacts on a small number of people. Repairable damage or disturbance to property, structures or items. Minor infringement of cultural heritage. Minor, temporary human rights impacts.
3	Moderate impact/s to land, biodiversity, ecosystem services, water resources or air.	Moderate medium-term social impacts or frequent social issues. Moderate damage to structures/items of local cultural heritage significance/sacred locations.
4	Significant impact/s (>20 years) to land, biodiversity, ecosystem services, water resources or air.	A breakdown of social order. Widespread damage to items of global cultural significance. Highly offensive infringements of cultural heritage. Company directly responsible or complicit in severe, long-term impacts on human rights.
5	Permanent, severe impact/s to land, biodiversity, ecosystem services, water resources or air.	Complete breakdown of social order. Widespread desecration of items of global cultural significance. Company directly responsible or complicit in severe and widespread long-term impacts on human rights.

Table 13 Risk assessment matrix

Likelihood	Consequence				
	Level 1 Low level impact	Level 2 Minor impact	Level 3 Moderate impact	Level 4 Significant impact	Level 5 Permanent impact
Almost certain	High	High	Extreme	Extreme	Extreme
Likely	Moderate	High	High	Extreme	Extreme
Possible	Low	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Rare	Low	Low	Moderate	High	High

7. Key environmental factors

7.1 SEA: Marine ecosystems

7.1.1 Objective for environmental factor

The NT EPA's objective for the marine ecosystem factor is to *'protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning*.'

7.1.2 Additional information and investigations

This section provides additional information relating to Referral Report submissions for the SEA: Marine ecosystems environmental factor. Additional information provided here addresses concerns regarding:

- Benthic habitat mapping, including natural temporal variations in seagrass extent and density
- Changes in listing of two threatened species
- Changes associated with underwater noise impact pathways following progression of the Proposal design
- Changes associated with direct alteration of marine habitat following progression of the Proposal design
- Clarification of information regarding the Northern Prawn Fishery and biosecurity.

7.1.3 Policy and guidance

The following documents have been used to inform survey works and assess the potential for impacts to marine ecosystems, including matters of national environmental significance, seagrass, and noise impacts:

- Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Southall, et al., 2019)
- Underwater Piling and Dredging Noise Guidelines (SA Guideline) (South Australia, 2023)
- Significant Impact Guidelines 1.1 - Matters of National Environmental Significance
- Seagrass Watch's Guidelines for the rapid assessment of seagrass habitats in the western Pacific (2003)
- Global seagrass research methods
- Draft NT EPA Environmental factor guidance: Marine ecosystems (March 2025)
- Draft NT EPA Guidelines for assessment of impacts on marine biodiversity (March 2025)
- Draft NT EPA Marine dredging guideline (June 2023).

7.1.4 Environmental values

Overview

Environmental values associated with the environmental factor 'marine ecosystems', are described in Section 6.4 of the Referral Report.

Key issues raised in the submissions received by the NT EPA for this environmental factor were in regard to the adequacy of benthic habitat mapping. It was noted that surveys were not undertaken during the optimal seagrass growth period, in which peak seagrass extent and density were potentially underestimated, and natural variations in seagrass extent and density, and benthic communities were not considered. In response, GEMCO conducted an additional benthic habitat survey in November 2025, considered to be close to the peak growth season for seagrasses in the area. In addition, survey information has also become available from an additional marine habitat survey conducted under other GEMCO field programs in June and October 2024. The findings from the two additional surveys have informed the updated benthic habitat description provided in this section.

A summary of surveys conducted for the Proposal is provided in Table 14. Results from these surveys have been contextualised using publicly available data, including that collected by the AIMS in December 2012 (Trott, 2012),

the ‘Mapping Makarda’ Project in 2016 undertaken as a collaboration between ALC and AIMS (Davies et al., 2020), and works undertaken by Arup in 2022 to the north of the wharf.

The Draft NT EPA Guidelines for assessment of impacts on marine biodiversity (2025) identifies that seagrass abundance peaks in the dry season around October. The October 2024 and November 2025 surveys provide information about seagrass abundance and diversity with the marine footprint during the seagrass optimal growth period. Combined, the results of the surveys and publicly available data provide a sound understanding of the presence and abundance of seagrasses in areas of relevance to the Proposal. This information has informed the impact assessment presented in Section 7.1.5.

Table 14 Summary of surveys undertaken for the Proposal

Survey	Date	Methods	Habitat summary
Baseline marine survey – WSP (presented in Referral Report)	September 2023 (Austral spring)	Video footage was captured of the seafloor and associated marine habitat along transects in Milner Bay. A small remotely operated vessel with a live feed video camera connected via a tether line to a laptop on the survey vessel was used. Survey activities focussed on the Project area.	– Distinct sequence of habitat types with water depth within survey area – Subtidal / deeper areas (10-15 m) consisted of soft mud and silt substrate with extensive bioturbation – Substrate gradually changed from mud/silt to gravelly sand closer to shore – Rocky reef with sections of macroalgae and coral identified 100-300 m north of marine footprint. Coral on rock communities were generally sparsely present throughout the survey area – Abundance and diversity of epibiota increased from deeper to shallower depths. Epibiota was also densest and most common in areas of rubble and gravels on mud or sand – Seagrass was sparse, but densest patches were 200-800 m south of marine footprint. Density and spatial extent of seagrass patches increased near the southern-most extent of the survey area.
Baseline marine survey – GHD (presented in Referral Report)	June 2024 (Austral winter)	Marine habitat was assessed in the Project area using a combination of tow cameras, drop cameras and benthic sediment grabs. Survey transects established in WSP (2023) were reassessed. Methods were based on: – Seagrass Watch’s Guidelines for the rapid assessment of seagrass habitats in the western Pacific – Global seagrass research methods.	– Seabed within marine footprint confirmed to consist of open sandy substrate, lacking high value habitat features – Patch of macroalgae observed on the northern boundary of marine footprint – Small patch of rocky reef with established coral colonies identified 130 m north of the marine footprint – Diverse patch of rocky coral gardens and benthic communities 500-560 m south of marine footprint – Seagrass was mostly devoid, with a few individual plants of *Halophila ovalis* located where denser meadows were identified in 2023 WSP survey, 200-800 m south of marine footprint.
Initial marine habitat survey GEMCO field program (new information)	June 2024 (Austral winter)	Marine habitat was assessed in both Milner Bay (beyond the Project area) and Bartalumba Bay using a combination of tow cameras, drop cameras and benthic sediment grabs. Methods were based on: – Seagrass Watch’s Guidelines for the rapid assessment of seagrass habitats in the western Pacific – Global seagrass research methods.	– Small patch of seagrass (0.06 ha) identified 292 m to the south of the marine footprint – Macroalgae *Sargassum* sp. was identified on rocky reef in inshore areas – Coral communities previously observed were confirmed – Bartalumba bay was found to be bioturbated bare sand.

Survey	Date	Methods	Habitat summary
Additional marine habitat survey GEMCO field program (new information)	October 2024 (Austral spring)	Marine habitat was assessed in both Milner Bay (within and beyond the Project area) and Bartalumba Bay using a combination of tow cameras, drop cameras and benthic sediment grabs. Methods were based on: – Seagrass Watch's Guidelines for the rapid assessment of seagrass habitats in the western Pacific – Global seagrass research methods.	– Additional patches of seagrass were identified to the north of the port. Seagrass was a single species *H. ovalis*, with densities from 5% to 80% – Small patch (0.04 ha) of seagrass identified 27 m to the south of the marine footprint: *H. ovalis* at 5% density – Macroalgae *Sargassum* sp. was identified on rocky reef in inshore areas. Additional patches of macroalgae were recorded north of the port – Coral communities previously observed were confirmed – Bartalumba Bay was found to be bioturbated bare sand.
Baseline marine survey – GHD (new information)	November 2025 (Austral spring)	Marine habitat was assessed in the Project area using a combination of tow cameras, drop cameras and benthic sediment grabs. Survey transects established in WSP (2023) and GHD (2024) surveys were reassessed. Methods were based on: – Seagrass Watch's Guidelines for the rapid assessment of seagrass habitats in the western Pacific. Benthic infauna samples were collected within the Project area, and at a reference location to the south of the Project area.	– Sparse *H. ovalis, H. spinulosa* and *H. uninervis* was identified within the inshore area of the marine footprint (0.77 ha) – Denser patches of seagrass observed 200-800 m south of marine footprint – Further confirmed seabed within marine footprint is sandy substrate lacking abundant habitat features – Coral communities and areas supporting macroalgae previously observed were confirmed.

Seagrasses

Seagrasses grow in a range of habitats, including estuaries (rivers and inlets), coastal waters (intertidal and subtidal), reef areas (intertidal and subtidal) and deep water; however, deep water seagrass are often very sparse (i.e. less than 5% cover) (Great Barrier Reef Marine Park Authority [GBRMPA], 2018). Seagrass species are colonising, opportunistic and/or persistent, and vary in their sensitivity to disturbances (Kliminster et al., 2015). Growth of seagrass is seasonally dependent, with high growth in summer months and less favorable growth in the post-wet season where growth can cease, or meadows may be lost (GBRMPA, 2018). This is due to runoff from the land leading to increased turbidity and cooler water temperatures. Seagrass growth and distribution is typically highest in spring prior to the wet season (Lanyon & Marsh 1995).

Thirteen seagrass species have been recorded in the Gulf of Carpentaria and are distributed by depth zones (intertidal and subtidal) (Carter et al*.,* 2024). Along NT waters of the gulf, seagrass was more dominant along the southern areas, and it was noted that data for Groote Eylandt was not able to be accessed for the study (Carter et al*.,* 2024). At Groote Eylandt, small areas of seagrass are seen in shallow areas on the west, southwest and northern coastlines according to Traditional Ecological Knowledge (TEK), as described in the 'Mapping Makarda' project (Figure 5) (Davies et al., 2020).

A marine environmental survey in Milner Bay was completed by AIMS in 2012 and included seagrass surveys, recording six species (*Cymodocea serrulata*, *Syringodium isoetifolium*, *Halodule uninervis*, *Halophila ovalis*, *Halophila spinulosa*, and *Halophila decipiens*) (AIMS, 2013). Seagrass has not historically been present north of the port (Davies et al., 2020), while sparse seagrass cover was observed south of the port, and seawards of the reef habitats, between Malkala Creek (3.7 km south of the wharf) and Ndunga Creek (6.5 km south of the wharf) (Davies et al., 2020). In these patches, epiphyte presence was generally low with no obvious evidence of grazing by either turtles or dugongs.

More recently, video surveys conducted by Arup in May 2022 identified *Cymodocea* seagrass in the immediate wharf area in low density (<5% cover) and at approximately 5 m depth (Arup, 2022). Subsequently, benthic video transect surveys conducted by WSP in September 2023 recorded seagrass as sparsely present with individual

plants in depths less than 5 m within their study area. No details on the species were provided. According to WSP (2023), there are denser patches to the southern portion of the WSP study area (Figure 6), similar to the AIMS (2013) study near Malkala Creek. This was also corroborated by discussions between GEMCO and Traditional Owners, where liaison determined that seagrass is considered more prevalent in other parts of the Groote Eylandt coastline outside of Milner Bay.

Results from the GHD surveys (June 2024, October 2024, November 2025) are presented in Figure 7 and Figure 8. Similar habitat was identified across each survey, with seasonal variation in seagrass abundance and density recorded. The most abundant species of seagrass observed was *H. ovalis*; other species observed included *H. uninervis, H. spinulosa, T. hemprichii, S. isoetifolium* and suspected *T. ciliatum.* During winter surveys, the marine footprint was devoid of seagrass and macroalgae with few individuals present.

In November 2025 sparse *H. ovalis*, *H. spinulosa* and *H. uninervis* was observed within the inshore area of the marine footprint (Figure 7). This low density, sparse seagrass intersects with 0.77 ha within the marine footprint. Denser patches of seagrasses were also observed 200 to 800 m south of the marine footprint.

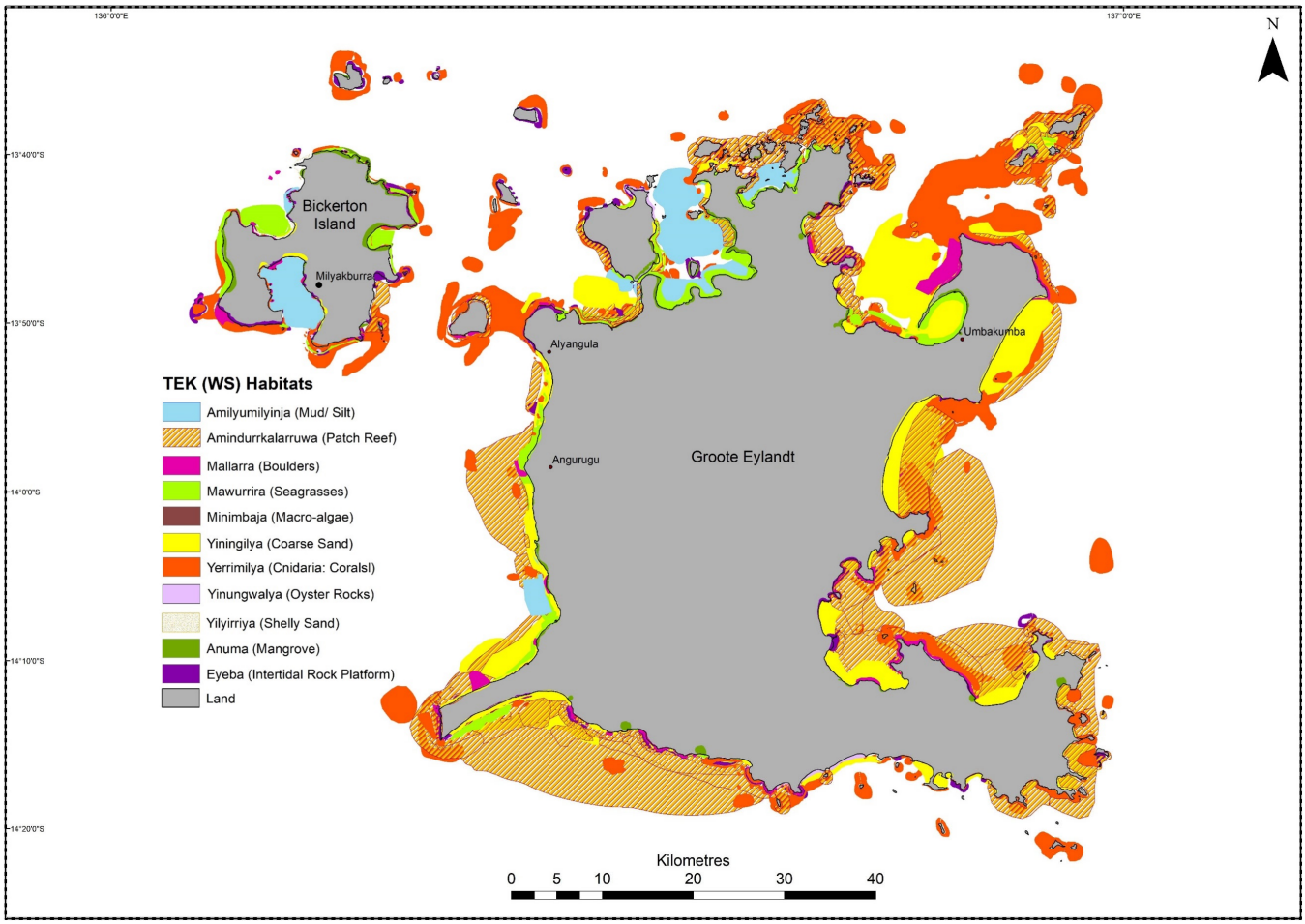


Figure 5 ***Broad-scale marine habitat distribution based on Anindilyakwa Traditional Owner knowledge (Davies et al., 2020)***

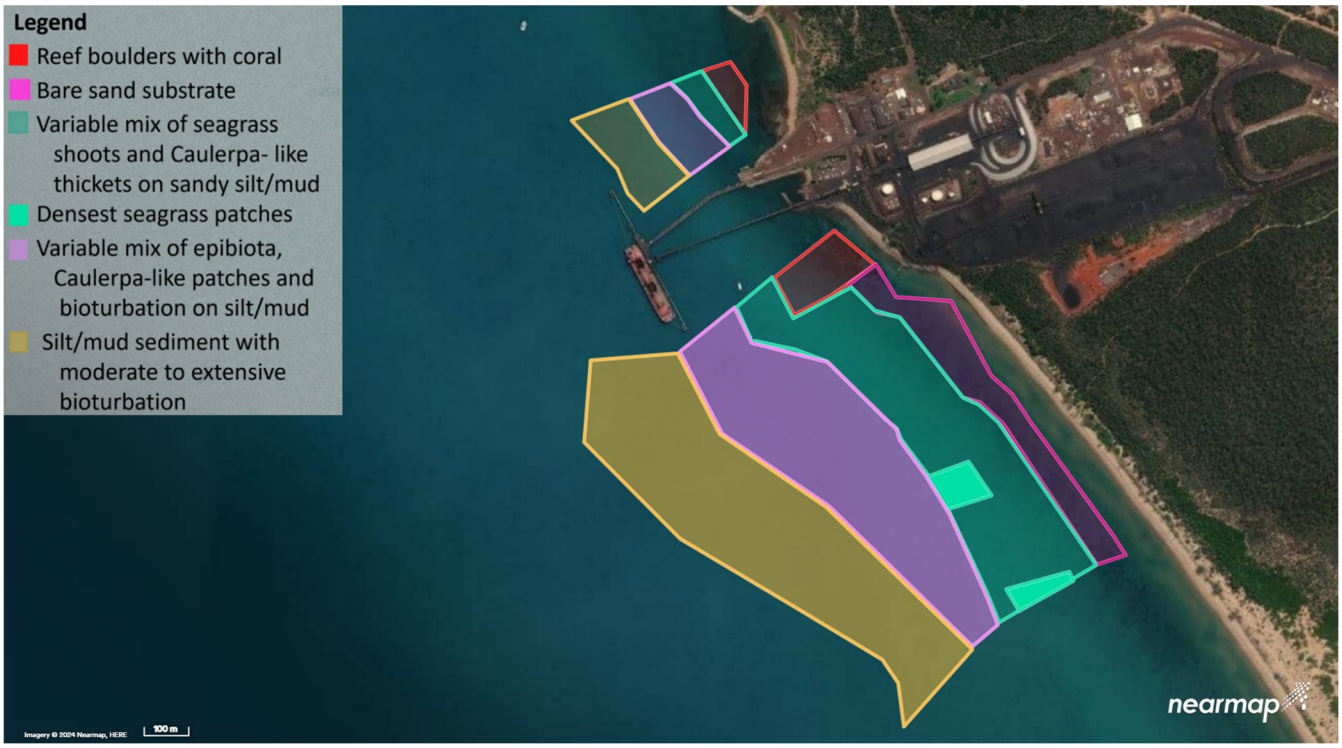
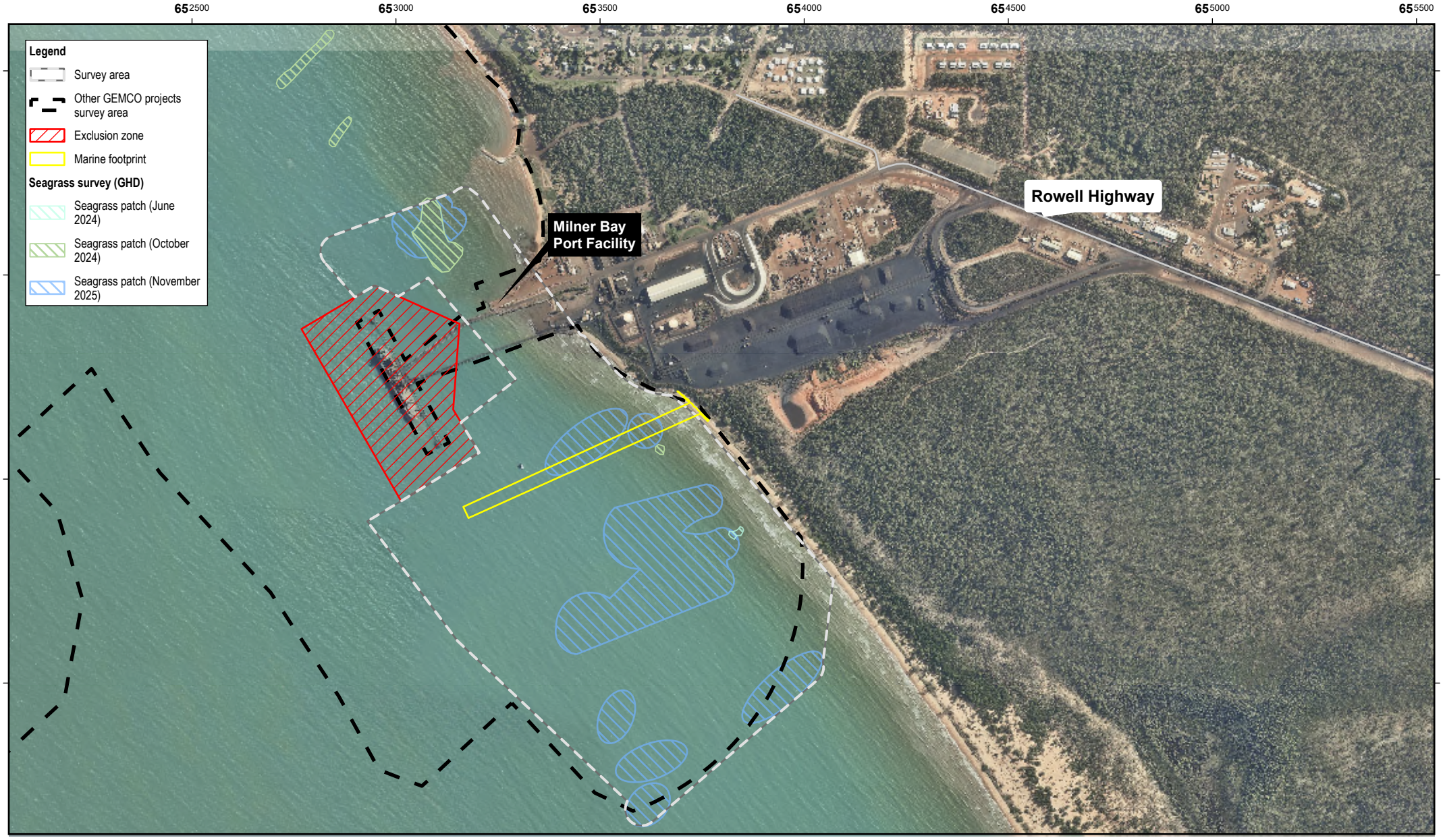


Figure 6 *Broadscale benthic habitat in vicinity of proposed pipeline corridor (extracted from WSP, 2023)*



Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

N

SOUTH32

GHD

South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Seagrasses observed in June 2024, October 2024 and November 2025

Project No. **12624084**
Revision No. **0**
Date **29/01/2026**

FIGURE 7

Data source: GA - road (2024); GHD - survey areas, seagrass survey (2024); South32: marine footprint (2026), Exclusion zone (2024); World Imagery: Vantor.
Created by: mvandermerwe

Macroalgae communities

The WSP (2023) surveys identified macroalgae communities on both hard and soft substrates (Figure 6) and this was confirmed by GHD surveys (Figure 8). Hard substrate macroalgal communities were characterised by red algae (*Rhodophyta*), growing amongst corals. In soft substrates the green algal *Caulerpa* species were more prevalent, observed generally as a monoculture patch. *Caulerpa* was observed on a range of substrate at a range of depths and cover, ranging from sparse to complete cover, with the highest density occurring in shallow subtidal areas (<5 m) in the southern extent of the WSP study area.

In June 2024, the macroalgae *Sargassum* sp. was recorded growing on the rocky reef in the inshore areas. *Sargassum* is a group of brown algae that provides food, refuge, and breeding ground for many marine animals, such as marine turtles, crabs, shrimp, fish, and seabirds. *Sargassum* species are known to be highly seasonal with peaks in cooler months (Ateweberhan et al., 2005). Patches of *Sargassum* were again observed in the October 2024 and November 2025 surveys, growing on the rocky inshore areas. Additional patches of macroalgae were recorded north of the port either growing on the bare sand or amongst rocky reef in conjunction with soft coral. Macroalgae comprised a variety of species including green, red and brown algae in low density.

Coral communities

Davies et al. (2020) described the coral reefs of Milner Bay as having a limited extent of coral reefs on the western shoreline, with the largest area present around Tasman Point, approximately 2.5 km north of the marine footprint (Figure 8).

Previous surveys have identified coral communities in the shallow subtidal zone to a limited extent (Arup, 2022; WSP, 2023). These communities grew on sparse boulders and small patch reef structures, with some individuals growing in the soft sediment areas. These forms of hard substrate also supported a diverse range of species, including bryozoans, hydroids, ascidians and macroalgae. Several small fish (species not identified) were recorded within this habitat (WSP, 2023), indicating these habitats may act as refugia for juvenile fish. Individual coral colonies were sometimes found in soft substrates, potentially attached to gravel. These coral communities were also confirmed by GHD in the surveys conducted in 2024 and 2025 (Figure 8).

The most recent survey (November 2025) identified intermittently occurring soft corals (sea whips) within the marine footprint (Figure 8).

Macroinvertebrates

Generally, marine invertebrates are poorly sampled and understood worldwide. This is a sentiment held true in the Gulf of Carpentaria and Groote Eylandt. Abundant and diverse communities of polychaetes, crustaceans, molluscs, and echinoderms characterise the Gulf of Carpentaria basin (Long et al., 1995; Haywood et al., 2005). A total of 33 species have been recorded in the Gulf of Carpentaria, including representatives from the Platyhelminthes, Bryozoa, Arthropoda, Mollusca, Nematoda, Cnidaria and Chordata phyla. To support description of the macroinvertebrate communities of relevance to the Proposal, these have been split into benthic epifauna (living on the seabed, typically attached to hard substrates such as boulders) and benthic infauna (living in the sediment).

Benthic epifauna

The WSP (2023) video transects recorded diversity, abundance and cover of epibiota communities and found all parameters were lower in deeper waters and higher in shallow subtidal areas, following a change in substrate from mud/silt in deeper waters to sand/gravel in shallower areas. Generally, sandy habitat was devoid of epifauna although hard structures scattered amongst sand supported epifauna communities. Soft coral gardens were recorded in Milner Bay by GHD in October 2024, predominantly on boulders along the north-western section of the coastline (Figure 8).

Benthic infauna

No direct studies of benthic infauna have been completed in the survey area; however, bioturbation viewed from video transect surveys can be used as a proxy. Bioturbation is the physical and chemical alteration of sediment by organisms and can be used to assess infauna communities, providing information on both the relative abundance and functional groups of infauna present (i.e., polychaete worms, crustaceans and molluscs).

Extensive bioturbation was observed within the soft mud and silt habitat in subtidal depths; however, no species were directly observed by WSP (2023) during their surveys. Bioturbation was also observed during the Arup (2023) surveys as well as the June 2024, October 2024, November 2025 surveys for this Proposal and under other GEMCO field programs.

In Bartalumba Bay, there was some bioturbation observed, but presence of infauna burrows were generally sparse and no species were observed from the video footage or VanVeen grabs.

Overall, the benthic infauna habitat observed within the marine footprint and the wider Project area was not considered to be unique or of high ecological value. Expansive infauna habitat is located adjacent to the Project area in the form of bare sand habitat (Figure 8).

As noted in Section 5, the ALC raised queries regarding the composition of infauna in the Project area. GEMCO has collected samples for analysis and will present these results to ALC when analysis is completed.

Inshore dolphins

Comments received on the Referral Report noted that both the Australian snubfin dolphin (*Orcaella heinsohni*) and Australian humpback dolphin (*Sousa sahulensis*) were uplisted from Migratory to Vulnerable under the EPBC Act subsequent to the preparation of the Referral Report.

The potential for impact to these species has been reassessed in the context of this uplisting and is summarised in Section 7.1.5 and detailed in Appendix B.

Biosecurity matters

Invasive marine species and their impacts were assessed in Appendix B of the Referral Report. It has since been noted that the NIMPIS contains records of the white colonial sea squirt (*Didemnum perlucidum)* in Gove, NT. Other records have been identified near Darwin and Melville Island.

The white colonial sea squirt is native to the Caribbean, but has been introduced to Australia (Northern Territory, Western Australia and Queensland) in various introduction events via anthropogenic vectors. New colonies can establish when mechanical disturbances cause fragmentation, and the fragments are carried by currents to other areas. Vectors include accidental translocation through aquaculture and fisheries activities, movement of marine infrastructure (i.e., buoys, floating pontoons, navigational aids) and vessels (DAWE, 2022).

Northern Prawn Fishery

As defined in Table 4, the Project area comprises of both the construction footprint and the mixing zone as predicted by the modelling undertaken. The construction footprint (direct impact area) is within the Alyangula Northern Prawn Fishery permanent closure area. However, a small part of the predicted mixing zone, north of the wharf, is within the Northern Prawn Fishery for both the 42-fold dilution contour for nitrogen. The potential impact pathway for nitrogen to the Northern Prawn Fishery is related to eutrophication.

An assessment of flushing rates of the nearshore waters was completed as part of the hydrodynamic modelling (Appendix A), indicating that the nearshore area is well flushed. E-folding timescales (the time to exchange ~67% of the volume with surrounding ambient waters) averaged 16 hours and ranged from 6 to 35 hours. These e-folding times were compared to the PIANC (2008) guidelines for marinas, in which an e-folding time of four days is classified as ‘good’, 4 to 10 days as ‘fair’ and greater than 10 days as ‘poor’. The purpose of the evaluation for marinas is to avoid water quality issues related to stagnation such as eutrophication. Due to the ‘good’ flushing of the nearshore area, potential nitrogen accumulation and eutrophication is unlikely. Therefore, impacts to the Northern Prawn Fishery due to nitrogen enrichment is considered negligible.

Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

N

SOUTH32

GHD

South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Project No. 12624084
Revision No. 0
Date 23/01/2026

Habitat features of Milner Bay

FIGURE 8

Data source: GA - road (2024); GHD - survey areas, benthic habitats (2024); South32: marine footprint (2026), Exclusion zone (2024); World Imagery: Vantor.
Created by: mvandermerwe

7.1.5 Assessment of potential significant environmental impacts

Overview

An assessment of potential significant environmental impacts to marine ecosystems has been provided in Section 6.4 and Appendix D of the Referral Report. This impact assessment has been reviewed based on the changes to the proposed works as detailed in Section 22 and information presented in Section 7.1.4 of this SER. Relevant information is presented in the following sections, including potential impacts associated with:

– Seabed disturbance during construction
– Altered water quality during construction
– Underwater noise during construction
– Marine pests and disease

A summary of the outcomes of the updated Significant Impact Assessment for uplisted species under the EPBC Act is also provided in the following section.

Seabed disturbance during construction

During construction, marine habitat will be removed for an open-cut trench for the pipeline's placement in the nearshore, and for partial burial of the pipeline in the deeper waters. Temporary placement of material will also be undertaken to establish a temporary work platform. As illustrated in Figure 7, seasonal seagrass is present in low density within the marine footprint. This represents an area of 0.77 ha; this area will be directly impacted by construction works. The remaining habitat that will be directly affected is described as open sandy substrate. Habitat will be altered within the construction footprint with trenching causing temporary disturbance.

Sediments excavated during trenching from within the coffer dam are expected to be stored at the port's existing onshore dredge spoil ponds. The seabed in this area will be reinstated via backfill post-pipeline burial. From approximately 5 m water depth the material trenched will be side cast. Following pipeline installation side cast material will be reinstated. Any excess material will be left in situ.

A small area of primarily open sandy substrate (2 ha) will be directly impacted during excavation of the intertidal and surf zone seabed during construction. Of this area, 0.77 ha comprises the low density seasonal seagrass observed during field survey activities.

The benthic habitat within the construction footprint is well represented at a local level, and in the wider region. There will be direct loss of infauna and sessile organism communities that dwell within the strata of the construction footprint directly by removal (from excavation). The potential for indirect impacts on benthic habitat outside of the construction footprint via changes to water quality (suspension / settlement of fine sediments) will be limited by the use of sheet piles to form a cofferdam, or the use of silt curtains, within which all trenching is proposed to occur. Impacts to the receiving environment, including water quality and benthic habitats are therefore expected to be contained to the marine footprint.

Post construction, recovery of the benthic community is expected to occur on a scale of weeks to months. This has been previously observed for dredging seabed disturbances, for example McCauley (1977) identified recovery of infauna to pre-dredging conditions to occur within 28 days of the disturbance ceasing. As such, impacts to communities present on the seabed are expected to be localised and short term, and thus are considered low risk.

This assessment is further supported by a study conducted by Vanderklift et al. (2017). Vanderklift et al. studied the mechanisms of seagrass recovery following disturbance in the northwest of Western Australia, focussing on the tropical species, *Halophila ovalis*. *H. ovalis* is considered to have a low resilience to disturbance but has been found to display the ability to recover rapidly. The study found that a 0.5 m^2 cleared patch of *H. ovalis* was able to recover within 2 to 3 months after disturbance through vegetative regrowth. However, the recovery from a disturbance that causes a large loss of *H. ovalis* would take longer due to the reliance on immigration of plant fragments or seeds from distant sites. It also noted that a study by Taylor et al. (2013) found small, cleared patches of subtidal *H. ovalis* were able to recover within 4 to 6 months through vegetative regrowth. Impacts to any seagrasses that may be present within the marine footprint will be localised. For areas where disturbed substrate will be reinstated, recovery is expected to occur on a scale of months if supported by vegetative regrowth. Recovery will take longer if it is solely reliant on immigration of plant fragments or seeds from distant meadows.

Given the marine footprint intersects only part of the seasonally present seagrass meadow, recovery supported by vegetative growth is expected.

It is noted that the seabed lay of the pipeline will change habitat from soft sediment to hard substrate creating artificial reef opportunity. Additional scour protection in the form of an articulated concrete mattress overlying the buried pipeline will also create artificial reef opportunity.

The installed marine infrastructure will provide a substrata for biofouling communities (e.g. molluscs, sponges, bryozoans, crustaceans and ascidians) similar to those observed on natural hard substrata in the region (Section 7.1.4). Settlement of, and colonisation by, sessile, encrusting and biofouling organisms on the hard substrata of the submerged marine structure is expected to commence immediately following installation, after which, the biofouling community will undergo a long-term natural recruitment succession process (Hamer and Mills, 2015). It is expected that a mature community, comparable to that currently present on natural hard substrate in the region may be achieved within a few years.

A large body of scientific evidence shows that pipelines and associated infrastructure support diverse and abundant fish assemblages by acting as artificial reefs (e.g. Bond et al. 2022; Birt et al., 2024). Communities are expected to be dominated by a variety of sponges, ascidians, cnidarians, and algae, supporting an array of invertebrate and fish species, similar to the ecology on and around the Project area.

Whilst habitat creation may be perceived as a positive impact, the colonisation of the submerged marine infrastructure will require regular maintenance activities to maintain adequate flow velocities at the outlets. Such activities come with risks associated with vessel movement and maintenance activities on slow-moving and sessile marine species. Artificial structures may also facilitate invasive marine pest proliferation through provision of habitat for establishment of non-indigenous species (Glasby et al., 2007), particularly in the Project area which is characterised by stretches of open substrate absent of extensive hard substrata habitat. These potential impact pathways are assessed in the Referral Report.

Altered water quality during construction

Potential impact pathways associated with altered water quality during construction are reviewed and assessed in the Referral Report. No additional impact pathways have been identified in the SER. As noted in Section 2.5, additional areas of excavation have been identified as a result of design progression. Given that all seabed excavation will be undertaken inside of the cofferdam or inside of silt curtains, the risk assessment outcomes associated with altered water quality during construction have not changed from that presented in the referral. The mitigation measures proposed to be included in a CEMP for the Proposal are outlined in Section 7.1.6. Following consultation with the NT EPA, additional monitoring of water quality during construction has also been committed to (refer to Section 7.1.6).

Underwater noise and vibration

The Proposal has the potential to generate underwater noise emissions during installation of the pipeline. Vessel operation, piling and trenching during construction within the marine section of the Project area have the potential for underwater noise and vibration impacts.

Noise impacts from impact piling

The preferred piling methodology is use of a vibratory hammer. However, where ground conditions prevent the pile from reaching the required depth, a hydraulic impact hammer will be used to finish the pile installation. It was identified in the Referral Report that should impact piling become necessary a detailed underwater noise impact assessment would be undertaken to identify appropriate mitigation measures. Noise impacts from impact piling have since been assessed. Details regarding this assessment are provided in Appendix C.

The source level of impact piling a steel pipe pile with a diameter of 0.61 m is 178 dB re 1 μPa^2 s at 10 metres from the source. Distances to the permanent threshold shift (PTS) and temporary threshold shift (TTS) threshold levels for different groups of marine mammals were determined for impulsive noise sources such as impact piling. For high frequency cetaceans, and sirenians, the distance to PTS threshold levels was found to be 87 m and 86 m respectively, while the distance to TTS threshold levels was 253 m and 242 m respectively.

For fish species and turtles, the distance to threshold level was calculated for different scenarios: TTS threshold level, recoverable injury, and mortality and potential mortal injury. For fish with and without a swimming bladder involved in hearing the distance to the TTS threshold level is 1,622 m, while for sea turtles it is 1,023 m. The

distance from the noise generating activity where fish and sea turtles are likely to experience a recoverable injury or mortality and potential mortal injury are below:

– Recoverable injury:
  - Fish without a swimming bladder involved in hearing: 92 m
  - Fish with and without swimming bladder involved in hearing: 676 m
  - Sea turtles: 580 m.
– Mortality and potential mortal injury:
  - Fish without a swimming bladder involved in hearing: 86 m
  - Fish with swimming bladder not involved in hearing: 342 m
  - Fish with swimming bladder involved in hearing: 542 m
  - Sea turtles: <10 m.

It should also be noted that these threshold levels are based on the total noise exposure over 24 hours if the animal is in a fixed position and continuously exposed to a noise source. This is considered an unlikely worst-case scenario since, more realistically, marine animals would not stay in the same location or at the same distance from a sound source for an extended period of time. Therefore, the estimated range to an exceedance of the threshold levels does not mean that any animal travelling within this radius from the source will be injured, but rather that it could be injured if it remained within that range for the entire duration of the construction activities.

Impact piling activities, where required, are anticipated to affect marine fauna near the piling activity. Mitigation measures to reduce risk of impacts to marine fauna, fishes and sea turtles are to be implemented. These are detailed in Section 7.1.6, Appendix C and Appendix D.

Cumulative noise impacts from vessel movement

As noted in Section 5, submissions by DLPE requested an assessment of the potential cumulative noise impacts associated with construction vessel movement and existing shipping. This is summarised below and detailed in Appendix C.

Underwater noise is generated from vessel movement. Given that the Proposal is near the existing GEMCO wharf, and the marine traffic in close proximity to the wharf is relatively high density, sound pressure noise level noise descriptors are not expected to increase significantly.

However, the cumulative sound exposure level noise descriptor (typically assessed/measured over a 24-hour period) could increase depending on the following factors:

1. The composition, speed and frequency of vessel movements associated with the Proposal in the port
2. The composition, speed and frequency of existing vessel movements in the port
3. The propeller design, hull design and selection of onboard machinery for vessels described in 1) and 2), and
4. The proximity of a given receptor location to the vessel routes described in 1) and 2).

Depending on the size and speed of the vessel, the sound levels radiating from it range from 160 to 220 dB re 1 µPa at 1 m with main frequencies from 1 to 500 Hz (McCauley 1994; NRC 2003). Vessel traffic, especially at low frequencies (5 to 100 Hz), is a major contributor to noise in the world's oceans, and under the right conditions, these sounds can propagate hundreds of kilometres, affecting very large geographic areas (Pidcock et al., 2003).

Typical Source Levels (SL) of vessels from the ECHO measurement dataset in MacGillivray & Li (2018) and MacGillivray & de Jong (2021) have been provided in Appendix C. The existing wharf is used by bulk-type vessels, which radiate broadband sound levels between 177 and 188 dB re 1 µPa at 1 m while in transit (McKenna et al., 2012). While berthed, the vessels would also radiate sound from the on-board engine and generator that powers the vessel. Sound levels while berthed would be less than during transit due to the lack of propeller movement.

Existing vessels at the GEMCO wharf consist of one tanker per month, one ore carrier approximately every three days, and two to three barges per week. Construction of the Proposal would require support vessels such as small watercraft, barges and jack-up barges and a pipe-laying vessel. Noise radiated from the small watercraft, barges and jack-up barges is considered minimal, whereas noise from a pipe-laying vessel would be similar to that of trenching activities.

Noise radiated from proposal-related vessel movements during construction is considered minimal, and is likely to be comparable to, or even less than, the noise generated by existing port traffic. Generally, doubling the number of noise sources results in only a modest increase in overall noise levels. Gradual exposure to continuous noise sources, such as additional shipping vessels during construction of the Proposal, is generally regarded as being less harmful and less likely to startle or stress marine fauna than rapid-onset impulsive noise sources like piling (Hamernik et al., 1993; Hamernik et al., 2003).

Marine pests and disease

As noted in Section 7.1.4, initial review of known invasive marine species undertaken for the referral did not include the records of the white colonial sea squirt (*Didemnum perlucidum*) in Gove. All potential impact pathways relevant to the Proposal were reviewed in the Referral Report. The proposed management and mitigation measures outlined in Section 6.4 and Appendix D of the Referral Report are aligned with industry standard, informed by Australian biosecurity requirements. No additional mitigation measures are proposed in this SER.

Threatened fauna

To assess matters of national environmental significance, a self-assessment of the Proposal was conducted in accordance with the EPBC Act '*Significant impact guidelines 1.1 – Matters of national environmental significance'* in the referral stage. Since the self-assessment was completed, two species; the Australian humpback dolphin (*Sousa sahulensis)* and Australian snubfin dolphin (*Orcaella heinsohni*) have been listed as Vulnerable under the EPBC Act (Effective 5 March 2025). Updated significant impact assessments have been conducted for these species in accordance with the guidelines for vulnerable species and are included in Appendix B.

The assessment found it is unlikely that the Proposal will have a significant impact on the Australian humpback dolphin and Australian snubfin dolphin.

In addition, a significant impact assessment was also conducted for the whale shark (*Rhincodon typus),* listed Vulnerable and migratory under the EPBC Act. The whale shark was previously assessed as 'may occur' in the Study area (construction footprint plus 10 km buffer) in the Referral Report likelihood of occurrence assessment. However, in November 2025, eight juvenile whale sharks were spotted off Groote Eylandt by a team from the Anindilyakwa Land and Sea rangers and Australian Institute of Marine Science. The likelihood of occurrence was updated to 'likely to occur' and therefore required a significant impact assessment. This assessment is provided in Appendix B.

The assessment found it is unlikely that the Proposal will have a significant impact on the whale shark.

7.1.6 Avoidance and mitigation

Overview

Measures to avoid and mitigate environmental impacts to marine ecosystems have been provided in Section 6.4 and Appendix D of the Referral Report. These measures have been reviewed based on the changes to the proposed works as detailed in Section 2 and information presented in Section 7.1.4 and 7.1.5 of this SER. Additional mitigation measures have been identified in the following sections, whilst all measures identified in the Referral Report and the SER have been collated in Appendix D for ease of reference.

A receiving environment monitoring strategy to be implemented during construction and operation has been provided in Appendix E.

Altered water quality during construction

The following mitigation measures will be implemented to manage the potential for impact associated with altered water quality during construction:

– All seabed excavation will be undertaken inside of the cofferdam or inside of silt curtains
– Monitoring of turbidity and underwater light in the receiving environment will be undertaken during construction. This program will include:
    - Monitoring at the inshore rocky reef area located between the wharf and the marine footprint
    - Monitoring at the reef/seagrass area to the south of the marine footprint

- Monitoring at a suitable far-field reference location
- In-situ measurements of turbidity every 15 minutes, with data telemetered to an online platform for visualisation in near real time
- Setting of ecologically relevant threshold values for management action. Thresholds will be informed by baseline data and relevant scientific literature, including the outcomes of the Western Australian Marine Science Institute's (WAMSI's) Dredge Science Node (DSN) referenced in the Draft NT EPA marine dredging guideline, and will consider holistic changes in water quality encompassing intensity and duration
- The implementation of the marine monitoring strategy described in Appendix E
- Management actions will be clearly set out in the CEMP for the works and will be linked to threshold values based on a tiered early warning system. Management actions will likely include:
  – Review of efficacy of installed silt curtains
  – Modification of trenching works (location, duration, etc)
  – Temporary cessation of trenching works.

Threatened fauna

Management and mitigation measures for impacts to marine species and their habitat, during construction and operation, have been provided in Appendix B of the Referral Report. Additional measures related to underwater noise impact pathways are outlined below.

Underwater noise

Key mitigation measures to reduce the risk of noise related impacts on marine fauna from impact piling include:

– Safety zones for marine mammals, whale sharks and turtles: Two safety zones, observation and shut-down zone, will be applied around the location of each noise generating activity:
  - A shut-down zone, within which the observation of marine mammals, whale sharks and turtles will trigger noise-generating activities to cease as soon as reasonably practical. The shut-down zone is 250 m from impact piling activities.
  - An observation zone, within which the movement of marine mammals, whale sharks and turtles will be monitored to identify any approach to the shut-down zone where practicable. The observation zone is sized based on a nominal 250 m distance from the outer edge of the shut-down zone.
– Planning of activities: Planning of impact piling activities will be incorporated into the marine fauna management plan. This includes, where feasible,
  - Avoiding periods where marine megafauna are likely to be breeding, calving, feeding or resting within biologically important habitats in potential noise impact areas.
  - Ensuring a marine fauna observer is present during impact piling.
  - Staff are briefed on environmental regulations and marine fauna and habitat.
– Standard operational procedures for impact piling: This includes visual monitoring for marine fauna 30 minutes before impact piling and gradually increasing impact piling over 10 minutes, allowing marine life to be alerted and move away.

Refer to Appendix C for the updated noise and vibration impact assessment or Appendix D for the summary of mitigation measures for further details.

7.1.7 Cumulative impacts

The potential for cumulative impacts has been considered against each of the potential impact pathways for the project.

– Seabed disturbance:
  - Potential for cumulative impacts in the Project area via the seabed disturbance pathway and associated flow on effects to water quality are associated with dredging activities at the port. The most recent capital dredging campaign was undertaken in 2022 to upgrade the tug berth. This program was conducted

under a dredge management plan, which included monitoring of water quality before, during and after dredging activities. Analysis of results from that program indicates that there was no impact from turbidity or mobilised metals and metalloids due to dredging activities (Arup, 2022).

- Maintenance dredging of the port is undertaken as required and is not planned during the construction period.
- No other Groote Eylandt port construction activities, including capital dredging activities are planned to occur during the construction phase of the project.
- The Winchelsea Island Manganese Mine project located approximately 12 km north-east of the Proposal is currently at 'Supplement to the draft EIS' phase. That project proposes to construct a wharf to facilitate trans-shipment of mined ore, which will involve installation of piles and dredging of marine sediments which will generate underwater noise and suspended sediment plumes. Given that seabed disturbance works for this Proposal will be undertaken either within the cofferdam or inside silt curtains, the potential for cumulative impacts associated with the seabed disturbance pathway between this Proposal and the proposed Winchelsea project are considered unlikely.

– Shipping noise:
  - As noted in Section 7.1.5, noise radiated from Proposal-related vessel movements during construction is considered minimal, and is likely to be comparable to, or even less than, the noise generated by existing port traffic. Cumulative impacts associated with vessel movements are expected to be negligible. No other anthropogenic noise sources are expected to be present during construction.
– Introduction of marine pests and diseases:
  - Cumulative impacts in the Project area relating to the marine pest and disease impact pathway are not predicted. Biosecurity is managed at the port level in accordance with Australian biosecurity requirements. Construction vessels will be sourced locally wherever possible and will be required to adhere to Australian biosecurity requirements, as well as GEMCO's biosecurity inspection procedure and GEMCO's port regulations and guidelines for arriving.
– Marine fauna strike / disturbance:
  - The Project area is a working port environment, as such marine fauna that are present in the area are subject to anthropogenic disturbance. To mitigate the risk of cumulative impact to marine fauna all vessels utilised for the Proposal will adhere to speed limits within and around the wharf (6 knots). The potential for cumulative disturbance via underwater noise is addressed above. Cumulative impacts associated with marine fauna strike are expected to be negligible.
  - As noted in Section 7.1.5, pile driving will generate underwater noise, which could lead to the avoidance of the area by marine fauna whilst works are underway. No other Groote Eylandt port construction activities are planned to occur during the construction phase of the Proposal. The Winchelsea Island Manganese Mine project located approximately 12 km north-east of the Proposal is currently at 'Supplement to the draft EIS' phase. The likelihood of that project achieving regulatory permitting and commencing construction at the same time as this Proposal is considered low. However, should this occur, there is potential for cumulative impact to avoidance behaviour of marine fauna if both proposals are generating underwater noise at the same time. This would potentially lead to further pressures on resources outside of the areas being avoided. Given the Project area is not highly utilised by threatened species, particularly in comparison to other areas in the Groote Archipelago, the contribution of this Proposal to cumulative pressure is considered low.

Note: potential cumulative impacts associated with changes in water quality during discharge are addressed in Section 7.2.

7.1.8 Predicted outcome / conclusion

The marine footprint lacks high value habitat features such as coral reef and high-density seagrass meadows. The marine footprint consists primarily of sandy substrate. An area of 0.77 ha of low density seasonally present seagrass overlaps with the marine footprint. However, it is noted that that the marine footprint represents a conservative area, and most of this area will not be subject to permanent impact, therefore less than 0.77 ha of seagrass habitat is predicted to be impacted by the Proposal.

The proposed management and mitigation measures will be implemented to minimise the risk of impact to marine species due to activities associated with construction and operation. These measures have been identified in the Referral Report, and where relevant (e.g. for underwater noise generating activities) updated in this SER.

Table 15 presents the environmental risk analysis for the *SEA: Marine ecosystems* environmental factor. The consequence and likelihood is provided in accordance with the rating system provided in Table 11 and Table 12. The overall residual risk (i.e. the risk remaining following the successful implementation of identified avoidance and mitigation measures) has been assessed in accordance with the matrix provided in Table 13.

With the application of identified management and mitigation measures the Proposal is not predicted to have significant impact on marine ecosystems, and the NT EPA's objective for the marine ecosystem factor to *'protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning*' will be met.

Table 15 Environmental risk analysis for SEA: Marine ecosystems

Environmental values	Potential Impact	Unmitigated			Avoidance and mitigation	Residual		
		L[1]	C[2]	R[3]		L[1]	C[2]	R[3]
– Conservation significant species – Soft substrate benthic ecology, including low density seasonal seagrass	– Seabed disturbance – Water quality impacts – Underwater noise – Introduction of marine pests / diseases (assessed in referral) – Marine fauna strike / disturbance (assessed in referral)	A	3	E	– Siting of pipeline to avoid sensitive marine habitat* – Seabed excavation works to be undertaken inside cofferdam or silt curtains – Placement of material for temporary work platform undertaken inside silt curtains – CEMP and OEMP development and implementation, including monitoring plans* – Monitoring of water quality during construction – Underwater noise management measures implemented – Model validation monitoring implemented* – Spill avoidance/management measures implemented* – Biosecurity management implemented* – Vessel operation restrictions implemented*	D	2	L

[1]L: Likelihood, [2]C: Consequence, [3]R: Risk; *mitigation measure outlined in referral

7.2 SEA: Marine environmental quality

7.2.1 Objective for environmental factor

The NT EPA's objective for the marine environmental quality factor is to '*protect the quality and productivity of water, sediment and biota so that environmental values are maintained*.'

7.2.2 Additional information and investigations

This section provides additional information relating to referral submission for the SEA: Marine environmental quality factor. Additional information provided here addresses concerns regarding:

- Sediment characteristics, including information relating to PASS
- Additional modelling to consider vertical mixing of discharge waters during high wave conditions
- Additional modelling to consider the potential for cumulative impacts
- Additional dispersion modelling of suspended sediments and deposition during discharge activities
- Assessment of the potential for bioaccumulation of metals from discharge waters.

Geotechnical assessment undertaken since submission of the Referral Report provides additional information relating to the sedimentary characteristics of the marine footprint. This information is provided in Section 7.2.4. Additional modelling is summarised in Section 7.2.5, with an updated modelling report provided in Appendix A. Assessment of potential for bioaccumulation of metals in discharge waters is also provided in Section 7.2.5 and Appendix A.

7.2.3 Policy and guidance

The following documents have been used to assess the potential for impact to marine environmental quality:

- ANZECC & ARMCANZ (2000) water quality guidelines
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) 2018
- NT EPA Guidelines on Mixing Zones version 1.2 (2013)
- PIANC (2008) standard for marinas
- Draft NT EPA Environmental factor guidance: Marine ecosystems (2025)
- Draft NT EPA Guidelines for assessment of impacts on marine biodiversity (2025)
- Draft NT EPA Marine dredging guideline (2023)
- WA EPA Technical Guidance – Environmental impact assessment of marine dredging proposals (2021).

7.2.4 Environmental values

Sediment characteristics

GEMCO conducted a geotechnical investigation of the offshore Project area in March 2025.

Subsurface materials were found to be predominantly clayey / silty sand with up to 30% gravel content, and secondary materials being sandy clay with up to 60% fines content. The particle size distribution in the samples collected can be viewed in Figure 9. Simplified column settling tests were undertaken to evaluate the sedimentation behaviour of materials. It was found that the materials have a rapid initial settling phase, with most solids consolidating within the first 20 minutes. For construction activities that cause the resuspension of sediments, residual turbidity may remain in the water column, but any associated plume is expected to dissipate relatively quickly, suggesting minimal long-term dispersion in the wider marine environment. Additional management measures will also be in place to support management of plumes generated via excavation works (refer Section 7.2.6). Samples were tested for soil dispersity; all five samples that were tested had an Emerson class number of 5, indicating the soils are stable. However, it was noted, it has the potential to disperse, break down and spread out in water when saturated and worked.

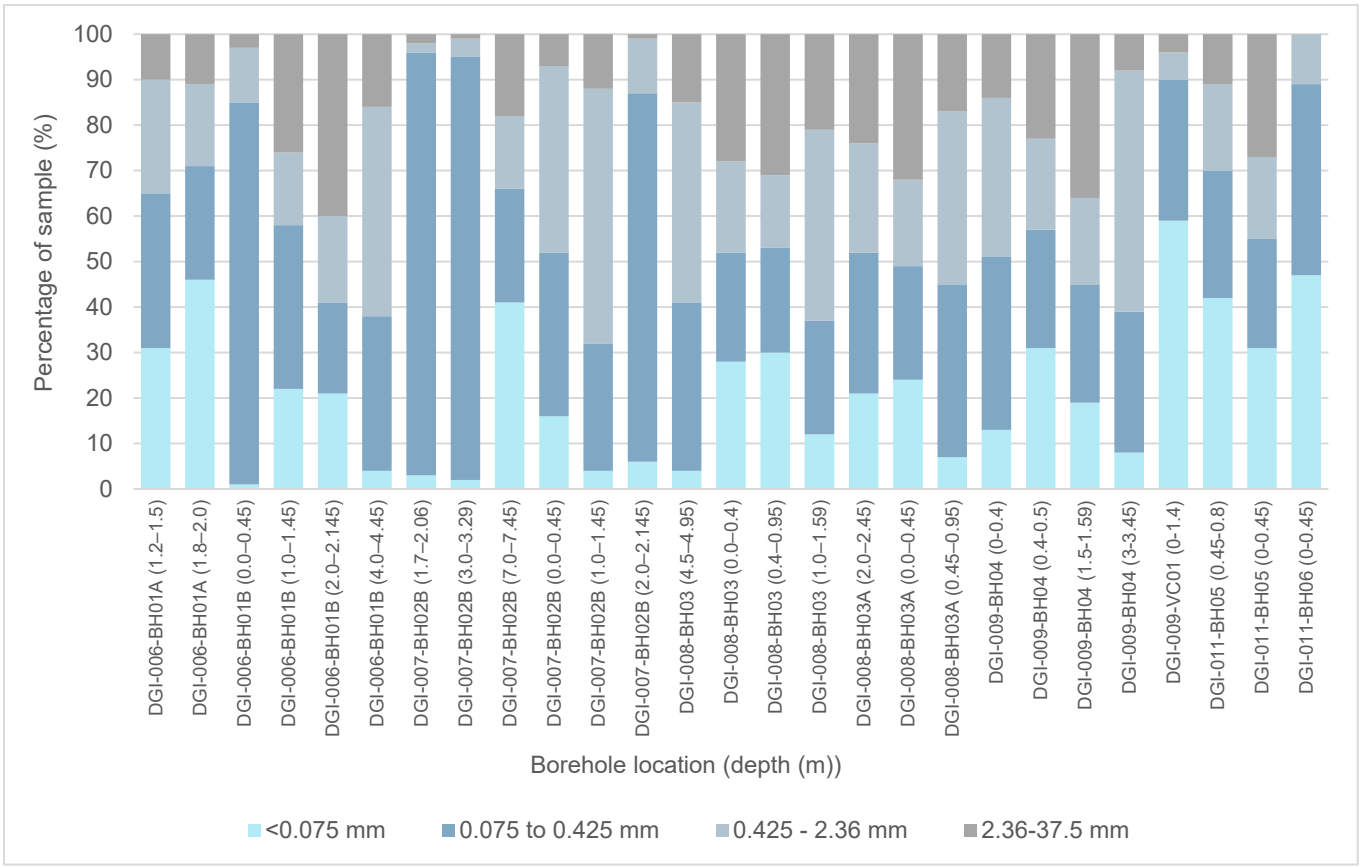


Figure 9 *Particle size distribution of sediment samples (REE, 2025)*

Acid sulfate soil assessments

Two assessments inform the potential for AASS or PASS:

– The geotechnical assessment conducted within the marine footprint in March 2025, and
– A survey including sediment sampling and analysis at the GEMCO tug berth area within the port conducted during November 2020.

Geotechnical investigation within offshore project footprint – March 2025

ASS screening tests to assess the presence of AASS or PASS were carried out on 14 samples collected during the geotechnical investigation in March 2025. The samples were collected along the proposed pipeline alignment and throughout the depth profile.

The screening test was using the field pH method (pH_F) which measures the pH in deionised water, and the field oxidised pH method (pH_{FOX}) which measures the pH in 30% hydrogen peroxide. The criteria on which the results of screening tests (pH_F and pH_{FOX}) are assessed as indicative of possible AASS or PASS were as follows:

– pH_F <4 indicates oxidation has occurred in the past and that actual acidity is present
– pH_F between 4 and 5.5 indicates the soils are acidic. This may be as a result of limited oxidation of sulphides but may also be as a consequence of the presence of organic acids
– pH_F between 5.5 and 7 indicates the soil to have no actual acidity, however this can be common with PASS materials or marine influenced samples.

The pH_F test method does not detect acidity bound within sulphides, the pH_{FOX} test gives an indication of any potential acid release. Results of the pH_{FOX} are summarised as follows:

– pH_{FOX} <3, plus a pH_{FOX} reading at least one pH unit below pH_F, plus a strong reaction with peroxide, strongly indicates the presence of PASS
– pH_{FOX} between 3 and 4 indicates the possibility of PASS material
– pH_{FOX} between 4 and 5 may indicate the presence of small amounts of sulphide or fine carbonates

– pH_{FOX} >5, plus a minimal difference to pH_F indicates that PASS is unlikely.

Field screen analysis also included a reaction rating observation between 1 and 4 to help classify the level of the reaction the samples had to the addition of the peroxide, detailed by:

– 1 = No reaction to slight reaction
– 2 = Moderate reaction
– 3 = Strong reaction with persistent frothing
– 4 = Extreme reaction.

The screening for ASS resulted in the following:

– All samples returned pH_F > 4, indicating that the soils are not AASS (Figure 10)

The pH_{FOX} for the samples is generally between 5.5 and 7.5 which indicates unlikely to be AASS. A single outlier of 1.4 (25A-VC01) shows a strong indication of AASS as shown in Figure 11:

– Thirteen (13) of the fourteen (14) soil samples returned pH_{FOX} values > 5 with minimal difference in pH_F, indicating PASS is unlikely (Figure 12)
– One sample (25A-VC01) returned pH_{FOX} < 3.0 and ΔpH_F > 1.0, indicating PASS (Figure 12).

Based on these results the assessment concluded that the presence of PASS is considered unlikely in the depths tested.

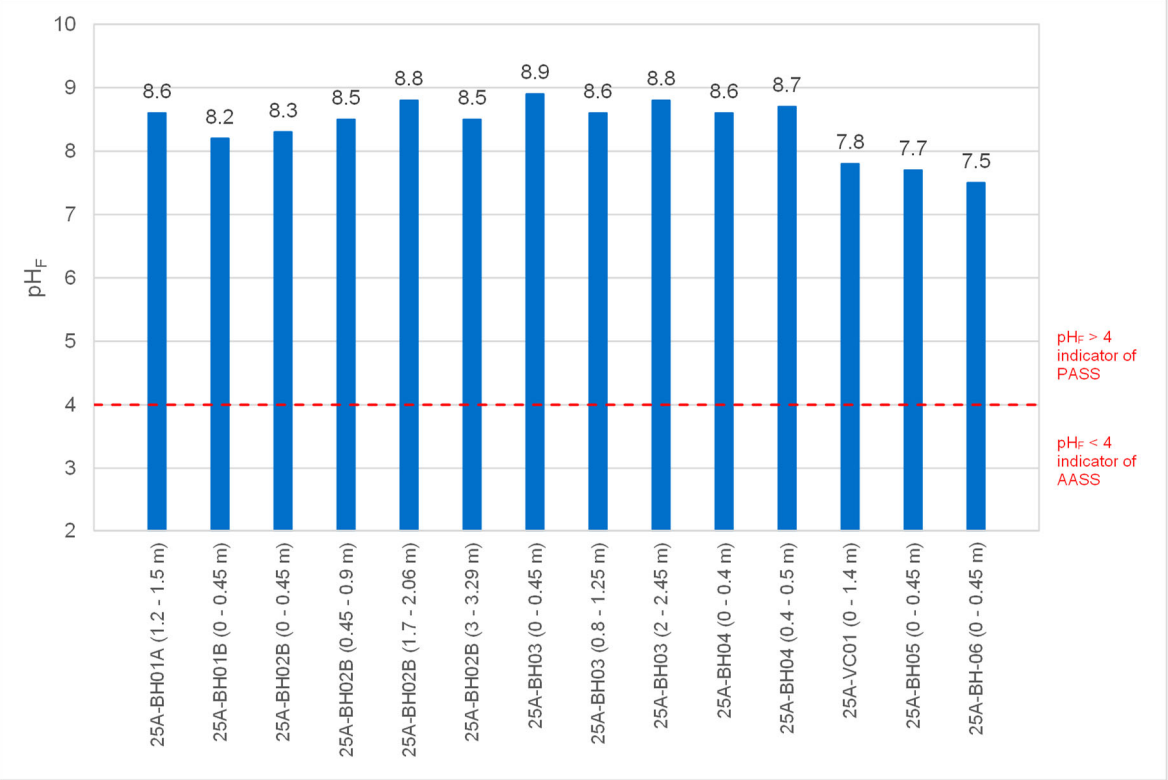


Figure 10 ASS screening test pH_F

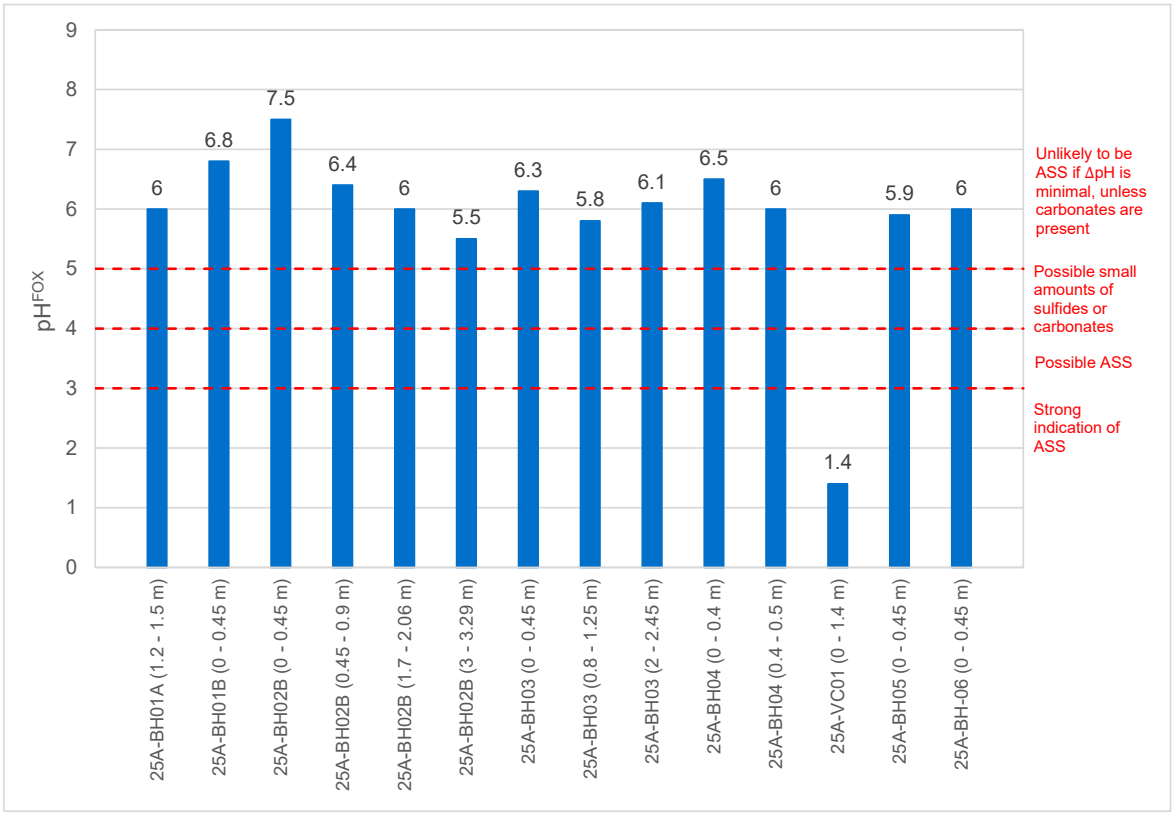


Figure 11 ***ASS screening test pH_{FOX}***

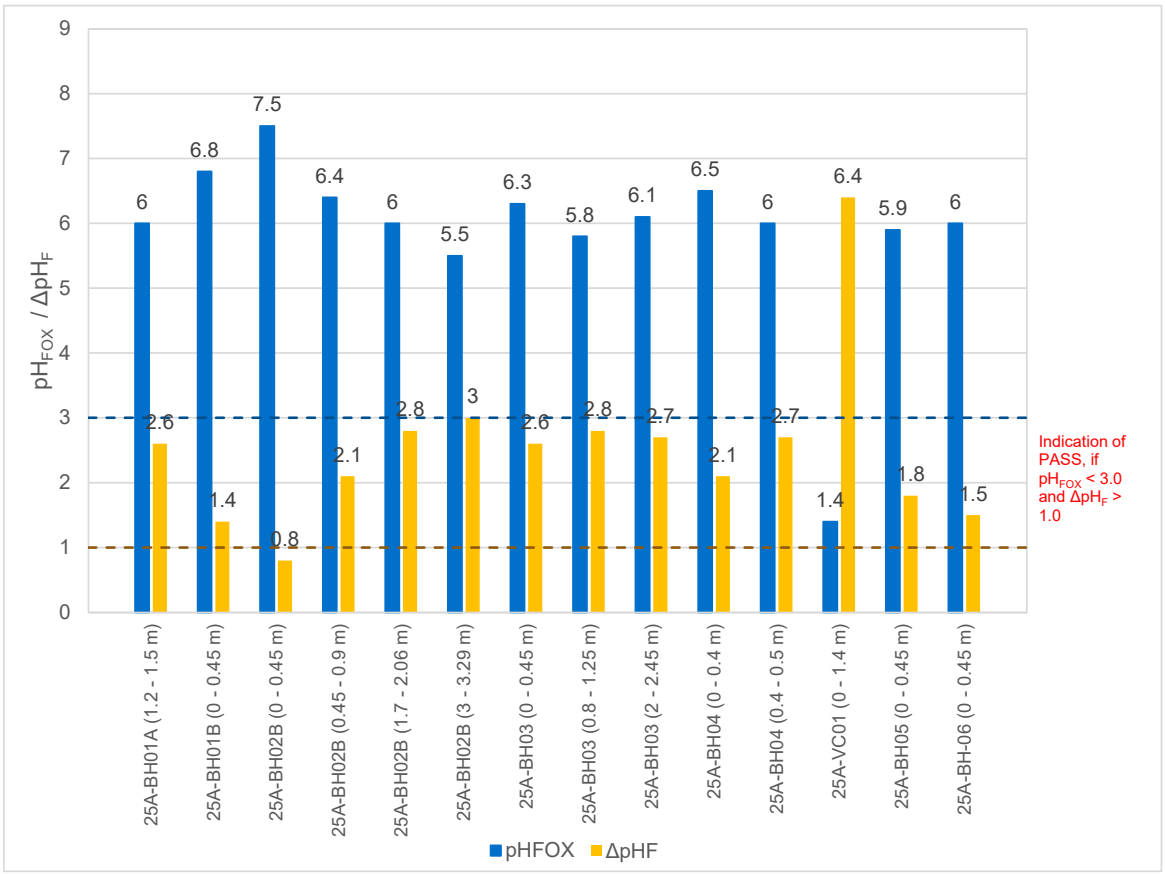


Figure 12 ***ASS screening test pH_{FOX} and ΔpH_F***

Sediment sampling and analysis at GEMCO tug berth area – October 2022

Five sediment samples were collected for acid sulfate soil potential. The chromium reducible sulfur suite method was used to estimate the actual and potential acidity of a sediment sample, the sample's acid neutralising capacity and the resultant total net acidity.

Laboratory analysis of the sediments identified extremely low acid sulfate forming potential. Tests indicated that all sediments had large negative net acidity and therefore a high capacity to self-neutralise if exposed to oxygen (i.e. stored on land) and extremely low risk of contaminant mobilisation due to acidification.

7.2.5 Assessment of potential significant environmental impacts

Modelling of vertical mixing of discharge waters during high wave conditions

The Referral Report presented a modelled mixing zone extent for the operational discharge scenario. This is replicated in Figure 13 – left. The influence of waves was excluded from that modelling study due to sheltered nature of the site (behind Groote Eylandt) and the anticipated effect of waves introducing additional mixing/dilution via vertical circulation of the plume. On this basis, the exclusion of waves was therefore considered conservative.

In response to the recommendation in the submission from DLPE, modelling of the mixing zone inclusive of the influence of wave conditions has now been undertaken. The results of the modelling are presented in detail in Appendix A. Figure 13 – right provides the predicted mixing zone for surface waters. Compared to the size of the mixing zone where the wave action was not considered (Figure 13 – left), the mixing zone has slightly reduced in size:

– The outer extent of the surface mixing zone for **potential indirect effects** (42-fold dilution target related to nitrate enrichment) is predicted to extend ~630 m north and ~460 m southeast from the diffuser
– The outer extent of the surface mixing zone for **potential direct effects** (35-fold dilution target related to salinity reduction) is predicted to extend ~400 m north-northwest and ~300 m southeast from the diffuser
– There remains no predicted mixing zone for **metals and metalloids exposure**
– There remains no predicted mixing zone at the seabed for any of the assessed dilution targets due to the buoyant nature of the plume.

These findings indicate that the inclusion of waves has no negative impact on the area of dilution and further demonstrated the lack of interaction of the plume with sensitive benthic communities on the seabed. Therefore the impact assessment conclusions presented in the Referral Report remain valid. No additional management and mitigation measures are proposed for this element.

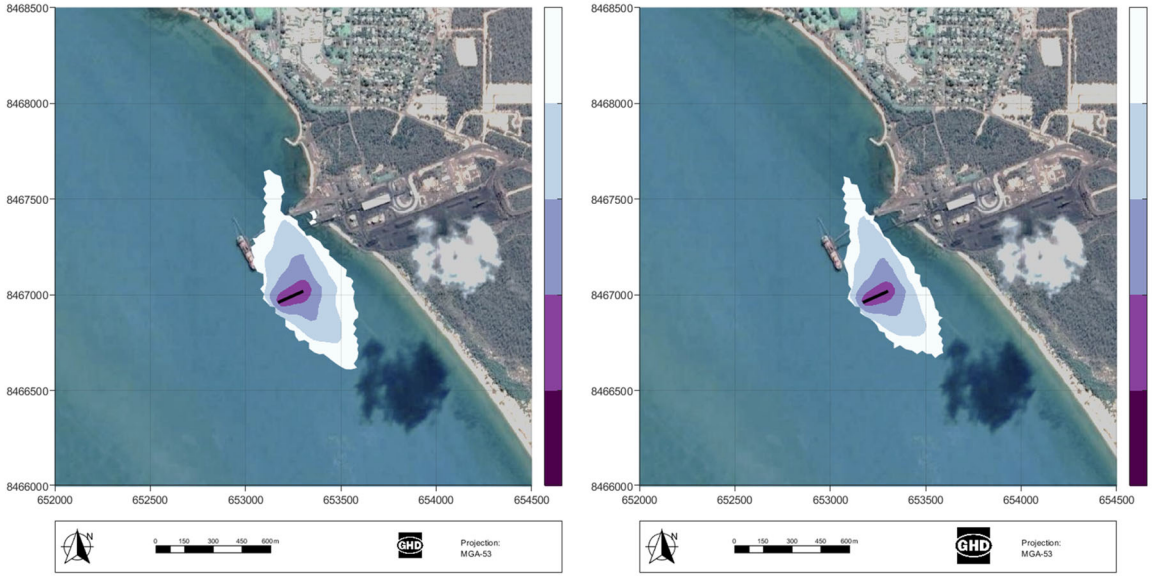


Figure 13 ***Predicted surface mixing zone without waves (left) as presented in the Referral Report and with waves (right), with the zone of potential indirect effects represented by the 42-fold dilution contour and the zone of potential direct effects represented by the 35-fold dilution contour***

Modelling of potential cumulative impacts

The STP outlet north of the diffuser ports discharges effluent containing various nutrient concentrations into the ocean. To understand a potential cumulative impact between mine water discharge and treated effluent discharge, nutrient concentrations at both outlets were modelled. As the STP outlet is already in operation, the assessment solely focussed on nutrients that are also present in the mine water discharge plume. Modelling was based on highly conservative assumptions that include both discharges continuously operating at high flow rates for a full year.

Generally, while some of the concentrations from the treated effluent discharge are relatively high compared to the mine water discharge, the flow is relatively small (0.011 m^3/s for the treated effluent discharge versus 2.54 m^3/s for the mine discharge), resulting in limited interaction between the nutrients in the two plumes.

Key outcomes of the cumulative assessment include:

– No cumulative effects between aluminium and iron discharge from the mine water discharge and treated effluent discharge is expected
– There is potential for cumulative effects for nitrate, as the 95th and the 99th percentile contours extend across both the diffuser ports and the STP outlet
– There is potential for cumulative effects for salinity as the 1st percentile extends across both the diffuser ports and the STP outlet
– Per the mixing zone assessment, no dilution is required from the mine water discharge for phosphate, as the concentration is below the target value. Although phosphate concentrations from the STP outlet are relatively high, the plume does not extend toward the diffuser ports, and cumulative effects are therefore not anticipated.

Figure 14 – left presents the contour plot for potential cumulative effects relating to the mixing zone for nitrate. Figure 14 – right, which presents the nitrate mixing zone for marine discharge only. Comparison of the spatial footprint of these two scenarios shows minimal change in the mixing zone for nitrate under a cumulative scenario. Therefore, the impact assessment conclusions presented in the Referral Report remain valid. No additional management and mitigation measures are proposed for this element.

A similar comparison of salinity (Figure 15) also shows minimal change, and therefore the impact assessment conclusions presented in the Referral Report remain valid. No additional management and mitigation measures are proposed for this element.

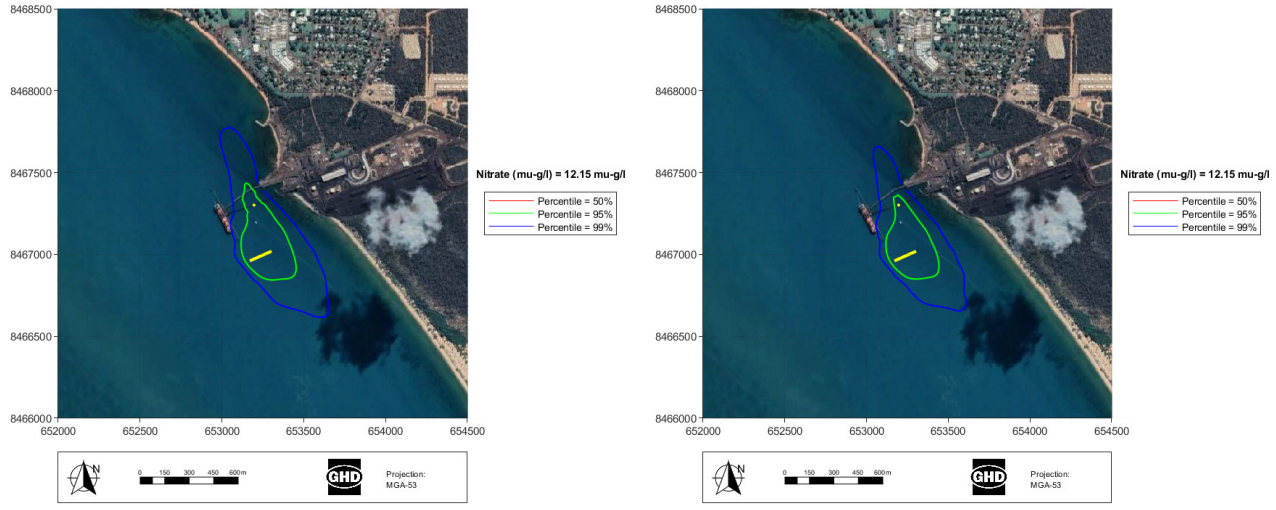


Figure 14 ***Contour plot for the 50th, 95th and 99th percentile extents of where the target value of nitrate is achieved for the cumulative discharge (left) and GEMCO mine discharge only (right). Yellow indicates the location of the diffuser ports (line) and the STP outlet (point)***

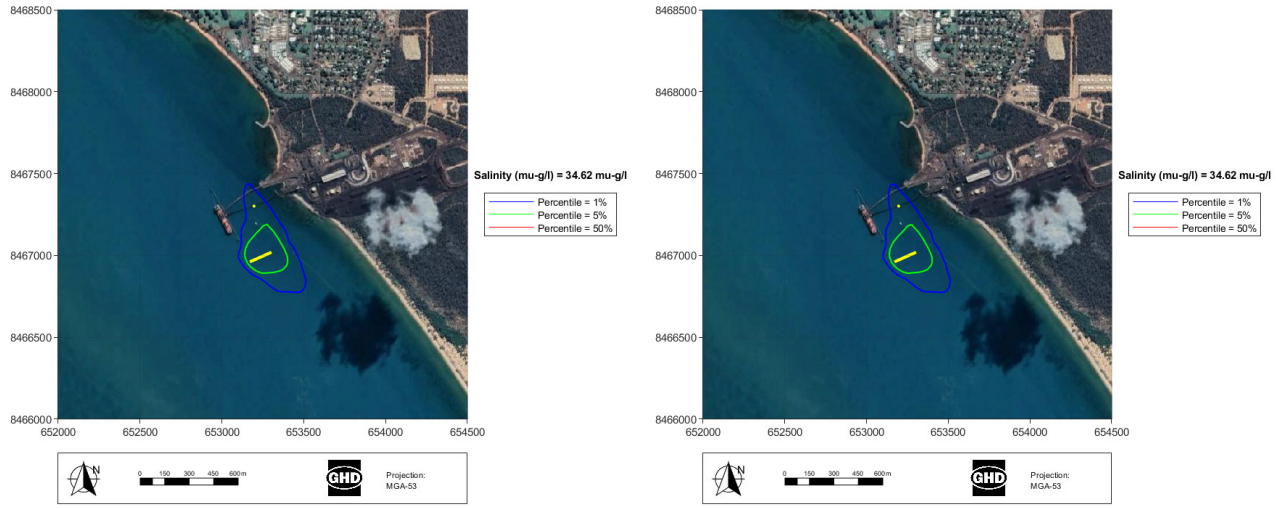


Figure 15 ***Contour plot for the for the 50th, 5th and 1th percentiles extents of where the target value of Salinity is achieved for the cumulative discharge (left) and GEMCO mine discharge only (right). Yellow indicates the location of the diffuser ports (line) and the STP outlet (point).***

Dispersion modelling of suspended sediments and deposition during discharge activities

Dispersion modelling of suspended sediment and deposition during discharge activities has been undertaken, with results presented in detail in Appendix A. Modelling included both the mine discharge water and the STP outlet discharging in parallel, so represents a cumulative assessment. Additionally, waves were also included in these simulations, which generate bed shear stress (along with ambient currents) that can remobilise deposited sediments back into the water column or prevent deposition from occurring under energetic wave conditions.

Modelling was undertaken in accordance with the guidance from the WAMSI DSN, as well as the WA EPA's (2021) *Technical Guidance – Environmental impact assessment of marine dredging proposals*, which is also heavily informed by the findings of the DSN. The outputs from the DSN are considered to be leading practice technical guidance for marine dredging by the NT EPA, as noted in the *Draft Marine Dredging Guideline* (NT EPA, 2023).

Data presentation, including selection of statistics for definition of impact zone thresholds, has been tested against approaches used for NT EPA approved dredging projects (KBR, 2023; INPEX, 2022). The approach adopted in Appendix A is considered more environmentally conservative than these studies. Per the technical guidance documents noted above, three zones have been defined to support impact assessment:

– **Zone of High Impact (ZoHI)** is the area where serious damage to benthic communities is predicted or where impacts are considered to be irreversible. The term serious damage means 'damage to benthic communities and/or their habitats that is effectively irreversible or where any recovery, if possible, would be unlikely to occur for at least 5 years'. The loss of the benthic communities and/or habitats within these zones should be considered irreversible, unless a defensible case for recovery of the impacted benthic communities and habitats can be presented.
– **Zone of Moderate Impact (ZoMI)** is the area within which predicted impacts on benthic organisms are sub-lethal, and/or the impacts are recoverable within a period of 5 years. This zone abuts, and lies immediately outside of, the ZoHI. The outer boundary of this zone is coincident with the inner boundary of the next zone, the Zone of Influence.
– **Zone of Influence (ZoI)** is the area within which changes in environmental quality associated with suspended sediment plumes are predicted and anticipated, but where these changes would not result in a detectible impact on benthic biota (e.g. a reduction in biomass). These areas can be large, but at any point in time the plumes are likely to be restricted to a relatively small portion of the ZoI.

The spatial extents of ΔSSC (the increase in SSC relative to ambient) are displayed in Figure 16 for the median (50th percentile) and 95th percentile depth-averaged concentrations. Depth-averaged outputs are considered appropriate for evaluating potential impacts from SSC, because the impact of SSC on the attenuation of light reaching benthic habitats at the seabed occurs throughout the entire water column. Further, the 95th percentile

represents the upper range of ΔSSC, in alignment with the ZoI threshold (95th percentile ΔSSC >1 mg/L). Additionally, the extents of the ZoI, ZoMI and ZoHI are presented in Figure 17.

The following outcomes were predicted:

– The median depth-averaged SSC throughout the entire simulated period was not predicted to exceed 1 mg/L above ambient conditions. Therefore, on average, increases in SSC are predicted to be negligible and are unlikely to be observable by the human eye.
– The 95th percentile depth-averaged SSC was predicted to exceed 1 mg/L above ambient conditions at distances of up to ~1,250 m northward and ~220 m to the south-east of the diffuser. Concentrations of 2-3 mg/L were predicted within ~100 m of the diffuser, and up to 2-4 mg/L were predicted to occur within the enclosed waters inside two breakwaters located at the port (Alyangula boat ramp) and ~300 m north of the port. The accumulation of suspended sediments within the breakwaters is attributable to a model artefact (refer to Appendix A for further details).
– The ZoI (Figure 17) encompasses the same extent as the 95th percentile ΔSSC >1 mg/L described above. Localised areas of ZoMI are predicted within the breakwater regions, however these are not considered realistic predictions, but rather are an artefact of the model (refer Appendix A for further details). Importantly, no ZoMI or ZoHI related to suspended sediments are predicted to occur in the vicinity of the mine water discharge diffuser.
– There is no significant increase in SSC predicted at the STP outlet location. Therefore, cumulative impacts are considered negligible.
– In summary, the results of the modelling indicate that impacts to benthic communities related to the discharge of suspended sediments are unlikely.

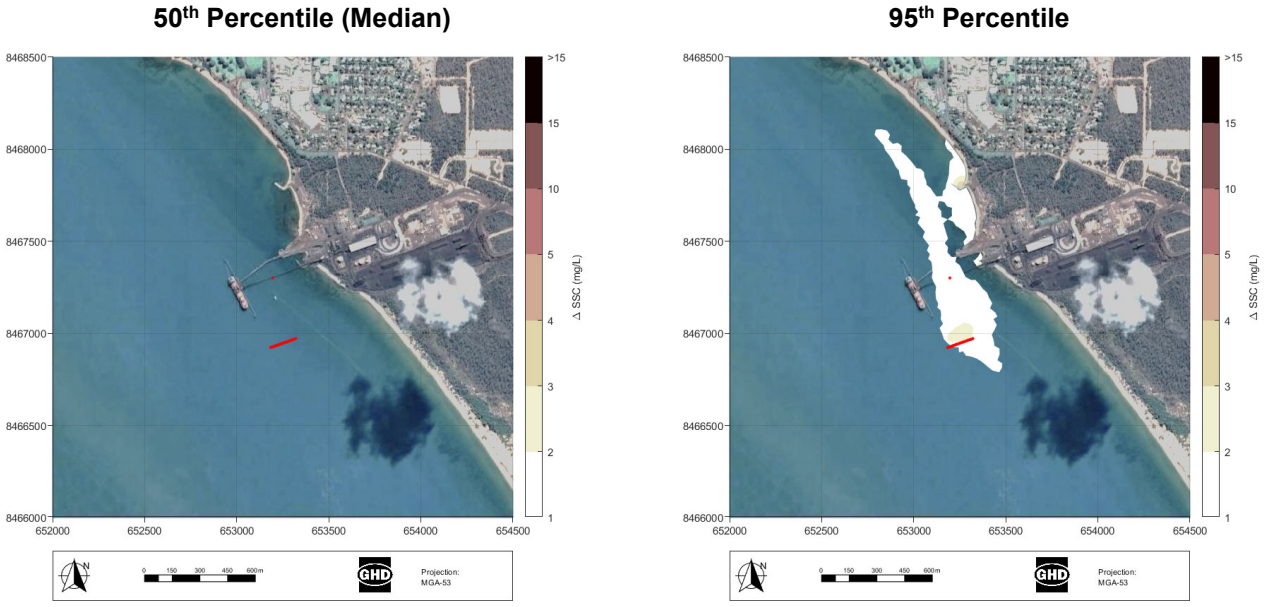


Figure 16 50th percentile (left) and 95th percentile (right) contours of predicted depth-averaged ΔSSC (above ambient)

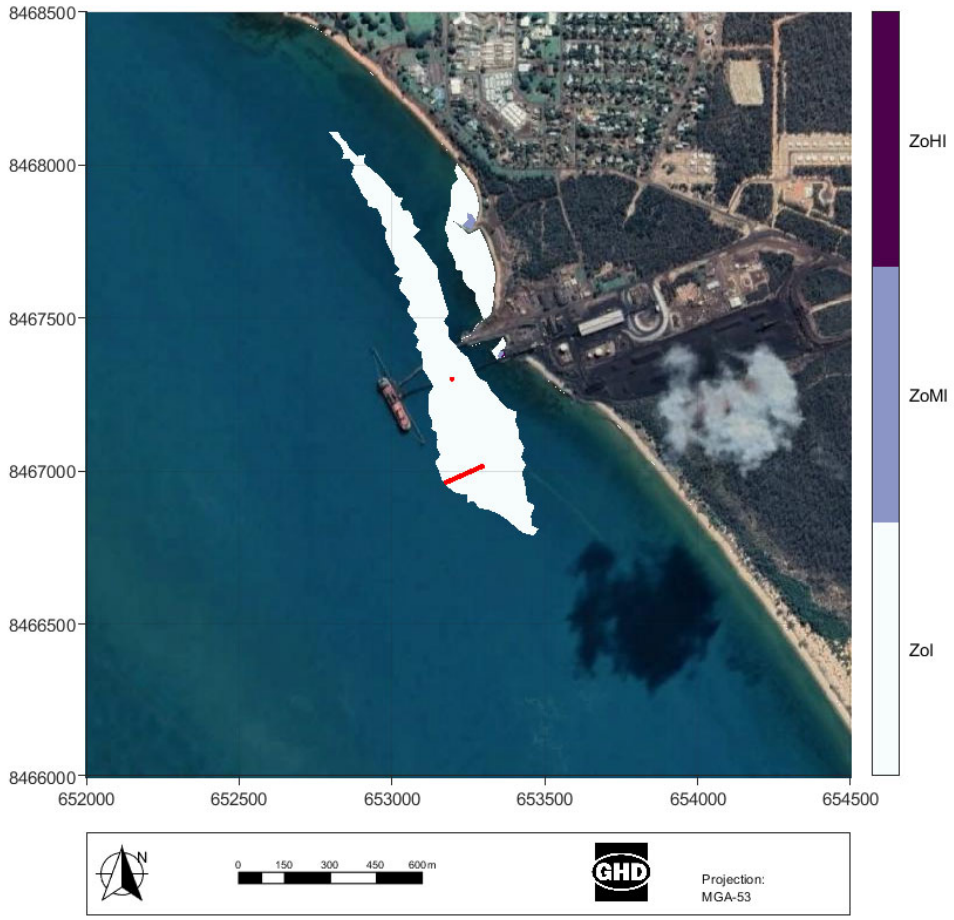


Figure 17 *Predicted extents of ZoI, ZoMI and ZoHI related to SSC*

Modelled deposition is presented in Figure 18, showing the maximum deposition thickness exceeding the ZoI threshold (detailed in Appendix A), and in Figure 19, showing the maximum net deposition accumulation expressed in grams per square metre (g/m^2) that occurred throughout the one year simulation. The deposition thickness figure allows direct comparison to the ZoI and ZoMI thresholds, while the deposition accumulation figure allows for comparison against the sediment toxicant guidelines as described in Appendix A, and the potential for bioaccumulation.

The following outcomes related to sediment deposition were predicted:

– Maximum deposition thicknesses exceeded the ZoI threshold of 3 mm only within highly localised deposition zones situated at the end of the Milner Bay jetty structure. The maximum deposition thickness within these zones was less than 8 mm, which is well below the ZoMI threshold of 15 mm. Therefore, no moderate impacts to benthic communities were predicted to occur on the basis of sediment deposition.
– Maximum net deposition accumulation throughout the simulation exceeding 100 g/m^2 (a nominal low value) occurred within localised and largely incongruent areas up to 2.5 km north-westward and ~1.2 km southward from the diffuser. The maximum localised net deposition was ~1,500 g/m^2 at the end of the jetty structure (aligned with the areas of maximum deposition thickness). This deposition accumulation is a factor of 18 lower than the most stringent deposition limit for silver (27,000 g/m^2). In other words, 18 years' worth of simulated deposition would need to occur, without any significant sediment erosion events or biological uptake of silver from the sediments, before silver will accumulate to toxic levels within the sediment. Further, this would only occur in localised zones at the end of the jetty structure which is already a disturbed environment due to the presence of the port and shipping activities and is thus unlikely to support sensitive benthic receptors.
– It is further highlighted that the below highly conservative assumptions were applied relating to the sediment dispersion modelling:

- Sediment concentrations within the discharge were sustained at the 95th percentile of measured mine quarry data for the entire one-year simulation
- The discharge rate was sustained at 80 GL/a whereas the anticipated annual flow rate is 60 GL/a
- For the sediment toxicant assessment, all measured toxicants were assumed to be entirely comprised of suspended particles that could potentially accumulate on the seabed. It should be highlighted that a significant proportion of the toxicants would be present as dissolved contaminants.

On the basis of the above outcomes, the risk of impacts to sediment quality and benthic receptors from deposition of sediments discharged through the diffuser is considered to be negligible.

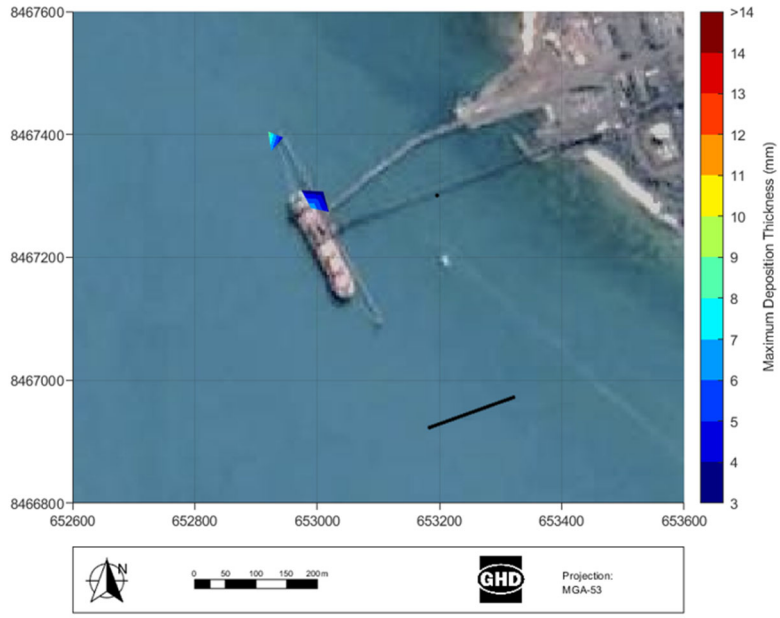


Figure 18 Maximum deposition thicknesses exceeding the ZoI threshold of 3 mm

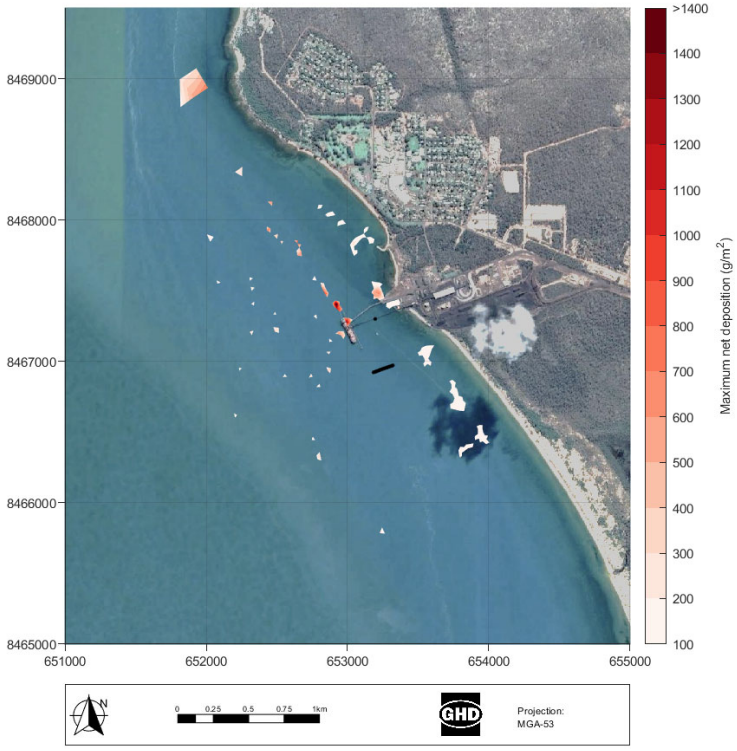


Figure 19 Maximum net deposition accumulation

Bioaccumulation of metals in discharge waters

Following review of the Referral Report, the NT EPA requested additional information to assess the potential for biomagnification and bioaccumulation of metals and metalloids present in the discharge. Additional modelling has been carried out, with the following updates being presented in Appendix A:

– The zone of potential metals and metalloids exposure (within the water column) has been explicitly defined and was predicted to be localised to within less than 20 m distance from the diffuser (i.e. adequate dilutions were achieved within the spatial scale of one model cell).
– An assessment of the potential for deposited metal/metalloid solids from the mine discharge to accumulate to toxic levels within the seabed has also been carried out, concluding that 18 years of sustained sediment deposition at the modelled rates would be required before a metal/metalloid (silver) accumulates to toxic levels within the sediments, and assuming no losses via biological uptake or large erosion events occur in this time. Further, the areas of toxicity under this unlikely scenario would be localised to the western end of the Milner Bay jetty structure, which is already a disturbed environment due to the port and shipping operations.

These assessments cover both exposure pathways that could introduce metals and metalloids into the food chain – i.e. uptake from the water column and uptake from the sediments. In this study, the risk of exposure at toxic levels is considered highly unlikely for metals/metalloids within the water column (due to the low dilution targets required and the high level of dilution predicted) and within the sediments (due to the low deposition rates predicted).

While bioaccumulation/biomagnification can occur with sub-toxic levels of metals/metalloids, the processes of uptake and accumulation within successive trophic levels are highly complex and difficult to predict with any certainty. Due to the negligible presence of metals/metalloids in the marine environment predicted by the modelling, it is deemed appropriate considering the EP Act's 'Principle of proportionality' to classify the risk of bioaccumulation/biomagnification of metals and metalloids as low, without the need for further complex and uncertain predictions to be presented.

7.2.6 Avoidance and mitigation

Measures to avoid and mitigate environmental impacts to marine environmental quality have been provided in Section 6.3 and Appendix D of the Referral Report. These measures have been reviewed based on the changes to the proposed works as detailed in Section 2 and information presented in Section 7.2.4 and 7.2.5 of this SER. Additional mitigation measures have been identified in the following section, whilst all measures identified in the Referral Report and the SER have been collated in Appendix D for ease of reference.

Additional monitoring measures include:

– Monitoring of turbidity of water to be discharged. This will comprise in-line monitoring with data available in real time which will inform an adaptive management program. Management actions will be clearly set out in the OEMP for the works and will be linked to turbidity threshold values based on a tiered early warning system. Management actions will likely include:
  - Review of monitoring data at NH2 quarry
  - Review of management of water storage (NH2 quarry)
  - Modification or cessation of excess water discharge.
– Monitoring of turbidity and underwater light in the receiving environment will be undertaken during operation. This program will include:
  - Monitoring at the inshore rocky reef area located between the jetty and the marine footprint.
  - Monitoring at the reef/seagrass area to the south of the marine footprint
  - Monitoring at a suitable far-field reference location
  - In-situ measurements of turbidity every 15 minutes, with data telemetered to an online platform for visualisation in near real time
  - Setting of ecologically relevant threshold values for management action. Thresholds will be informed by baseline data and relevant scientific literature, including the outcomes of the WAMSI DSN referenced in the Draft NT EPA marine dredging guideline, and will consider holistic changes in water quality, encompassing intensity and duration

- The implementation of the marine monitoring strategy described in Appendix E
- Management actions will be clearly set out in the OEMP for the works and will be linked to threshold values based on a tiered early warning system. Management actions will likely include:
  - Review of monitoring data at NH2 quarry
  - Review of management of water storage (NH2 quarry)
  - Modification or temporary cessation of excess water discharge.

A receiving environment monitoring program to be implemented during construction and operation has been provided in Appendix E.

7.2.7 Predicted outcome / conclusion

Additional modelling has been undertaken to understand the potential for vertical mixing associated with wave interactions, potential generation of turbid plumes during operation, potential bioaccumulation of toxicants from discharge water, and potential cumulative effects. Based on this modelling the following is concluded:

- The inclusion of waves has no negative impact on the area of dilution, and therefore the impact assessment conclusions presented in the Referral Report remain valid. The modelling with inclusion of waves demonstrates no interaction of the buoyant plume with the seabed.
- Assessment of potential cumulative impact between the mine water discharge and treated effluent discharge indicates a small potential for salinity and nitrogen plumes to interact, however this results in a minimal change in the mixing zones. Therefore, the impact assessment conclusions presented in the Referral Report remain valid.
- Dispersion modelling has identified minimal risk of suspended sediments to sensitive benthic receptors, with no ZoMI or ZoHI predicted. The modelled ZoI, representing the 95th percentile of a conservative scenario (constant discharge over 12 months, 1mg/L change above ambient) is predicted to reach ~1,250 m northward and ~220 m to the south-east of the diffuser. However, it is noted that per the guideline definition of the ZoI at any point in time the plumes are likely to be restricted to a relatively small portion of the ZoI and that this zone does not suggest impacts to benthic communities will occur, rather that measurable changes to water quality may be observed at times.
- The risk of impacts to sediment quality from deposition of sediments discharged through the diffuser is considered to be negligible.
- The risk of exposure at toxic levels is considered highly unlikely for metals/metalloids within the water column (due to the low dilution targets required and the high level of dilution predicted) and within the sediments (due to the low deposition rates predicted).

The proposed management and mitigation measures will be implemented to minimise the risk of impact to the marine environment due to activities associated with construction and operation. These measures have been identified in the Referral Report, and where relevant (e.g. for marine discharge activities) updated in this SER.

Additional information relating to the characteristics of the sediments within the marine footprint indicates that sediments that will be disturbed have low acid forming potential.

Table 16 presents the environmental risk analysis for the *SEA: Marine environmental quality* environmental factor. The consequence and likelihood is provided in accordance with the rating system provided in Table 11 and Table 12. The overall residual risk (i.e. the risk remaining following the successful implementation of identified avoidance and mitigation measures) has been assessed in accordance with the matrix provided in Table 13.

With the application of identified management and mitigation measures the Proposal is not predicted to have significant impact on marine ecosystems, and the NT EPA's objective for the marine environmental quality factor to '*protect the quality and productivity of water, sediment and biota so that environmental values are maintained'* will be met.

Table 16 Environmental risk analysis for SEA: Marine environmental quality

Environmental values	Potential Impact	Unmitigated			Avoidance and mitigation	Residual		
		L[1]	C[2]	R[3]		L[1]	C[2]	R[3]
– Water and sediment quality – Macroinvertebrates – Values supporting fishing, recreation and aesthetics – Cultural and spiritual values	– Seabed disturbance – Water quality impacts	A	3	E	– Siting of Proposal to avoid sensitive marine habitat* – Development and implementation of CEMP and OEMP, including monitoring plans* – Model validation monitoring implemented* – Monitoring of water quality during operation – Spill avoidance/ management measures implemented*	D	1	L

[1]L: Likelihood, [2]C: Consequence, [3]R: Risk; *mitigation measure outlined in referral

7.3 PEOPLE: Culture and heritage

Environmental values associated with this environmental factor, culture and heritage, are described in Section 6.1.3.9 and Appendix G of the Referral Report. It has been noted by the NT EPA that there is uncertainty around the presence and impact to Aboriginal sacred sites in the Project area. Additional information has been provided below.

7.3.1 Objective

The NT EPA's objective for the culture and heritage factor is to *'protect culture and heritage'.*

7.3.2 Policy and guidance

The following legislation and frameworks have been used to assess culture and heritage:

– EPBC Act (Cth)
– *Underwater Cultural Heritage Act 2018* (Cth)
– *Aboriginal Lands Rights (Northern Territory) Act 1976* (Cth)
– *Northern Territory Aboriginal Sacred Sites Act 1989* (NT)
– *Heritage Act 2011* (NT)
– EP Act (NT)
– Register of National Estate
– National Trust of Australia
– Anindilyakwa Indigenous Protected Area (IPA) Plan of Management 2016.

7.3.3 Environmental values

Environmental values associated with this environmental factor 'culture and heritage' are described in Section 6.1.3.9 of the Referral Report and detailed within the Appendix G of the Referral Report. A search of desktop heritage registers identified no known sites listed on any of the following registers:

– World Heritage List
– National Heritage list
– AAPA Register
– NT Archaeological Database
– NT Heritage Register
– Register of National Estate
– National Trust.

However, there were two previous unsuccessful nominations to the National Heritage List:

– Sea Country (Place ID: 106212) – Place rejected for Emergency Listing
– Saltwater Country of the Groote Eylandt Archipelago (Place ID 106240) – Nomination withdrawn.

In addition to information presented in Section 6.1.3.9 and Appendix G of the Referral Report, the below additional information was made available by the Heritage Branch via submission on the referral.

Underwater cultural heritage

The Australian Government DCCEEW are the regulators of the Commonwealth UCH Act. The Heritage Branch of the NT DLPE represent DCCEEW as the authorised delegate for underwater cultural heritage in the Northern Territory, to the edge of the Australia's Exclusive Economic Zone (therefore within the Project area). The Heritage Branch maintains a closed database of heritage places in both Northern Territory and Commonwealth Waters containing significantly more data than is captured in the Australasian Underwater Cultural Heritage Database.

Heritage Branch advised on 16 September 2025 that the Heritage Branch has 'no recorded underwater places or objects within the proposed construction area or close enough to the predicted mixing zone to be at risk of impact from the dewatering'.

Aboriginal sacred sites

AAPA advised in their submission on the Referral Report that their database comprises Aboriginal sacred sites identified during research for Authority Certificates. They also advised that there are no Authority Certificates within the Project area. The absence of sacred sites may be a function of the fact that the Authority has not yet undertaken work in the region, or that the work required to register a sacred site has not yet been completed. It does not mean there are no sites in the area.

GEMCO is in the process of applying for an Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act 1989* for the Proposal to obtain clear guidance on where sacred sites are, and how to work alongside them (if identified).

Heritage values summary

There are no known historic heritage, natural heritage, or Aboriginal heritage or Macassan archaeological sites or objects identified within the construction footprint recorded on the heritage registers. There are also no registered underwater cultural heritage places or objects within or near the proposed construction area or predicted mixing zone at risk of impact from water discharge, as advised by the Heritage Branch (16 September 2025).

GEMCO is in the process of applying for Authority Certificate from AAPA to obtain clear guidance on where Aboriginal sacred sites are, and how to work alongside them (if identified).

Initial consultation with Traditional Owners was held in August 2023 to present the Proposal. Other Traditional Owner clans or individuals for consultation were identified by the ALC. In October 2023, GEMCO consulted with senior Bara and Jaragba men on Country, at the site, regarding cultural heritage values within the Project area (fishing and traditional foraging activities). At that time, the Traditional Owners stated that they do not use the port area or launch boats from the wharf. The areas north and south of the port are being used for boating and fishing. No concerns regarding the Proposal impacting on traditional fishing were raised at that meeting or during any subsequent engagement with the ALC (refer to Referral Report and Section 4 of this report).

While bioaccumulation/biomagnification can occur with sub-toxic levels of metals/metalloids, the processes of uptake and accumulation within successive trophic levels are highly complex and difficult to predict with any certainty. Due to the negligible presence of metals/metalloids in the marine environment predicted by the modelling, it is deemed appropriate considering the EP Act's 'Principle of proportionality' to classify the risk of bioaccumulation/biomagnification of metals and metalloids as low, without the need for further complex and uncertain predictions to be presented. As part of the GEMCO MEMP biota monitoring is undertaken every two years. This includes collection of fish species from Milner Bay that have limited home ranges, that are considered to be food items collected by fishers and therefore provide an indication of the risk to human health should seafood be consumed from the Milner Bay port area. This program will continue to be conducted, with results communicated as appropriate. Per Section 4, GEMCO is committed to ongoing consultation with Traditional Owners including on the topic of traditional fisheries.

7.3.4 Assessment of potential significant environmental impacts

Aboriginal Cultural Heritage

Appendix G of the Referral Report explored the Anindilyakwa's history on Groote Eylandt, which is evidenced in the cultural heritage sites found on the island. Previous archaeological assessments have identified a range of archaeological site types including rock shelters, rock art, shell middens, and artefact scatters. Rock shelters with art are prolific in certain parts of the island and previous archaeological reports have identified a correlation between rock shelters with art and the Groote Land System (SHIM Consulting, 2015). Previous survey also suggests Aboriginal sites are more likely to be found within proximity of the coastline (SHIM Consulting, 2018). It is assessed that there is likely low risk of Aboriginal cultural heritage within the Project area.

Historic cultural heritage

Appendix G of the Referral Report explored the land use history on Groote Eylandt, this found that European settlement of Groote Eylandt's northwest has been limited. European history in relation to the Project area is focused on the Emerald River Mission area, subsequent use by the Royal Australian Airforce (RAAF), the towns of Angurugu and Alyangula, and the manganese mining activities. These are all known areas and recognised features, which will not be impacted by the Proposal. The Emerald River Mission area, RAAF, and Angurugu are all outside the Project area, further to the south. This assessment has found it to be unlikely for unknown European historic heritage to be located outside these areas and therefore, it is considered unlikely that the proposed works will impact European historic cultural heritage.

The land use history as presented in the Appendix G of the Referral Report has shown extensive seasonal use of Groote Eylandt by the Macassan fisherman over several centuries. Archaeological evidence for this exists around the Gulf of Carpentaria and at Groote Eylandt, primarily being trepang processing sites (Clarke, 1994). There are no Macassan archaeological sites registered on the NT Heritage register and early research into Macassan archaeological sites identified the west side of Groote Eylandt as unsuitable to trepang harvesting (Macknight, 1976, p. 61). Given this, it is unlikely that Macassan archaeological sites would be located within the Project area.

7.3.5 Avoidance and mitigation

Avoidance

Avoidance of known heritage sites at Groote Eylandt identified through previous heritage surveys was achieved through design. As discussed in the Referral Report, the Proposal route was selected to avoid any known heritage finds along the coastline.

Mitigation measures

Mitigation measures are presented in the Section 5 of Appendix G of the Referral Report, and replicated in Appendix D of the SER. Mitigation measures include:

– An Authority Certificate is in the process of being applied for
– Continued consultation with the ALC and Project execution in line with the guiding principles of the Anindilyakwa IPA Plan of Management
– Heritage induction requirements for relevant personnel undertaking or supervising ground-breaking works. The induction will cover protocols around access and working in proximity to Aboriginal cultural heritage sites and cover the unexpected finds procedure
– No ground disturbing works are to take place outside of Project area
– Implementation of the unexpected finds procedure in Appendix D.

7.3.6 Predicted outcome / conclusion

The heritage assessment has conducted a search of the relevant heritage registers and found that there are no known Aboriginal heritage sites, historic heritage sites, or natural heritage sites within or in close proximity to the Project area.

Considering the proposed works, the Aboriginal heritage context for the Project area, the environmental landforms, European land use history, and the level of previous development, there is a low risk of encountering unknown Aboriginal, historic or natural heritage sites and objects during construction.

With regard to Aboriginal cultural heritage risk, Aboriginal sites are more likely to be located within proximity of the coastline and the most likely site types include rock shelters, rock art, shell middens, and artefact scatters. It is assessed that there is likely low risk of Aboriginal cultural heritage within the Project area.

With regard to historic cultural heritage risk, the land use history has shown that European settlement of Groote Eylandt's northwest has been limited. Historic heritage in relation to the Project area is focused on the Emerald River Mission area, subsequent use by the RAAF, the towns of Angurugu and Alyangula, the manganese mining activities, and Macassan trepang fishing. These are all known areas and recognised features, and outside the Project area. This assessment has found it to be unlikely for unknown historic heritage to be located outside these

areas and therefore, it is considered unlikely that the proposed works will impact European historic cultural heritage.

Table 17 presents the environmental risk analysis for the PEOPLE: Culture and heritage factor. The consequence and likelihood is provided in accordance with the rating system provided in Table 11 and Table 12. The overall residual risk (i.e. the risk remaining following the successful implementation of identified avoidance and mitigation measures) has been assessed in accordance with the matrix provided in Table 13.

With the application of identified management and mitigation measures the Proposal is not predicted to have significant impact on culture and heritage, and the NT EPA's objective for the culture and heritage factor to *'protect culture and heritage'* will be met.

Table 17 Environmental risk analysis for PEOPLE: Culture and heritage

Environmental values	Potential Impact	Unmitigated			Avoidance and mitigation	Residual		
		L[1]	C[2]	R[3]		L[1]	C[2]	R[3]
– Sensitive or sacred sites	– Ground disturbance works impacting unknown culture and heritage values	A	3	E	– Proposed application for an Authority Certificate and compliance with its conditions – Heritage and cultural awareness inductions to be undertaken* – Ground disturbing works within Project area only* – Unexpected finds protocol to be implemented* – Continued consultation with the ALC* – Project execution in line with the guiding principles of the Anindilyakwa IPA Plan of Management*	C	1	L

[1]L: Likelihood, [2]C: Consequence, [3]R: Risk; *mitigation measure outlined in referral

8. Other environmental factors

Changes to the Project area through design progression triggered a review of the Land: Terrestrial ecosystems factor as part of the SER development. This review is presented in the following sections.

8.1 LAND: Terrestrial ecosystems

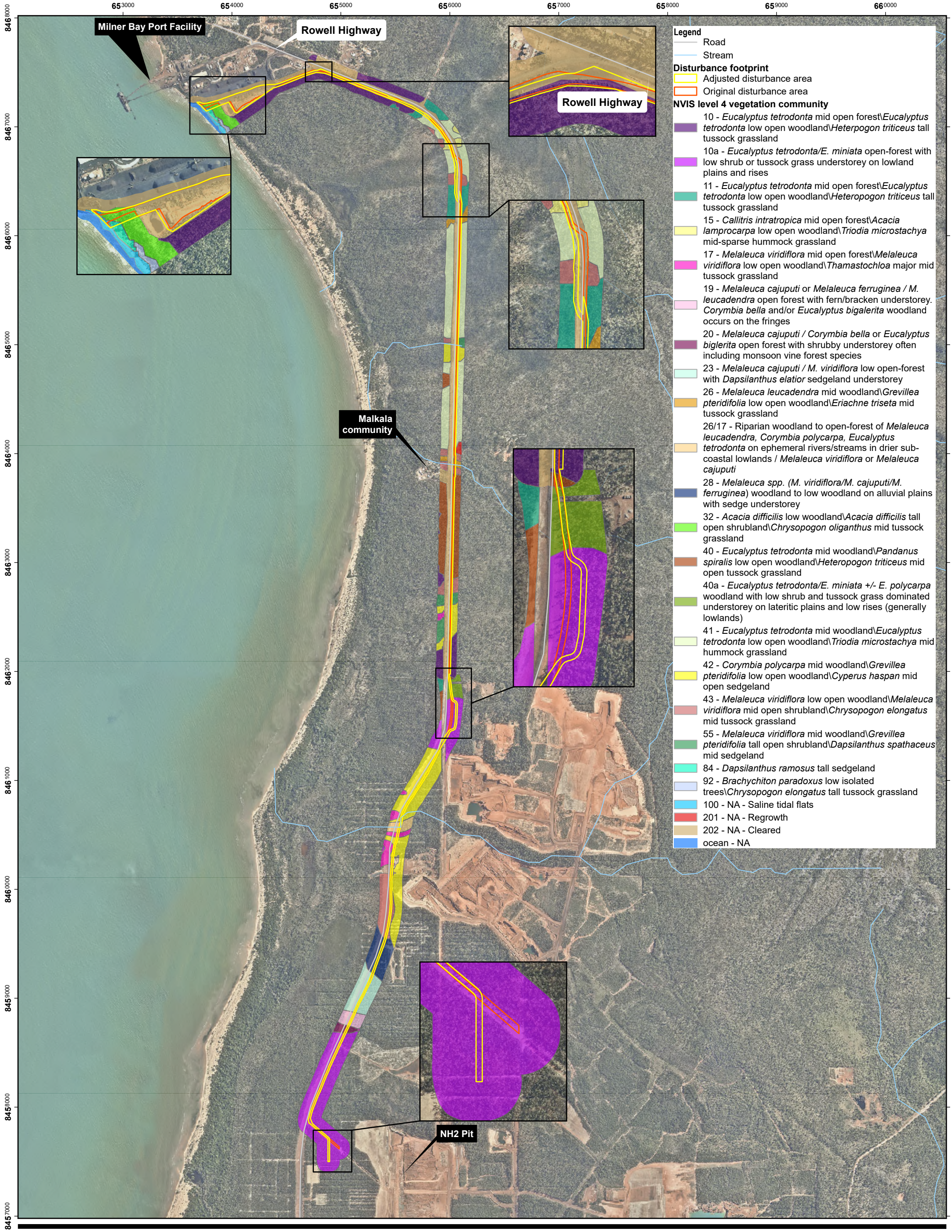
The NT EPA's objective for the terrestrial ecosystems factor is to '*protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.*'

Changes to design resulted in an increase in the terrestrial Project area of approximately 6.18 ha within the same land parcels. Survey conducted in 2024 was inclusive of the adjusted terrestrial Project area. The increased terrestrial Project area resulted in no change to:

– Presence of threatened ecological communities
– Sensitive / significant vegetation
– Presence of threatened flora species
– Presence of vegetation communities
– Presence of threatened fauna species
– Presence of migratory species.

Significant impact assessments for species listed under the EPBC Act were conducted in Appendix C of the Referral Report and reviewed in development of the SER. Descriptions of this review are provided in Sections 8.1.1 to 8.1.12.

The minor realignment of the pipeline with additional disturbance areas remains within the surveyed vegetation communities (Figure 20) and has not resulted in a change to the assessment of significance of the Terrestrial ecosystems present, impact types or mitigation measures. The proposed crossing points have been realigned with the pipeline to maintain the proposed connectivity mitigations, this is demonstrated in Figure 21. On this basis the conclusions presented within the Referral Report remain valid and no further assessment of Land: Terrestrial Ecosystems was conducted.



Paper Size ISO A3

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

N

SOUTH32

GHD

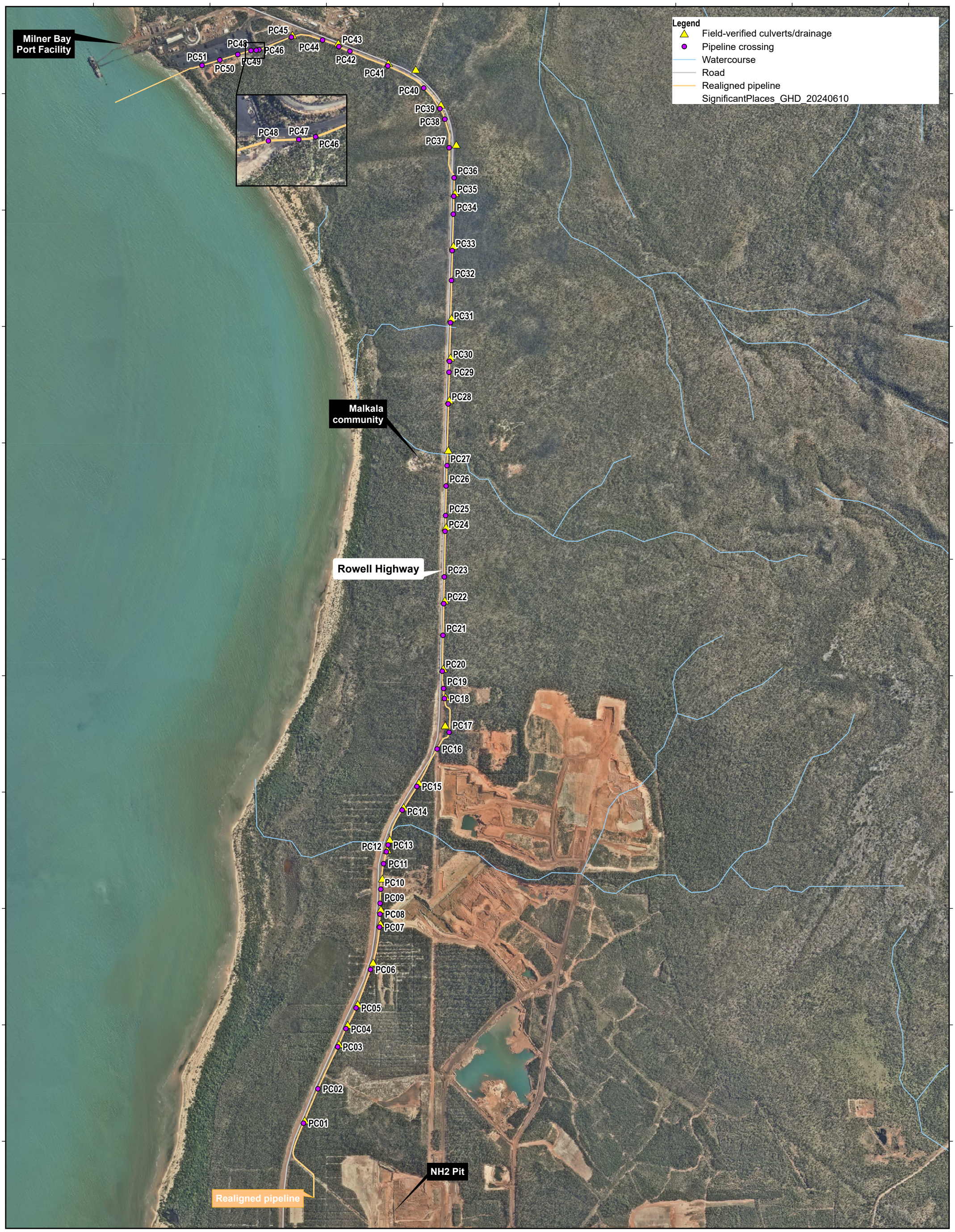
South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Vegetation communities within adjusted construction footprint

Project No. **12624084**
Revision No. **A**
Date **23/01/2026**

FIGURE 20

Data source: South32 - adjusted disturbance area (2026), original disturbance area (2025), vegetation community, imagery (2024); Imagery_Offline: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
Created by: mvandermerwe



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 53

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SOUTH32

GHD

South32 Group Operations Pty Ltd
GEMCO Excess Water Disposal Project
Supplementary Environmental Report

Proposed adjusted pipeline crossings and field verified culverts

Project No. **12624084**
Revision No. **A**
Date **23/01/2026**

FIGURE 21

Data source: GHD - Field-verified culverts/drainage (2024); GA - road, watercourse (2024); South32 - adjusted disturbance area, pipe crossings (2026), imagery (2024); World Imagery: Vantor; Imagery_Offline: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
Created by: mvandermerwe

8.1.1 Threatened flora – vulnerable

A single EPBC listed flora species, *Eleocharis retroflexa*, has been assessed as 'may occur' within the Project area. *E. retroflexa* is listed as Vulnerable under the EPBC Act, with the main threats listed as inappropriate fire regimes and grazing and trampling by high densities of feral animals (Woinarski et al., 2007).

The assessment concluded that with the application of identified avoidance and mitigation measures the Proposal will result in the low likelihood of a significant residual impact to *Eleocharis retroflexa.* The adjusted Project area is within the same vegetation communities assessed in the Referral Report and within the field surveyed extent therefore the assessment in Appendix C of the Referral Report remains valid.

8.1.2 Threatened shorebirds – vulnerable

Two threatened shorebird species listed under the EPBC Act as Vulnerable have been assessed as 'may occur' within the northern extent of the Project area. Each of these species occur in coastal habitats and have a dual listing as migratory and threatened under the EPBC Act. They were grouped for assessment of significant impacts against the EPBC significant impact guidelines 1.1 due to the similarity of their habitat requirements and relevance to the Proposal. The species assessed were as follows:

– *Calidris acuminata* – sharp-tailed sandpiper (Vulnerable)
– *Limosa lapponica baueri* – Alaskan bar-tailed godwit (Vulnerable).

The Project area at its northern extent remains within the same approximate design parameters as assessed in Appendix C of the Referral Report (e.g., relatively narrow (<150 m across) and linear extent of the Project area at its northern extent, with a minor increase (0.15 ha) to the marine footprint). Therefore, the assessment that the Project area is unlikely to provide important habitat for any migratory or resident shorebird species and that with implementation of the identified avoidance and mitigation measures, the Proposal will result in the low likelihood of a significant residual impact to sharp-tailed sandpiper and Alaskan bar-tailed godwit.

8.1.3 Threatened shorebirds – endangered

One threatened shorebird species, *Tringa nebularia* - common greenshank, listed under the EPBC Act as Endangered has been assessed as 'may occur' within the northern extent of the Project area. This species occurs in coastal habitats and has a dual listing as migratory and threatened under the EPBC Act.

The Project area at its northern extent remains within the same approximate design parameters as assessed in Appendix C of the Referral Report (e.g., relatively narrow (<150 m across) and linear extent of the Project area at its northern extent, with a minor increase (0.15 ha) to the marine impact footprint). Therefore, the assessment that with implementation of the identified avoidance and mitigation measures, the Proposal will result in the low likelihood of a significant residual impact to the common greenshank remains valid.

8.1.4 Northern masked owl – vulnerable

The northern masked owl is listed as Vulnerable under the EPBC Act. The species occurs throughout northern Australia, from Mackay to the Kimberley region of Western Australia (DCCEEW, 2023b). The species inhabits riparian forest, rainforest, open forest, Melaleuca swamps, edges of mangroves and the margins of sugar cane fields (DCCEEW, 2023b; Menkhorst et al., 2019).

Key habitat requirements for the species include a large home range, presence of hollow-bearing trees for nesting and the abundance of arboreal and small mammals (Woinarski, 2004).

There are 20 historical records of the species within the desktop search extent (NR Maps, 2024). The closest record of the species is approximately 300 m from the Project area, with the most recent recorded sighting in 2018. The species is known to persist in habitat adjacent to the pipeline alignment.

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to northern masked owl.

8.1.5 Northern quoll – endangered

The northern quoll is listed as Endangered under the EPBC Act and was once distributed throughout much of northern Australia; however, the species range is now highly fragmented due to habitat clearing and cane toad invasion (DCCEEW, 2023a). The species inhabits a variety of habitats, ranging from eucalypt woodlands to rainforests (Hill and Ward, 2010). The species prefers areas that contain rock crevices, hollow logs and termite mounds (DCCEEW, 2023a). There are 440 historical records of the species within the desktop search extent (NR Maps, 2023). The species was recorded eight times (including six camera sightings and two sets of tracks) during 4 days of field survey in August 2024. Groote Eylandt is known to support the largest remaining population of northern quolls in the NT with a population density of approximately 0.33/ha compared to approximately 0.08/ha on the mainland (DEPWS, 2019., Heiniger et al., 2020).

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to northern quoll.

8.1.6 Ghost bat – vulnerable

The ghost bat is a large, carnivorous bat that perches in vegetation to ambush prey as well as gleaning surfaces while in flight (Bullen 2021). The ghost bat inhabitants a highly fragmented distribution, with geographically disjunct colonies occurring in the Pilbara, Kimberley, Northern Territory, the Gulf of Carpentaria and coastal and near coastal eastern Queensland (DCCEEW, 2023c). This species is known to occur in rainforest areas, vine shrub, open woodlands and arid zone (McKenzie and Hall, 2008), and roosts in caves, rock crevices and old mine shafts (TSSC, 2016). The species requires multiple roosting sites and moves between several caves seasonally or as dictated by weather conditions (TSSC, 2016).

There are six historical records of the species within the desktop search extent (NR Maps, 2024). The closest record of the species is approximately 1.2 km from the Project area, with the most recent recorded sighting in 2017. Records of this species are sparsely scattered across Groote and most likely indicate the presence of one or more maternity roosts on the island and/or elsewhere in the archipelago (DEPWS, 2019).

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to ghost bat.

8.1.7 Northern brushtail possum – vulnerable

The northern brushtail possum is a semi arboreal, nocturnal marsupial that occurs sporadically throughout northern Australia, from the Gulf of Carpinteria in the east, through the NT and the northern islands, to the Kimberley in Western Australia (TSSC, 2021). It occurs predominantly in tall, open Eucalypt forests with a shrubby understory that contains small, fleshy fruits. The sub-species is also known to occur in mangrove forests and rainforests particularly those that contain hollow-bearing trees. Where tree hollows are limited (often in northern Australia), the species is known to inhabit semi-urban areas and human infrastructure, particularly around Darwin. The northern brushtail possum’s diet comprises small fruits, flowers, and leaves.

There are two historical records of the species within the desktop search extent (NR Maps, 2024). The closest record of the species is approximately 800 m east of the Project area, with the most recent recorded sighting in 2012. The species was not recorded during field surveys.

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to northern brushtail possum.

8.1.8 Mertens' water monitor – endangered

Mertens' water monitor occurs patchily across tropical northern Australia, from the west Kimberley in Western Australia, across the north of the NT, to the wet tropics in far north Queensland (DCCEEW, 2023d). This species is a highly aquatic lizard that seldom ventures more than 5 –10 m from the edge of the water (Wilson & Knowles, 1988; Mayes, 2006; Smith & Griffiths, 2009). This species has been recorded in perennial and semi-permanent pools in upper catchment areas, including springs, seeps, swamps, creeks and gorges (DCCEEW, 2023). Mertens' water monitor is an active predator (Mayes, 2006) that forages primarily in the water and at the water-land interface (Mayes et al., 2005; Mayes, 2006; Wilson & Swan, 2021).

There are 10 historical records of the species within the desktop search extent (NR Maps, 2023). The closest record of the species is approximately 100 m from the Project area, with the most recent recorded sighting in 2018. Groote Eylandt is assumed to support a healthy population of this species due to the absence of cane toads, however, no island wide targeted surveys have been undertaken to establish the population size and extent (DEPWS, 2019).

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area, the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to Mertens' water monitor.

8.1.9 Northern blue-tongue skink – critically endangered

Northern blue-tongue skink (*Tiliqua scincoides intermedia*) is listed as Critically Endangered under the EPBC Act effective from 21 December 2023.

The northern blue-tongue skink occurs across northern Australia from Eighty Mile Beach in Western Australia, across the southern Kimberley and north of the NT, to approximately the Gregory Downs / Cloncurry area in western Queensland. It is not clear where the eastern limit of this subspecies' range occurs in north Queensland due to a sampling gap.

The distribution of the northern blue-tongue skink includes Mornington, Vanderlin, Groote and Bickerton Islands in the Gulf of Carpentaria, Croker, Melville, Bathurst and Quoin Islands to the north of the NT.

The main factor that makes the northern blue-tongue skink eligible for listing as Critically Endangered is a very severe and sustained population reduction over the last three generations, which is predicted to continue as the cane toad (*Rhinella marina*) continues to advance across its range. Importantly, cane toads are not present on Groote Eylandt.

There are seven records of the species from Groote Eylandt on iNaturalist. The species was only listed in December 2023, potentially explaining the lack of NT government database records. Recent anecdotal reports from preclearance surveys on the GEMCO leases also suggest that two additional individuals have been recorded in 2024.

Given the minor change to the design (realignment and additional disturbance areas) and that the ecological surveys in 2024 extended through this adjusted Project area, the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to northern blue-tongue skink.

8.1.10 Migratory marine species

The Significant Impact Guidelines 1.1 defines several key characteristics to consider when assessing significant impacts to a migratory species. According to the Guidelines, 'important habitat' for a migratory species is:

- *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or*
- *habitat that is of critical importance to the species at particular life-cycle stages, and/or*
- *habitat utilised by a migratory species which is at the limit of the species range, and/or*
- *habitat within an area where the species is declining.*

Listed migratory species cover a broad range of ecological niches with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species.

A total of 10 marine migratory species listed under the EPBC Act have been assessed as 'confirmed present', 'likely to' or 'may' occur within the northern extent of the Project area.

All of these species occur in coastal habitats and are listed as migratory under the EPBC Act. They have been grouped in Appendix C of the Referral Report due to the similarity of their habitat requirements and relevance to the Proposal for assessment under the EPBC Significant Impact Guidelines 1.1. The species assessed were as follows:

– *Pandion haliaetus* – eastern osprey – confirmed present
– *Sterna hirundo* – common tern – confirmed present
– *Calidris ruficollis* –red-necked stint
– *Chlidonias leucopterus* - white-winged black tern
– *Hydroprogne caspia* - caspian tern
– *Pluvialis fulva* - Pacific golden plover
– *Sterna dougallii* - roseate tern
– *Sterna hirundo* - common tern
– *Sterna sumatrana* - black-naped tern
– *Sternula albifrons* - little tern.

Given the minor change to the design (realignment and additional disturbance areas), and that survey was conducted within this adjusted Project area during the 2024 surveys the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to these migratory marine species.

8.1.11 Migratory terrestrial species

The Significant Impact Guidelines 1.1 defines several key characteristics to consider when assessing significant impacts to a migratory species. According to the Guidelines, 'important habitat' for a migratory species is:

– *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or*
– *habitat that is of critical importance to the species at particular life-cycle stages, and/or*
– *habitat utilised by a migratory species which is at the limit of the species range, and/or*
– *habitat within an area where the species is declining.*

Within the Guidelines, each migratory terrestrial species has a specific definition of 'important habitat', including five species that were assessed as 'may occur' in the Project area:

– Fork-tailed swift: Almost entirely aerial favours dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, riparian woodlands, health land or saltmarsh.
– Red-rumped swallow: Non-breeding habitat only: predominately forages over wetlands and open well-watered grasslands.
– Barn swallow: Non-breeding habitat only: occurs in the air above open vegetated areas including native and agricultural grasslands as well as over open water area.
– Oriental cuckoo: Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. Frequently at edges or ecotones between habitat types. Riparian forest is favoured habitat in the Kimberley region.
– Grey wagtail: Non-breeding habitat only: has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes.

Listed migratory species cover a broad range of ecological niches with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species.

Given the minor change to the design (realignment and additional disturbance areas), and that survey was conducted within this adjusted Project area during the 2024 surveys the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to these migratory terrestrial species.

8.1.12 Migratory wetland species

The Significant Impact Guidelines 1.1 defines several key characteristics to consider when assessing significant impacts to a migratory species. According to the Guidelines, 'important habitat' for a migratory species is:

- *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or*
- *habitat that is of critical importance to the species at particular life-cycle stages, and/or*
- *habitat utilised by a migratory species which is at the limit of the species range, and/or*
- *habitat within an area where the species is declining.*

The following wetland migratory species were assessed as 'may occur' after the likelihood of occurrence assessment:

- *Gallinago megala* - Swinhoe's snipe
- *Glareola maldivarum* - oriental pratincole
- *Acrocephalus orientalis* - oriental reed-warbler
- *Charadrius veredus* - oriental plover.

Given the minor change to the design (realignment and additional disturbance areas), and that survey was conducted within this adjusted Project area during the 2024 surveys the assessment outcomes in Appendix C of the Referral Report remain valid. On this basis, the Proposal with the application of identified avoidance and mitigation measures is concluded to result in the low likelihood of a significant residual impact to these migratory terrestrial species.

9. Whole of environment considerations

The NT EPA have identified that the Proposal has the potential to significantly impact two themes and three environmental factors. For each of these factors supplementary information has been provided in this SER. A fourth factor has been reviewed in the SER to confirm that the impact assessment undertaken in the Referral Report and associated mitigation measures proposed remain relevant given the minor changes that have arisen through design progression.

Section 2.6 of the Referral Report outlines how the Proposal adheres to the principles of environment protection and management under Part 2 of the EP Act. This information remains valid and has been carried across to the SER. Embedded within the design of the Proposal, and the impact assessment presented in the Referral Report and the SER are the principles of ecologically sustainable development and management hierarchies. Where there is uncertainty in information informing the impact assessment, the precautionary principle has been adopted; aligned with this, the modelling that has underpinned impact assessment has been based on conservative, worst case scenarios. The Proposal has been designed to avoid adverse environmental impacts, with management and mitigation measures proportional to identified impact pathways embedded in the delivery approach.

To support the NT EPA with evidence-based decision-making, additional studies have been conducted, providing the best available evidence upon which the outcomes of the SER have been based. Impact assessment undertaken in the referral and in this SER has considered the severity (including scale, duration and magnitude) of the predicted impacts, alongside the importance and sensitivity of the environmental value components.

Activities proposed in the marine environment have the potential to impact both the Marine Ecosystem and Marine Environmental Quality factors. These potential impact pathways are interconnected and have been considered holistically. Proposed activities include seabed disturbance, generation of underwater noise, marine fauna strike/disturbance, introduction of marine pests/diseases and altered water quality. The potential for impact associated with these pathways has been explored in the Referral Report, with supplementary information provided in the SER.

Consideration has been given to the potential for impacts across both factors of the Sea theme. Changes to water quality have the potential to influence the marine ecosystem, including sensitive benthic communities such as seagrasses and corals. Further studies to delineate habitat values have been undertaken and presented in the SER. Additional modelling of potential changes to water quality, including potential cumulative influences relating to existing ecosystem pressures has underpinned the marine ecosystem impact assessment. Mitigation measures, including adaptive management informed by real time monitoring data have been nominated to provide confidence that the NT EPA's objectives for these factors are able to be maintained over the life of the Proposal. With the effective application of the identified management and mitigation measures the Proposal is not likely to significantly affect the Marine Environmental Quality, or Marine Ecosystems.

The potential for impact to Terrestrial Ecosystems was considered under the referral, with appropriate mitigation measures proposed across the life of the Proposal. This factor was not included in the NT EPA's *Notice of Decision and Statement of Reasons* as one of the factors that the Proposal has the potential to significantly impact. Changes to the Project area through design progression triggered a review of this factor as part of the SER development. The realignment and additional disturbance areas remain within the surveyed vegetation communities and has not resulted in a change to the assessment of significance of the terrestrial ecosystems present, impact types or mitigation measures. Crossing points have been realigned with the pipeline to maintain the proposed connectivity mitigations for fauna to traverse the combined footprint of the Proposal and Rowell highway. Based on this, the conclusions reached in the referral remain valid; with the effective implementation of designed avoidance and mitigation measures the Proposal is not likely to significantly impact on terrestrial ecosystem values, and the NT EPA's objective for Terrestrial Ecosystems will be maintained over the life of the Proposal.

Further assessment of the Culture and Heritage factor has been undertaken in the SER. GEMCO is in the process of applying for an Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act 1989* to obtain clear guidance on where sacred sites are, and how to work alongside them (if identified). The Referral Report included an unexpected finds procedure; this has been updated in the SER based on feedback contained in the Referral Report submissions. As discussed under the SEA theme, the Proposal is unlikely to impact on Marine Environmental Quality or Marine Ecosystems, therefore impact to traditional fisheries in unlikely. With the

implementation of the identified management and mitigation actions, including ongoing consultation with the ALC and Traditional Owners, the risk to culture and heritage is low, and the NT EPA's objective for this factor will be maintained over the life of the Proposal.

"

10. Responding to a direction to provide additional information

The NT EPA provided direction to include additional information under regulations 119(2) and 121(2) of the EP Regulations on 20 November 2025. The direction included the requirement to include the additional information listed in Table 18.

Table 18 Additional information required

Theme / environmental factor	Topic	Comment	Additional information required
SEA: Marine environmental quality	Dispersal and mixing of discharge waters	The SER is to address the submissions made on the referral including provision of updated hydrodynamic modelling. The hydrodynamic modelling in the referral did not account for the effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment. This may lead to an underestimation of the Zone of Influence.	Provide hydrodynamic modelling accounting for the effects of vessel movements and berthing on the dispersal and mixing of discharge waters in the marine environment. Discuss any change to the Zone of Influence, including how it may change the potential for dispersal, biomagnification or bioaccumulation of metals and metalloids, or change the predicted cumulative impacts of the proposed action combined with effluent discharges.

During consultation with the NT EPA and DLPE on 4 December 2025, it was advised that further modelling to include the effects of vessel movement would not be undertaken due to the reasons outlined below.

The hydrodynamic modelling was conducted over a 12-month period which considered a highly variable range of environmental conditions. The modelling also adopted a range of highly conservative assumptions including 95th percentile discharge concentrations, continuous discharge at peak flow rate, and water quality analytes modelled as conservative tracers.

Tankers come once a month, ore carriers every three days, barges two to three times per week, and small recreational boats occasionally transit the Project Area. However, the potential for vessel interaction with the predicted plume is very low due to the low frequency of vessel movements and the western / northwestern approach towards the port. Tankers and ore carriers do not transit across the plume, and barges will only interact with the outer extent of the nitrate dilution zone (Figure 22). Therefore, any potential changes to the zone of potential direct or indirect effects are considered negligible. Recreational boats may cross the plume, but their potential to influence the mixing zone is considered negligible.

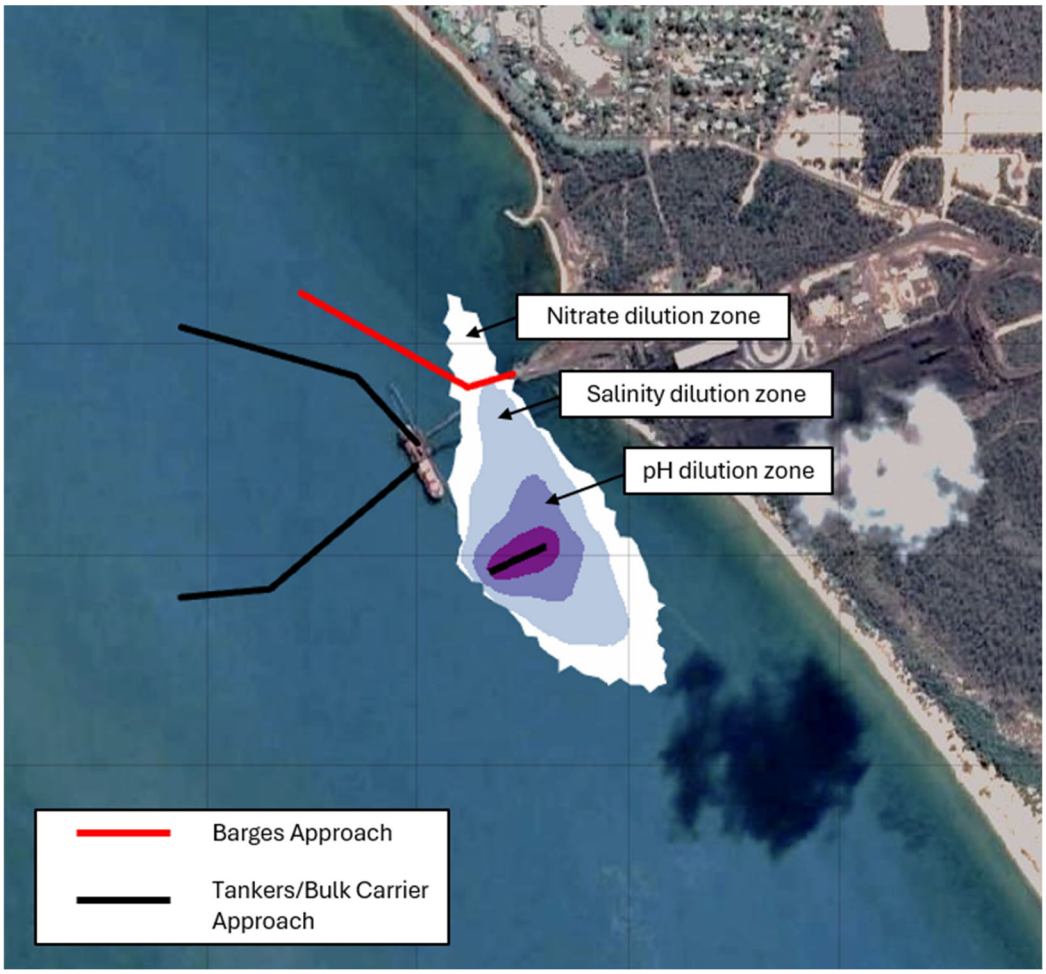

Figure 22 Approach of vessels towards the port

For metals and metalloids, the dilution zone is predicted to be constrained to within 22 m of the diffusers, in which there is no potential for vessel interaction. Thus, there is no potential impact of vessels on the metal mixing zone or altered risk of bioaccumulation and biomagnification due to vessel movement. Further, no bioaccumulating metals exceed the threshold values in the discharge.

There is no established industry standard method to model the effects of vessel interactions on plume dispersion. Models to simulate vessel-generated waves exist, such as MIKE 21 Mooring Analysis, however they do not readily integrate with the three-dimensional hydrodynamic model that has been applied in this study.

Finally, the anticipated effect of vessel movement across the plume would be to further mix and dilute the plume through the introduction of turbulence created by the vessel. Therefore, it is expected to reduce the impacts below the conservative outcomes already presented.

In summary, due to the model being highly conservative, the limited potential for vessel interaction with the predicted plume, and the anticipated outcome that vessel interaction would improve the outcomes due to additional dilution, inclusion of quantitative modelling of vessel movements within the study is not anticipated to result in outcomes that would increase the level of environmental risk or alter the conclusions of the study. Further, modelling of vessel influences on plume dispersion would be highly intensive process, since there is no established method for doing so.

The EP Act's 'Principle of proportionality' states that *'decision-making processes should ensure that decisions or actions directed at minimising harm or a risk of harm or impact to the environment are proportionate to the harm or risk of harm or impact that is being addressed*.' Applying the principle, the decision not to model vessel related impacts on the plume is appropriate as the level of risk / harm to the environment is low.

11. References

ANZG. (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. **www.waterquality.gov.au/anz-guidelines**.

Arup. (2022). GEMCO Tug Berth Project – Water Quality Report.

Ateweberhan, M., Bruggemann, J.H., & Breeman, A.M. (2005). Seasonal dynamics of *Sargassum ilicifolium* (Phaeophyta) on a hallow reef flat in the southern Red Sea (Eritrea). *Marine Ecology Progress Series, 292*, 159-171.

Australian Institute of Marine Science (AIMS). (2013). Milner Bay Project: Marine Environmental Survey.

Birt, M., McLean, D. L., Case, M., Jaworski, S., Speed, C. W., Pygas, D., Driessen, D., Fullwood, L., Harvey, E., Vaughan, B., Macreadie, P. I., & Claisse, J. T. (2024). Contribution of offshore platforms and surrounding habitats to fish production in the Bass Strait, south-east Australia. *Continental Shelf Research, 274*, 105209.

Bond, T., McLean, D.L., Prince, J., Taylor, M.D., & Partridge, J.C. (2022). Baited remote underwater video sample less site attached fish species along a subsea pipeline compared to a remotely operated vehicle. *Marine and Freshwater Research, 73*, 915-930.

Bullen, R. D. (2021). A review of ghost bat ecology, threats and survey requirements. Bat Call WA Pty Ltd. Prepared for the Australian Government Department of Agriculture, Water and Environment.

Carter, A., McKenna, S., Rasheed, M.A., Taylor, H., van de Wetering, C., Chartrand, K., Reason, C., Collier, C., Shepherd, L., Mellors, J., & McKenzie, L. (2024). Seagrass spatial data synthesis from north-east Australia, Torres Strait and Gulf of Carpentaria, 1983 to 2022. *Limnology and Oceanography Letters, 9(1),* 7-22.

Clarke, A. (1994). Winds of Change: an archaeology of contact in the Groote Eylandt archipelago, Northern Australia. The Australian National University.

Davies H.N., Gould J., Hovey R.K., Radford B., Kendrick G.A., The Anindilyakwa Land and Sea Rangers and Anindilyakwa Traditional Owners. (2020). Mapping the Marine Environment Through a Cross-Cultural Collaboration. *Front. Mar. Sci*. 7:716 *(12) (PDF) Mapping the Marine Environment Through a Cross-Cultural Collaboration*.

Department of Agriculture, Water and the Environment (DAWE). (2022). Species - *Didemnum perlucidum*. National Introduced Marine Pest Information System (NIMPIS). **https://nimpis.marinepests.gov.au/species/species/149**.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023a). Species Profile and Threats Database Dasyurus hallucatus — Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu]. **https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=331**.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023b). Species Profile and Threats Database Tyto novaehollandiae kimberli — Masked Owl (northern). **https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=26048**.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023c). Species Profile and Threats Database Macroderma gigas — Ghost Bat. **https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=174**.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023d). Conservation Advice for Varanus mertensi (Mertens' water monitor). **http://www.environment.gov.au/biodiversity/threatened/species/pubs/1568-conservation-advice-21122023.pdf**.

Department of Environment, Parks and Water Security (DEPWS). (2019). Groote Archipelago Threatened Species Management Plan. Northern Territory Government.

Department of the Environment. (2013). Matters of National Environmental Significance. Significant impact guidelines 1.1 under the *Environment Protection and Biodiversity Conservation Act 1999.* **https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf**.

Glasby, T. M., Connwell, S. D., Holloway, M.G., & Hewitt, C. L. (2007). Nonindigenous biota on artificial structures: could habitat creation facilitate biological invasions. *Marine Biology, 151*, 887–895.

Great Barrier Reef Marine Park Authority (GBRMPA). (2018). Guidelines: Seagrass value assessment.

Hamer, P. and Mills, K. (2015). Trial of nearshore artificial reefs to enhance pier based recreational fishing. Recreational Fishing Grants Program Research Report. The State of Victoria Department of Economic Development, Jobs, Transport and Resources.

Hamernik, R. P., Ahroon, W. A., Hsueh, K. D., Lei, S. F., & Davis, R. I. (1993). Audiometric and histological differences between the effects of continuous and impulsive noise exposures. *The Journal of the Acoustical Society of America, 93(4*), 2088–2095.

Hamernik, R. P., Qiu, W., & Davis, B. (2003). The effects of the amplitude distribution of equal energy exposures on noise-induced hearing loss: The kurtosis metric. *The Journal of the Acoustical Society of America, 114*(1), 386–395.

Haywood, M. D. E., Hill, B. J., Donovan, A. G., Rochester, W. A., Ellis, A. N., Welna, A., et al., (2005). Quantifying the effects of trawling on the seabed fauna of the Northern Prawn Fishery., FRDC Project 2002/102 final report, CSIRO, Cleveland.

Heiniger, J, Skye, C, F., Thomas, M, Niehaus A, C., & Wilson R, S. (2020) D*emography and spatial requirements of the endangered northern quoll on Groote Eylandt*. *Wildlife Research, 47*, 224-238.

INPEX. (2022). Draft Maintenance Dredging and Spoil Disposal Management Plan (2023-2027). Rev 0, August 2022.

KBR. (2023). NCIS-5 – HMAS Coonawarra Dredging and Dredged Material Management Supplementary Environmental Report. Rev 0, April 2023.

Kilminster, K., McMahon, K., Waycott, M., Kendrick, G.A., Scanes, P., McKenzie, L., O'Brien, K.R., Lyons, M., Ferguson, A., Maxwell, P., Glasby, T., & Udy, J. (2015). Unravelling complexity in seagrass systems for management: Australia as a microcosm. *Science of the Total Environment, 534*, 97-109.

Lanyon, J. M., & Marsh, H. (1995). Temporal changes in the abundance of some tropical intertidal seagrasses in North Queensland. *Aquatic Botany, 4*, 217-237.

Long, B. G., Poiner, I. R., & Wassenberg, T. J. (1995). Distribution, biomass and community structure of megabenthos of the Gulf of Carpentaria, Australia. *Marine Ecology Progress Series*, *129*, 127-139.

MacGillivray, A., & de Jong, C. (2021). A Reference Spectrum Model for Estimating Source Levels of Marine Shipping Based on Automated Identification System Data. *J. Mar. Sci. Eng. 2021*, 9(4), 369.

MacGillivray, A., & Li, Z. (2018). Vessel Noise Measurements from the ECHO Slowdown Trial: Final Report. Document 01518, Version 3.0. Technical report by JASCO Applied Sciences for Vancouver Fraser Port Authority ECHO Program.

Macknight, C. (1976). *The Voyage to Marege*. Melbourne: Melbourne University Press.

Mayes P. J. (2006). The ecology and behaviour of *Varanus mertensi* (Reptilia: Varanidae). PhD Thesis. Edith Cowan University.

Mayes P. J., Thompson G. G., & Withers P. C. (2005) Diet and foraging behaviour of the semi-aquatic Varanus mertensi (Reptilia: Varanidae). *Wildlife Research, 32*, 67–74.

McCauley, J. E., Parr, R. A., & Hancock, D. R. (1977). Benthic infauna and maintenance dredging: A case study. *Water Research*, *11(2*), 233–242.

McCauley, R. (1994). The environmental implications of offshore oil and gas development in Australia – seismic surveys. Environmental Implications of Offshore Oil and Gas Development in Australia. The Findings of an Independent Scientific Review Swan, 19-22.

McKenna, M., Ross, D., Wiggins, S., & Hildebrand, J. (2012). Underwater radiated noise from modern commercial ships.

McKenzie, N., & Hall, L. (2008). Macroderma gigas. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. www.iucnredlist.org.

Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P., Franklin, K. (2019). The Australian Bird Guide: Revised edition. CSIRO Publishing, Australia.

NRC. (2003). Ocean Noise and Marine Mammals. Washington, District of Columbia: National Academy Press.

NT EPA. (2023). Draft Marine Dredging Guideline – Assessment and Authorisation of Marine Dredging Proposals in the NT. Northern Territory Environmental Protection Authority. Ver 0.2, June 2023.

Pidcock, S., Burton, C., & Lunney, M. (2003). The potential sensitivity of marine mammals to mining and exploration in the Great Australian Bight Marine Park Marine Mammal Protection Zone. An independent review and risk assessment report to Environment Australia. Natural Heritage Trust.

Red Earth Engineering (REE). (2025). GEMCO Excess Water Disposal Project - Offshore Geotechnical Interpretive Report. Prepared for South 32 – Groote Eylandt Mining Company (GEMCO).

SHIM Consulting. (2015). Archaeological Report for the Eastern Leases. Darwin: SHIM Consulting.

SHIM Consulting. (2018). Report on the Cultural Heritage of Akwamburrkba (Winchelsea Island). Brompton: SHIM Consulting.

Smith, J. G. & Griffiths, A. D. (2009). Determinants of home range and activity in two semi-aquatic lizards. *Journal of Zoology*, *279*, 349–357.

Threatened Species Scientific Committee (TSSC). (2016). Conservation Advice Macroderma gigas ghost bat. **http://www.environment.gov.au/biodiversity/threatened/species/pubs/174-conservation-advice-05052016.pdf**.

Threatened Species Scientific Committee (TSSC). (2021). Conservation Advice Trichosurus vulpecula arnhemensis Northern Brushtail Possum. **http://www.environment.gov.au/biodiversity/threatened/species/pubs/83091-conservation-advice-11052021.pdf**.

Trott, LA (2012). Milner Bay Project: Marine Environmental Survey. Report produced for GEMCO – BHP Billiton. Australian Institute of Marine Science, Townsville. 204pp.

Vanderklift, M., Bearham, D., Haywood, M., McCallum, R., McLaughlin, J., McMahon, K., Mortimer, N., & Lavery, P. (2017). *Recovery mechanisms: Understanding mechanisms of seagrass recovery following disturbance* (WAMSI Dredging Science Node Report Theme 5, Project 5.4). Western Australian Marine Science Institution. **https://wamsi.org.au/app/uploads/2019/10/Dredging-Science-Final-Report-PROJ-5.4-Seagrass-Recovery-Mechanisms-Vanderklift-et-al-January-2017.pdf**.

WA EPA. (2021). Technical Guidance – Environmental impact assessment of marine dredging proposals. Environmental Protection Authority.

Wilson, S. K., & Knowles, D. G. (1988). Australia's reptiles: a photographic reference to the terrestrial reptiles of Australia. Collins Publishers, Sydney.

Wilson, S., & Swan, G., (2021). A Complete Guide to Reptiles of Australia. 6th Edition. Reed New Holland.

Woinarski, J., Pavey, C., Kerrigan, R., Cowie, I., & Ward, S., (eds) (2007). Lost from our landscape: threatened species of the Northern Territory. Northern Territory Government, Darwin.

Woinarski, J.C.Z (2004). NON-CURRENT National Multi-species Recovery Plan for the Partridge Pigeon Geophaps smithii smithii, Crested Shrike-tit, Falcunculus frontatus whitei, Masked Owl Tyto novaehollandiae kimberli and Masked Owl Tiwi Islands Tyto novaehollandiae melvillensis 2004-2008. Darwin: Northern Territory.

WSP. (2023). Marine Ecology Baseline Assessment – Desktop Report.

Appendix A

Updated modelling report

Appendix B

Updated significant impact assessments

Appendix C

Updated noise and vibration assessment

Appendix D

Mitigation and management measures

Appendix E

Marine monitoring strategy

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