

Review of Environmental Factors

5

CONTENTS

| 3 | Review of Environmental Factors | | | 3-1 |
|---|---------------------------------|----------------------|-----------------------------|-----|
| | 3.1 | Introc | duction | 3-1 |
| | 3.2 3.3 | Regulatory Framework | 3-1 | |
| | | Methodology | | 3-1 |
| | | 3.3.1 | Overview | 3-1 |
| | | 3.3.2 | Baseline Data Sources | 3-2 |
| | 3.4 | Revie | ew of Environmental Factors | 3-3 |

Tables

 Table 3-1
 Review of Environmental Factors

Figures

Figure 3-1 NT EPA Environmental Factors and Objectives

3 REVIEW OF ENVIRONMENTAL FACTORS

3.1 INTRODUCTION

This section describes the self-assessment undertaken for the Southern Lease Exploration Program (2023-2025) (exploration program) against the Northern Territory Environment Protection Authority's (NT EPA's) environmental factors and objectives. The regulatory framework and methodology utilised in the self-assessment is discussed, followed by a review of the full suite of environmental factors.

3.2 **REGULATORY FRAMEWORK**

The NT EPA has produced the *NT EPA Environmental Factors and Objectives* guideline (NT EPA, 2022), which explains that environmental factors and objectives are designed to provide a systematic way to categorise information about the environment to enable effective environmental impact assessment and reporting. Environmental factors are aspects of the environment that may be impacted by a proposed action. The guideline identifies a total of 14 environmental factors, characterised under five themes, namely Land, Water, Sea, Air, and People (NT EPA, 2022). Objectives have been developed for each environmental factor and potential impacts must be considered relative to these objectives. The NT EPA's environmental factors and objectives are provided in Figure 3-1.

The *Referring a proposal to the NT EPA* (NT EPA, 2021) guideline requires proponents to consider potential project impacts (including all impact sources and pathways) relative to each environmental factor to determine whether the project may significantly impact the environment. If a project has the potential to have a significant impact on the environment (i.e. on one or more environmental factor), it is necessary to refer the project to the NT EPA under the *Environment Protection Act 2019* (NT) (EP Act) and the *Environment Protection Regulations 2020* (NT) (EP Regulations). If a referral is made under the EP Act, it should focus on the environmental factors that will potentially be impacted.

Section 3.3 describes the methodology that was adopted to assess potential impacts from the exploration program against the NT EPA's environmental factors and objectives, and Section 3.4 provides the results of this assessment.

3.3 METHODOLOGY

3.3.1 Overview

Groote Eylandt Mining Company Pty Ltd (GEMCO) (the proponent) has undertaken a self-assessment of the exploration program to determine the environmental factors that are relevant to the exploration program and require further assessment.

The *Referring a proposal to the NT EPA* (NT EPA, 2021) guideline contains a screening tool which includes indicative environmental values and sensitivities for each environmental factor (e.g. threatened species are an indicative environmental value for the "Terrestrial Ecosystem" environmental factor) and these were considered as part of the assessment. In addition to considering the indicative environmental values and sensitivities listed in NT EPA (2021), the proponent drew on its knowledge of the environmental values that are potentially present within the exploration program area.

This knowledge was gained through:

- Consultation with stakeholders. As detailed in Section 2 Project Description, there has been an extensive consultation program with the Anindilyakwa Land Council (ALC) and Traditional Owners, undertaken over several years. In addition, Traditional Owners have been involved in fieldwork undertaken in the Southern Lease and have provided valuable insights regarding the environmental factors that they believed to be important.
- Undertaking an extensive body of baseline environmental work (listed in Section 3.3.2).

In understanding potential impacts, the proponent was able to draw on information gained from previous exploration programs. As described in Section 2 – Project Description, several exploration programs have been undertaken in the Southern Lease, and elsewhere on Groote Eylandt. These have provided information on the potential impacts from exploration (including impact sources and pathways) and the measures required to avoid and mitigate impacts. Data from previous exploration programs includes survey data collected in the Southern Lease, particularly monitoring data that has shown the success of the rehabilitation of drill pads and access tracks. In addition, a camera fauna monitoring program was undertaken in 2021 for the purpose of providing quantitative data to assist in understanding the impacts of vegetation disturbance associated with exploration activities on the density of Feral Cats (*Felis catus*) and the occurrence of the Northern Quoll (*Dasyurus hallucatus*). Data from previous exploration programs has provided a high level of confidence in the conclusions of the environmental assessment and the effectiveness of the management measures.

3.3.2 Baseline Data Sources

Baseline data sources that have informed the proponent's understanding of the baseline environment (i.e. environmental values and sensitivities) include:

- Terrestrial ecology field surveys (including both fauna and flora surveys) undertaken in the Southern Lease between 2016 and 2022, as well as a literature review and database searches, as documented in the *Baseline Terrestrial Ecology Report* (Appendix A).
- The Southern Lease Small Mammal Research Project, which was carried out in 2017 and 2018 and comprised a large-scale research project into the presence of threatened small mammals in the Southern Lease. The project included field surveys undertaken at 152 survey sites, and yielded approximately 26,000 trap nights of data, and 74 fauna species were identified to species level. The Small Mammal Research Project is described in the *Baseline Terrestrial Ecology Report* (Appendix A).
- Vegetation mapping of the Southern Lease, prepared by the Department of Environment and Natural Resources (now the Department of Environment, Parks and Water Security), and further field-validated/amended during fieldwork undertaken on behalf of the proponent in the Southern Lease. Vegetation mapping is described in the Baseline Terrestrial Ecology Report (Appendix A).
- An aquatic ecology survey of the Southern Lease, undertaken in 2018 on behalf of the proponent. This survey was
 undertaken to provide baseline information on aquatic ecology values in the Southern Lease and involved aquatic
 habitat assessments, water and sediment quality sampling, macroinvertebrate and fish sampling, turtle surveys,
 and listed species recordings undertaken across 14 sampling sites.
- Waterway mapping of the Southern Lease, undertaken in 2021. The mapping included reviewing government data and other available waterway mapping; using LiDAR, aerials, drone imagery and field inspections to correct the mapped alignment of waterways, and subsequently preparing an accurate waterway map.
- A Southern Lease sacred sites assessment undertaken between 2019-2020, by the ALC on behalf of the proponent. The assessment included collection of testimony and evidence from 106 Warnindilyakwa Traditional Owners regarding the nature and location of sacred sites. As a result of this assessment, nine sacred

sites throughout the Southern Lease have been thoroughly documented and associated instructions and protection buffer zones identified. Further information is provided in Section 5 – Culture and Heritage.

- Previous archaeological surveys undertaken in the Southern Lease, as well as a literature review and database searches, as described in Section 5 Culture and Heritage.
- Recent high quality mapping data, including LiDAR and recent aerial photography (from 2021).
- Data from recent (2016, 2019, 2020, 2021, 2022) pre-clearance surveys undertaken in exploration drilling areas located in the Southern Lease.

3.4 **REVIEW OF ENVIRONMENTAL FACTORS**

Table 3-1 provides a full list of environmental factors and objectives from NT EPA (2022) and describes the potential for the exploration program to impact each factor. Environmental factors that are not considered likely to be impacted by the proposed action are not required to undergo further environmental assessment.

Table 3-1 concludes that the exploration program has the potential to impact one environmental factor, namely terrestrial ecosystems. Potential impacts are discussed further in Section 4 – Terrestrial Ecosystems. This section presents the findings of a detailed environmental impact assessment, undertaken by Cumberland Ecology and provided in the *Assessment of Impacts on Listed Species Report* (Appendix B). The assessment concludes that given the measures to avoid and minimise impacts, no significant impacts on terrestrial ecosystems, biological diversity and ecological integrity are predicted. Despite this conclusion, the proponent is lodging this EP Act Referral to obtain certainty on the approval requirements of the exploration program.

Although Table 3-1 concludes that the exploration program is unlikely to impact culture and heritage, additional information on cultural heritage has been provided in Section 5 – Culture and Heritage, given the importance of this issue on Groote Eylandt.

Table 3-1 Review of Environmental Factors

| FACTORS AND OBJECTIVES | POTENTIAL FOR IMPACT ON ENVIRONMENTAL VALUES | | | |
|--|---|--|--|--|
| LAND | | | | |
| LANDFORMS | | | | |
| Conserve the variety and integrity of distinctive physical landforms. | □ Yes ⊠ No □ Uncertain □ N/A There are no distinctive physical landforms in the disturbance footprint proposed for the exploration program. Some of the white rock outcrops on Groote Eylandt, including outcrops in the Southern Lease, are distinctive physical landforms. However, the disturbance footprint has been sited to avoid these areas and consequently no impact | | | |
| TERRESTRIAL ENVIRO | on distinctive physical landforms is predicted. | | | |
| Protect the quality | □ Yes ⊠ No □ Uncertain □ N/A | | | |
| and integrity of land and soils so that environmental values are supported and maintained. | The exploration program does not involve any significant or permanent disturbance of land or soils. As detailed in Section 2 – Project Description, the blade up method of clearing is used which ensures that topsoil is largely undisturbed, maintaining its structural integrity and retaining vegetative material such as roots and tubers, as well as the soil seed bank. Consequently, no impact on terrestrial environmental quality is predicted. | | | |
| TERRESTRIAL ECOSYS | STEMS | | | |
| Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. | Yes D No D Uncertain N/A The exploration program involves clearing drill pads and access tracks in an area of native vegetation. Clearing native vegetation has the potential to give rise to direct and indirect impacts on listed threatened species and their habitat. Further discussion on terrestrial ecosystems is therefore warranted. Section 4 – Terrestrial Ecosystems provides an assessment of the potential impacts of | | | |
| functioning. | the exploration program on terrestrial ecosystems and provides a full description of the values and sensitivities of the ecosystems. | | | |
| WATER | | | | |
| HYDROLOGICAL PRO | CESSES | | | |
| Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained. | □ Yes ⊠ No □ Uncertain □ N/A Surface Water Section 2 – Project Description explains that a multi-year project planning process was adopted to ensure that the proponent's exploration activities are located in a broad area that avoids the most sensitive features in the Southern Lease, including significant watercourses. At a finer scale, and to further reduce impacts, the disturbance footprint for the exploration program has been designed to ensure that all activities are located beyond watercourses, wetlands and riparian vegetation. The surface water setting is described in Section 2 – Project Description and this section also includes maps | | | |

showing the exploration program relative to watercourses.

| FACTORS AND OBJECTIVES | POTENTIAL FOR IMPACT ON ENVIRONMENTAL VALUES | | | | |
|--|---|--|--|--|--|
| | The exploration program, in addition to being sited beyond watercourses, does not include activities that could give rise to changes in hydrological processes. For example, the exploration program does not involve abstraction or discharge of water, or the construction of structures (e.g. culverts) that could change flows in watercourses. No impact on hydrological regimes (surface water) is therefore predicted. | | | | |
| | Groundwater | | | | |
| | The local groundwater regime comprises shallow groundwater that occurs seasonally in weathered sediments and deeper groundwater that occurs within a confined sandstone aquifer. The shallow and deep groundwater are separated by a low permeability aquitard formation. | | | | |
| | The exploration program does not involve abstracting groundwater, and drilling will be undertaken in a manner that prevents any connection between aquifers developing. Specifically, bentonite, an inert low permeability clay, will be used to create a seal in any holes where the confined aquifer is intersected. This will prevent any possible connection between the aquifers. This is a standard measure, undertaken in accordance with the proponent's existing procedure related to capping and plugging exploration drill holes. No impact on hydrological regimes (groundwater) is therefore predicted. | | | | |
| INLAND WATER ENV | NVIRONMENTAL QUALITY | | | | |
| Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained. | ☐ Yes ⊠ No ☐ Uncertain ☐ N/A As explained in the response to "Hydrological Processes" the exploration program has been sited and designed to avoid impacts on watercourses and there are no watercourses within the disturbance footprint. Standard measures will be adopted to prevent indirect impacts from spills (e.g. diesel), or erosion and sedimentation. For example, each drill rig is supplied with a spill kit and operators are trained and familiar with its application. Any spent hydraulic fluids from servicing the drill rigs will be contained and returned to the mine site for recycling. Given the location of the exploration program beyond watercourses and the measures to be adopted to prevent indirect impacts on surface water quality, no impacts are predicted. Water is not required for RC drilling, other than for dust suppression. For diamond drilling, water used during drilling will be supplied by a support truck. Wastewater will be recaptured in tanks on the support vehicle and reused for each hole. No sumps are required. The only chemical used in drilling is LIQUI POL, which is used to aid diamond drilling. LIQUI POL is an organic polymer that is non-toxic to waterways and the environment. The majority of the LIQUI POL is retrieved with the drill cuttings returned from the drill hole. Any LIQUI POL that remains in the drill hole will biodegrade over time. No impacts on inland water quality (surface water or groundwater) are therefore predicted. | | | | |

FACTORS AND OBJECTIVES

AQUATIC ECOSYSTEMS

Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.

\Box Yes \boxtimes No \Box Uncertain \Box N/A

Refer to the response to "Hydrological Processes" and "Inland Water Quality". As discussed in these sections, the exploration program has been designed to ensure that there are no watercourses, wetlands or riparian vegetation within the disturbance footprint. Furthermore, the exploration program does not involve activities that may impact watercourses (e.g. abstraction or discharge of water) and standard mitigation measures are in place to prevent spills, or erosion and sedimentation. No impacts on surface water systems (flows or quality) are therefore predicted and consequently no impacts on aquatic ecosystems are predicted.

POTENTIAL FOR IMPACT

ON ENVIRONMENTAL VALUES

| SEA | | | | |
|--|--|--|--|--|
| COASTAL PROCESSES | | | | |
| Protect the geophysical and hydrological processes that shape coastal morphology so that the environmental values of the coast are maintained. | □ Yes ⊠ No □ Uncertain □ N/A The exploration program is not located on the coast, with the activities being approximately 1 km from the coastline at the closest point. This, coupled with the nature of the exploration activities and the absence of any activities within watercourses (refer to preceding sections on "Water"), means that no impacts on coastal processes are predicted. | | | |
| MARINE ENVIRONME | ENTAL QUALITY | | | |
| Protect the quality and productivity of water, sediment and biota so that environmental values are maintained. | □ Yes ⊠ No □ Uncertain □ N/A The exploration program is not located on the coast, with the activities being approximately 1 km from the coastline at the closest point. This, coupled with the nature of the exploration activities and the absence of any activities within watercourses (refer to preceding sections on "Water"), means that no impacts on marine environmental quality are predicted. | | | |
| MARINE ECOSYSTEM | S | | | |
| Protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. | □ Yes ⊠ No □ Uncertain □ N/A The exploration program is not located on the coast, with the activities being approximately 1 km from the coastline at the closest point. This, coupled with the nature of the exploration activities and the absence of any activities within watercourses (refer to preceding sections on "Water"), means that no impacts on marine environmental quality are predicted. | | | |

| FACTORS AND OBJECTIVES | POTENTIAL FOR IMPACT ON ENVIRONMENTAL VALUES | | | |
|---|--|--|--|--|
| AIR | | | | |
| AIR QUALITY | | | | |
| Protect air quality and minimise emissions and their impact so that environmental values are maintained. | Yes ⊠ No □ Uncertain □ N/A The activities proposed to be undertaken are small scale and of a short duration. Emissions are limited to those associated with the use of diesel by drill rigs, support vehicles and clearing equipment, with emissions only occurring while the equipment is operating. Dust from the activities will be minimised through progressively rehabilitating the drill pads and tracks. In addition, the drill rigs have dust curtains on the cones to help minimise air emissions. The exploration program is consequently no predicted to significantly impact air quality. | | | |
| ATMOSPHERIC PROC | ESSES | | | |
| Minimise greenhouse gas emissions so as to contribute to the NT Government's goal of achieving net zero greenhouse gas emissions by 2050. | Yes No Uncertain N/A Emissions are limited to those associated with the use of diesel by drill rigs, support vehicles and clearing equipment, with emissions only occurring while the equipment is operating. The exploration program would, therefore, not make a significant contribution to greenhouse gas (GHG) emissions. The proponent also operates in accordance with South32's Global Environment Standard, which requires all operations and projects to: Consider energy use and emissions within the optimisation of the integrated business planning process, and identify and implement energy efficiency and emission reduction initiatives; and Maintain a GHG emissions forecast for the life of the mining operation. | | | |
| PEOPLE | | | | |
| COMMUNITY AND EC | CONOMY | | | |
| Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians. | Yes No Uncertain N/A Section 2 – Project Description describes the socio-economic benefits that would be provided by the exploration program. These include direct employment, including employment of Traditional Owners. However, the key significance of the exploration program relates to its role in securing the long-term future of the proponent's operations on Groote Eylandt. The existing GEMCO mine has been operating for nearly 60 years and is an integral part of the economy of Groote Eylandt. The existing GEMCO mine provides significant socio-economic benefits to the Traditional Owners, as well as the regional economy of the Northern Territory. These benefits include: Provision of approximately 1,100 direct jobs at the existing mine, comprising approximately 900 employees and 200 agency contractors. This includes approximately 60 jobs for Aboriginal and Torres Strait Islanders. Provision of employment opportunities for service contractors, with a proportion of | | | |

| POTENTIAL FOR IMPACT ON ENVIRONMENTAL VALUES | |
|--|--|
| Royalties, government taxes and business opportunities which significantly contribute to both the local economy and the regional economy of the Northern Territory. | |
| • Education, training and apprenticeship opportunities for local residents, including Traditional Owners. | |
| • Provision of social infrastructure and services, specifically health services, to the communities on Groote Eylandt. | |
| Procurement opportunities for businesses on Groote Eylandt and, in particular, Indigenous enterprises. | |
| Coordination of community events by the proponent. | |
| The continuation of these benefits in the medium to long term is dependent on the identification and development of additional manganese resources by the proponent, with the Southern Lease being the proponent's only exploration tenement on Groote Eylandt. The Southern Lease is considered to be critical to the long term future of the proponent's mining operations on Groote Eylandt. | |
| No significant adverse socio-economic impacts are predicted given that: | |
| • The exploration program is in a remote setting and there are no dwellings or towns within or near to the exploration program disturbance footprint. The closest dwelling is Yedikba Outstation, located approximately 650 m from the nearest proposed disturbance associated with the exploration program. The closest community to the disturbance footprint is Angurugu which is located approximately 10 km to the north. Given these distances and the small scale and short-term nature of exploration, no impacts on residential amenity are predicted. | |
| Extensive consultation has been undertaken with the Traditional Owners in relation to exploration. This culminated in an Exploration Agreement being signed under the <i>Aboriginal Land Rights (Northern Territory) Act 1976</i> (Cth) (ALRA). The Exploration Agreement provided the Traditional Owners' consent for exploration and specified the conditions under which exploration may be undertaken. This includes environmental conditions such as ensuring culturally and environmentally sensitive areas are avoided. It also details the compensation to be provided to Traditional Owners for undertaking works in the Southern Lease and describes the process for engaging with Traditional Owners. In addition, as part of its Permit to Clear process, the proponent obtains consent from the ALC prior to undertaking clearing. The proponent has undertaken a detailed project planning process designed to avoid and minimise impacts on environmental and cultural values, including sacred sites. This was undertaken in consultation with the ALC. It will ensure, amongst other things, that the exploration program does not impact sacred sites in any way. The exploration program will not impact any of the roads/tracks that provide access to outstations, recreational areas or sacred sites. Only a small workforce is required for the exploration program, with the workforce to be housed in the proponent's existing accommodation. Consequently, no change to community structure or cohesion is predicted as a result of this workforce. | |
| | |

| FACTORS AND OBJECTIVES | POTENTIAL FOR IMPACT ON ENVIRONMENTAL VALUES | | |
|--|--|--|--|
| CULTURE AND HERIT | E AND HERITAGE | | |
| Protect culture and \Box Yes \boxtimes No \Box Uncertain \Box N/Aheritage. | | | |
| | The exploration program has been designed to ensure that there are no sacred sites or heritage places within the disturbance footprint (i.e. avoidance of impacts on cultural heritage was a design objective for the exploration program). Refer to Section 2 – Project Description for a description of the project planning process that was adopted to achieve this. No impacts on cultural heritage are therefore predicted. However, given the importance of cultural heritage in a setting such as Groote Eylandt, a separate section has been included to provide further detail (Section 5 – Culture and Heritage). | | |
| HUMAN HEALTH | | | |
| Protect the health of \Box Yes \boxtimes No \Box Uncertain \Box N/A the Northern | | | |
| Territory population. | As noted in "Community and Economy" there are no dwellings or towns within or near to the exploration program disturbance footprint. The location of the exploration program, coupled with the small-scale nature and short duration of the proposed activities, means that no impacts on human health are predicted. In relation to the proposed activities: | | |
| | • There will be no activities within watercourses or discharges to watercourses and hence the exploration program is not predicted to impact water quality, including drinking water or water used for recreational purposes (refer "Inland Water Environmental Quality"). | | |
| | No harmful chemicals will be introduced into the environment by the exploration program and measures will be put in place to prevent spills of diesel or hydraulic fluid. | | |
| | • The only air emissions are from the use of diesel, and these emissions will be small scale, with no significant impact on air quality predicted (refer "Air Quality"). | | |
| | The exploration program does not involve the construction of sumps or other sources of standing water. It would not, therefore, create conditions that are favourable for biting insects. | | |
| | • Although Traditional Owners supplement their diets with bush tucker, including bush tucker from the Southern Lease, the exploration program would not place significant limitations on this resource. The Traditional Owners will be able to continue to access the Southern Lease during the exploration program, with the only restrictions being in the specific areas where drilling activities are being undertaken (e.g. along the length of a drill track that is in active use). The exploration program will consequently not significantly impact the availability of bush tucker. | | |
| | Potential impacts on the health and safety of the workforce involved in the exploration program will be managed in accordance with the proponent's existing occupational health and safety (OHS) procedures and OHS legislation applicable to exploration tenements. | | |

FIGURES

| THEME | FACTOR | ENVIRONMENTAL OBJECTIVE | | | |
|--------|--|---|--|--|--|
| | LANDFORMS | Conserve the variety and integrity of distinctive physical landforms. | | | |
| LAND | TERRESTRIAL ENVIRONMENTAL QUALITY | Protect the quality and integrity of land and soils so that environmental values are supported and maintained. | | | |
| | TERRESTRIAL ECOSYSTEMS | Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. | | | |
| | | | | | |
| | HYDROLOGICAL PROCESSES | Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained. | | | |
| WATER | INLAND WATER ENVIRONMENTAL QUALITY | Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained. | | | |
| | AQUATIC ECOSYSTEMS | Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. | | | |
| | | | | | |
| | COASTAL PROCESSES | Protect the geophysical and hydrological processes that shape coastal morphology so that the environmental values of the coast are maintained. | | | |
| SEA | MARINE ENVIRONMENTAL QUALITY | Protect the quality and productivity of water, sediment and biota so that environmental values are maintained. | | | |
| | MARINE ECOSYSTEMS | Protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. | | | |
| | | | | | |
| | AIR QUALITY | Protect air quality and minimise emissions and their impact so that environmental values are maintained. | | | |
| AIR | ATMOSPHERIC PROCESSES | Minimise greenhouse gas emissions so as to contribute to the NT Government's goal of achieving net zero greenhouse gas emissions by 2050. | | | |
| | | | | | |
| | COMMUNITY AND ECONOMY | Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians. | | | |
| PEOPLE | CULTURE AND HERITAGE | Protect sacred sites, culture and heritage. | | | |
| | HUMAN HEALTH | Protect the health of the Northern Territory population. | | | |
| | | | | | |





SOUTHERN LEASE EXPLORATION PROGRAM

NT EPA Environmental Factors and Objectives

FIGURE 3-1