

Supplement



Groote Eylandt Mining Company (GEMCO)

Eastern Leases Project

Supplement to the
Draft Environmental Impact Statement

2016

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GROOTE EYLANDT MINING COMPANY (GEMCO)
EASTERN LEASES PROJECT

SUPPLEMENT TO THE
DRAFT ENVIRONMENTAL IMPACT
STATEMENT

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For:

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*Aboriginal and Torres Strait Islander readers should be aware that this document
may contain images or names of people who have died*

TABLE OF CONTENTS

1	Introduction	1
2	Submissions Received on the Draft EIS	2
3	Stakeholder Consultation.....	3
3.1	Feedback Consultation on the Draft EIS	3
3.2	Consultation in Relation to the Supplement	5
4	Revisions to the Draft EIS.....	6
4.1	Introduction	6
4.2	Supplementary Technical Information.....	7
4.2.1	Groundwater Recovery.....	7
4.2.2	Management of Tailings	8
4.2.3	Haul Road Crossings of Watercourses	9
4.3	Revised or Additional Management Measures	9
4.3.1	Salvage of Cleared Timber	10
4.3.2	Weed Management	11
4.3.3	Cane Toads	14
4.3.4	Biodiversity Offsets.....	16
4.3.5	Rehabilitation Completion Criteria for Fauna.....	19
4.3.6	Fire In Rehabilitation.....	20
4.3.7	Monitoring of Groundwater Dependent Ecosystems	21
4.3.8	Erosion and Sediment Control Plan	24
5	Responses to Submissions on the Draft EIS	25
1.	Northern Territory Environment Protection Authority	25
2.	Department of Business.....	46
3.	Department of Health – Environmental Health.....	47
4.	Department of Health – Medical Entomology.....	48
5.	Department of Land Resource Management	49
6.	Department of Lands, Planning and the Environment – Heritage Branch	72
7.	Department of Mines and Energy	73
8.	Department of Primary Industry and Fisheries.....	77
9.	Northern Territory Police, Fire and Emergency Services	78
10.	Anindilyakwa Land Council	79

11.	Anindilyakwa Land Council, Land and Sea Management Unit	108
12.	Environment Centre NT	111
13.	Jeff Aschmann	122

LIST OF FIGURES

Figure 1	Groundwater Dependent Ecosystems beyond the Project Disturbance Footprint	22
Figure 2	Location of Photographs relating to Issue 10.5	84
Figure 3	Predicted Maximum Extent of Groundwater Drawdown in the Lateritic Aquifer over the Life of the Mine	91

LIST OF TABLES

Table 1	Summary of Meetings held prior to and during the Draft EIS Public Exhibition Period
Table 2	Summary of Meetings Held During the Preparation of the Supplement
Table 3	Summary of the Supplementary Information Presented
Table 4	Summary of the Revised / Additional Management Measures

LIST OF PHOTOGRAPHS

Photograph 1	Posters utilised during the Draft EIS Feedback Consultation
Photograph 2	The Proponent's Representative Engaging in Draft EIS Feedback Consultation with Local Residents
Photograph 3	The Proponent's Representative Engaging in Draft EIS Feedback Consultation with Local Residents
Photograph 4	View of Area Referred to in Issue 10.5
Photograph 5	View of Area Referred to in Issue 10.5
Photograph 6	View of Area Referred to in Issue 10.5
Photograph 7	View of waterhole within an ephemeral reach of the Emerald River – Tributary 2
Photograph 8	View of waterhole within an ephemeral reach of the Emerald River – Tributary 2
Photograph 9	View of waterhole within an ephemeral reach of the Emerald River – Tributary 2
Photograph 10	View of waterhole within an ephemeral reach of the Emerald River – Tributary 2
Photograph 11	View downstream of waterhole within an ephemeral reach of the Emerald River – Tributary 2
Photograph 12	View of ephemeral reach of the Emerald River – Tributary 2

LIST OF ATTACHMENTS

Attachment A	<i>Revised Commitments Register</i>
Attachment B	<i>Revised Biodiversity Offsets Strategy</i>
Attachment C	Groundwater Recovery at the Existing GEMCO Mine
Attachment D	Conceptual Tailings Management Report
Attachment E	Haul Road Crossing Design Overview Report
Attachment F	Copies of Submissions Received on the Draft EIS

GROOTE EYLANDT MINING COMPANY (GEMCO)

EASTERN LEASES PROJECT

SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

for
South32

1 INTRODUCTION

The Groote Eylandt Mining Company (GEMCO) is proposing to develop the Eastern Leases Project (the project) on Groote Eylandt. GEMCO is the project proponent, and has two shareholders, South32 Pty Ltd (South32) and Anglo Operations (Australia) Pty Ltd. A Draft Environmental Impact Statement (EIS) was prepared for the project and was placed on public exhibition between 30 May and 10 July 2015. Stakeholders were provided with an opportunity to make submissions about the Draft EIS.

The Northern Territory Environment Protection Authority (NT EPA) provided the proponent with a direction to prepare a Supplement to the Draft EIS on 27 July 2015. The Supplement to the Draft EIS (the Supplement) is required for the purpose of responding to issues raised in the submissions on the Draft EIS. The Supplement is being formally submitted under Clause 12(3)(b) of the Northern Territory *Environmental Assessment Administrative Procedures*. The Draft EIS and the Supplement collectively form the EIS for this project and should be read in conjunction. The Supplement addresses the issues raised by stakeholders in their submissions. It contains responses to individual issues, as well as additional information about project impacts and management measures.

The Supplement has been prepared by Hansen Bailey, on behalf of South32. Input into the Supplement was provided by the proponent and its mine planning consultants (The Minserve Group), and by the EIS groundwater consultant (Australasian Groundwater and Environmental Consultants) and the EIS ecology consultant (Cumberland Ecology).

The Supplement is structured as follows:

- Section 2 provides a list of organisations and individuals who provided submissions on the Draft EIS;
- Section 3 describes the stakeholder consultation undertaken in relation to the exhibition of the Draft EIS and the preparation of the Supplement;
- Section 4 details the revisions to the Draft EIS, including additional / supplementary information and an overview of any additional or revised management measures for the project; and
- Section 5 provides a response to each of the individual submissions provided on the Draft EIS.

2 SUBMISSIONS RECEIVED ON THE DRAFT EIS

The NT EPA received a total of thirteen submissions on the Draft EIS from the following stakeholders:

Federal Government

- Department of the Environment (DotE) (incorporated within the submission from the NT EPA)

Northern Territory Government

- NT EPA
- Department of Business
- Department of Health – Environmental Health
- Department of Health – Medical Entomology
- Department of Land Resource Management (DLRM)
- Department of Lands, Planning and the Environment – Heritage Branch (DLPE)
- Department of Mines and Energy (DME)
- Department of Primary Industry and Fisheries (DPIF)
- Northern Territory Police, Fire and Emergency Services

Other Stakeholders

- Anindilyakwa Land Council (ALC)
- Anindilyakwa Land Council, Land and Sea Management Unit (ALC Rangers)
- Environment Centre NT (ECNT)
- Jeff Aschmann (a member of the Environment Centre NT)

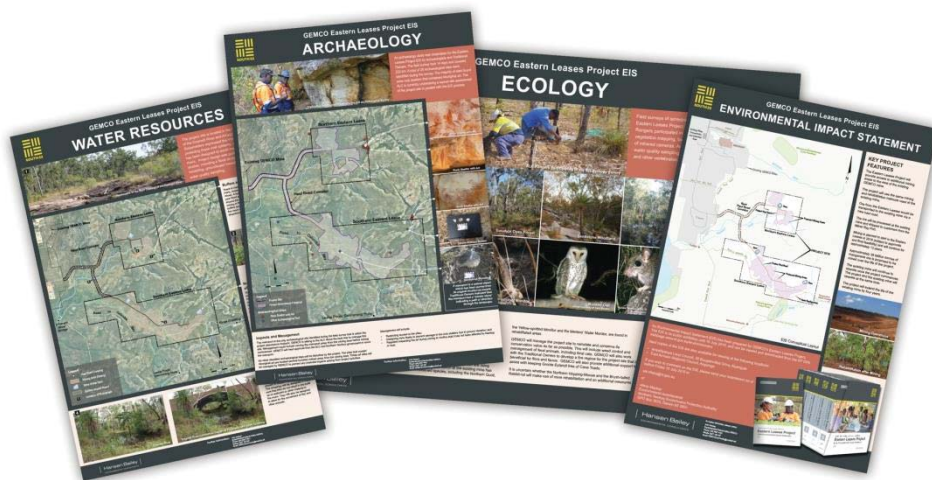
A full copy of each submission is included in Attachment F of this report.

Section 5 lists all of the individual issues raised in the submissions and provides a response to each issue. Each issue has been assigned an issue number.

3 STAKEHOLDER CONSULTATION

3.1 FEEDBACK CONSULTATION ON THE DRAFT EIS

The Draft EIS was placed on public exhibition from 30 May until 10 July 2015. During this public exhibition phase, a series of feedback consultation meetings were held with key stakeholders to present and explain the technical findings of the Draft EIS (Table 1). Tools used during consultation included PowerPoint presentations, which incorporated 3D animations, tailored toward the stakeholder's specific interests, and a series of visual information posters (Photographs 1 to 3). The posters were specifically designed for use during consultation with Traditional Owners. These posters were endorsed by the ALC for use in the Draft EIS feedback consultation.



Photograph 1 Posters utilised during the Draft EIS Feedback Consultation



Photographs 2 and 3 The Proponent's Representative Engaging in Draft EIS Feedback Consultation with Local Residents

The proponent advertised the project in a variety of community forums, including:

- An article in The Eylandt Echo (a community newspaper);
- Posters on community notice boards;
- Emails to island residents; and
- The Village Newsletter (on display in GEMCO's mess halls for its workforce and contractors).

The advertisements noted where copies of the Draft EIS could be viewed, and also detailed the process for interested parties to make submissions on the Draft EIS.

The proponent identified various key stakeholders that may be interested in the project and EIS process, and invited these stakeholders to EIS feedback consultation meetings. Table 1 provides a summary of the feedback meetings held during the EIS public exhibition period.

Table 1
Summary of Meetings held prior to and during the Draft EIS Public Exhibition Period

Date	Stakeholder	Meeting Location
26/5/15	ALC Mining & Environment Manager, and ALC Anthropologist	Alyangula, Groote Eylandt
27/5/15	Department of the Environment (DotE)	Groote Eylandt (including a visit to the project site)
28/5/15	Amateur Fisherman's Association of the NT (AFANT)	Darwin
29/5/15	Department of Land Resource Management (DLRM)	Darwin
29/5/15	Environmental Assessment Forum (coordinated by the NT EPA)	Darwin
15/6/15	East Arnhem Regional Shire Council (EARC)	Angurugu, Groote Eylandt
15/6/15	Alyangula small business owners (Post Office)	Alyangula, Groote Eylandt
15/6/15	Alyangula Police Station	Alyangula, Groote Eylandt
16/6/15	Aminjarrinja Enterprises	Umbakumba, Groote Eylandt
16/6/15	Umbakumba School (including Aboriginal Women's Group)	Umbakumba, Groote Eylandt
16/6/15	Alyangula School	Alyangula, Groote Eylandt
16/6/15	Groote Eylandt & Bickerton Island Enterprises (GEBIE)	Milner Bay, Groote Eylandt
17/6/15	GEMCO Rehabilitation and Mine Services Crew	GEMCO Mine, Groote Eylandt
17/6/15	ALC Executive Board	Angurugu, Groote Eylandt
17/6/15	ALC Land and Sea Rangers	Pole 13, Groote Eylandt
18/6/15	4-Mile Outstation	Umbakumba, Groote Eylandt
18/6/15	Umbakumba Shop	Umbakumba, Groote Eylandt
18/6/15	Umbakumba Festival	Umbakumba, Groote Eylandt
19/6/15	ALC Land and Sea Rangers	Pole 13, Groote Eylandt
19/6/15	Angurugu Women's Centre	Angurugu, Groote Eylandt
19/6/15	Angurugu Men's Shed	Angurugu, Groote Eylandt

3.2 CONSULTATION IN RELATION TO THE SUPPLEMENT

The NT EPA provided the proponent with the submissions on the Draft EIS in July 2015. The proponent then undertook a series of further consultation meetings with key stakeholders in order to:

- Discuss issues raised in the submissions;
- Assist with the development of a response to the issues raised in the submissions;
- Provide information on the progress and status of the project approval process; and/or
- Provide feedback on the information presented in the Supplement.

A series of PowerPoint presentations were presented at these meetings. Table 2 provides a summary of the meetings held.

Table 2
Summary of Meetings Held During the Preparation of the Supplement

Date	Stakeholder	Primary Focus
25/8/15	NT DLRM	Biodiversity offsets
1/10/15	The Office of the Federal Threatened Species Commissioner	Project outline, and biodiversity offsets
1/10/15	DotE EPBC Act Assessment Team	Project update, and biodiversity offsets
19/10/15	NT EPA	Project update
8/12/15	ALC Mining & Environment Manager, and ALC Anthropologist	Presentation of information in the Supplement, including groundwater, haul road crossings, biodiversity offsets, and revised management measures
8/12/15	ALC Mining & Environment Manager, and ALC Land & Sea Rangers	Biodiversity offsets
9/12/15	NT DLRM	Biodiversity offsets
11/01/16	NT EPA	Project update

4 REVISIONS TO THE DRAFT EIS

4.1 INTRODUCTION

A detailed review of the submissions on the Draft EIS was undertaken and Section 5 provides a response to the individual issues raised in each submission. A number of revisions to the Draft EIS are necessary in order to address the issues raised in the submissions. This section provides an overview of the revisions to the Draft EIS. In summary, the revisions to the Draft EIS comprise the following:

- Two sections of the Draft EIS have been replaced in their entirety, with revised versions included in the Supplement. These are the Commitments Register and the Biodiversity Offsets Strategy. The *Revised Commitments Register* is provided in Attachment A and reflects the amended or new management measures that will be implemented in response to the submissions received on the Draft EIS. The *Revised Biodiversity Offsets Strategy* is provided in Attachment B, with an overview of the *Revised Biodiversity Offsets Strategy* being provided in Section 4.3.4.
- Supplementary technical information relating to groundwater recovery, haul road crossings over watercourses, and the management of tailings and middlings generated by the project. An overview of the supplementary information is provided in Section 4.2, and detailed technical reports are included in Attachments C to E.
- Revised or additional management measures, as described in Section 4.3. The revised or additional management measures are also summarised in the *Revised Commitments Register* (Attachment A).

The issues raised in the submissions on the Draft EIS have not necessitated any changes to the proposed mine layout, and the Supplement does not propose any changes to the mine layout as presented in the Draft EIS.

It should be noted that the proponent is currently engaging with the ALC in relation to the management of sacred sites. As detailed in Section 2.5.1 of the Draft EIS, this is a separate process to the environmental approval process, as sacred sites are regulated under the *Northern Territory Aboriginal Sacred Sites Act 1989*. In some instances, management of sacred sites may involve amending the proposed mining footprint in order to provide appropriate buffers around sacred sites. The management of sacred sites is currently being discussed with the ALC and any changes to the mine plan that may be required as a result of sacred sites negotiations would likely involve a reduction in the mining footprint, with a consequent reduction in the environmental impacts as presented in the Draft EIS.

4.2 SUPPLEMENTARY TECHNICAL INFORMATION

As part of preparing a response to the submissions, it was necessary to prepare supplementary information in relation to:

- Groundwater recovery;
- Haul road crossings over watercourses; and
- The management of tailings and middlings generated by the project.

Table 3 summarises the supplementary information that has been provided and the issue number of the submission that requested the additional detailed information.

Table 3
Summary of the Supplementary Information Presented

Additional Information	Related Issue Number (refer to Section 5 of the Supplement)		Supplement Section Reference
Additional information on groundwater recovery	Issue 1.14 Issue 10.7 Issue 10.20	Issue 10.25 Issue 10.28 Issue 13.8	Section 4.2.1 and Attachment C
Additional information on the management of tailings and middlings	Issue 1.1	Issue 12.15	Section 4.2.2 and Attachment D
Additional information on haul road crossings of watercourses	Issue 1.17 Issue 10.1	Issue 10.24 Issue 12.10	Section 4.2.3 and Attachment E

4.2.1 Groundwater Recovery

The Draft EIS includes a numerical groundwater model, which makes use of data obtained from groundwater monitoring bores, as well as extensive geological information gathered during the proponent's ongoing exploration drilling program. As explained in Section 9 of the Draft EIS, mining in the project site is predicted to lead to drawdown of groundwater levels around active quarries, but the groundwater model predicts rapid recovery of groundwater following mining. Once mining has been completed in a quarry, active quarry dewatering will cease and groundwater table recovery will commence. The groundwater model predicts that around each quarry, 80% of the drawdown is predicted to recover within five years of mining. Almost total recovery of groundwater levels (i.e. to pre-mining levels) is expected to be achieved within 20 years of the completion of mining.

A number of submissions requested further information in relation to groundwater recovery, or expressed concerns as to whether groundwater would recover post-mining. In response to these submissions, and as part of the preparation of the Supplement, a report has been prepared by the EIS groundwater consultant (Australasian Groundwater and Environmental Consultants) which provides data from the existing GEMCO mine that demonstrates groundwater recovery post-mining. The report is presented in Attachment C of the Supplement. Data from the existing GEMCO mine has been used because the hydrogeology at the existing mine and the project site are directly

comparable. The behaviour and response of the groundwater system at the existing mine can therefore be used to inform potential changes to the groundwater regime that may result from project activities.

The report addresses the following two issues:

- The post-mining effects on groundwater levels in the vicinity of mined area; and
- The re-establishment of a groundwater table in backfilled quarries.

Post-mining effects on groundwater levels in the vicinity of mined areas have been assessed using detailed groundwater monitoring data collected at the existing GEMCO mine. Monitoring data was obtained from bores located less than 1 km from mined areas, and showed no significant residual effects on groundwater levels. The re-establishment of a groundwater table in backfilled areas has been assessed through establishing a groundwater monitoring bore at the existing GEMCO mine within a quarry that has been mined, backfilled and rehabilitated. Monitoring of this bore has confirmed that, within 10 years of mining, groundwater levels in backfilled overburden have recovered to pre-mining levels.

The data from the existing GEMCO mine, as presented in Attachment C, has confirmed the findings of the Draft EIS groundwater model and provides confirmation of groundwater recovery post-mining.

4.2.2 Management of Tailings

The processing of manganese ore gives rise to waste streams, including tailings. Manganese ore from the project site will be transported to the existing GEMCO mine for processing. Tailings from the processing of project ore will be stored in tailings storage facilities at the existing GEMCO mine, in accordance with existing management procedures. A submission on the Draft EIS requested additional information on the management of tailings. In particular, the submission requested confirmation that the facilities at the existing mine have sufficient capacity for waste generated from processing project ore. The submission also requested further detail on the management of the tailings storage facilities.

The proponent has prepared a report providing additional information on the management of tailings, including information on the capacity and operation of tailings dams. This report (*Conceptual Tailings Management Report*) is presented in Attachment D, and specifically addresses the issues raised in the submission. The Conceptual Tailings Management Report provides a life of mine tailings balance that demonstrates that excess tailings storage capacity will be available at each year of the remaining mine life. The *Conceptual Tailings Management Report* provides detailed design, management and monitoring measures for the storage of tailings. These measures will be implemented over the remaining mine life to ensure that tailings storage will not give rise to significant adverse environmental impacts.

4.2.3 Haul Road Crossings of Watercourses

It is necessary in a number of locations for the project haul road to cross watercourses on the project site, including the Emerald River and tributaries of the Emerald River and Amagula River. A number of submissions were received requesting additional information on the crossings, including further assessment of impacts and more detail on the design and operation of the crossings.

In response to these submissions, a conceptual design report of the haul road crossings has been prepared and is provided in Attachment E. The report includes conceptual design information, as well as a detailed description of the operation of the culverts, proposed monitoring of the crossings and adaptive management in the event of impacts being detected. The haul road crossings will be designed and operated as per the conceptual design contained in this report. Detailed design of the culverts will be completed prior to the commencement of construction. The Commitments Register has been updated to include reference to this report (refer to Attachment A).

4.3 REVISED OR ADDITIONAL MANAGEMENT MEASURES

A number of the submissions on the Draft EIS requested additional information in relation to management measures proposed for the project, or requested that the proponent consider additional management measures for particular aspects of the project. These submissions were reviewed in light of the predicted impacts and experience at the proponent's existing manganese mine on Groote Eylandt, and a response to each individual submission is provided in Section 5. In some instances, the responses involve committing to additional or revised management measures.

Table 4 summarises the revised and additional management measures proposed for the project. It provides references to the sections of the Supplement that describe the management measures in detail, and lists the issue number of the submission that prompted the changes to the management measures.

The Commitments Register contained in the Draft EIS has been revised to reflect the additional or revised management measures and is contained in Attachment A.

Table 4
Summary of the Revised / Additional Management Measures

Management Measure	Related Issue Number (refer to Section 5 of the Supplement)		Supplement Section Reference
Revised management measures for the use of timber cleared during mining operations	Issue 7.2 Issue 7.6	Issue 10.10 Issue 12.14	Section 4.3.1
Additional detail on weed management	Issue 5.44 Issue 10.36	Issue 12.3	Section 4.3.2
Additional detail on Cane Toad quarantine procedures	Issue 5.16 Issue 5.30 Issue 10.6 Issue 11.4	Issue 12.3 Issue 13.4 Issue 13.16	Section 4.3.3

Management Measure	Related Issue Number (refer to Section 5 of the Supplement)		Supplement Section Reference
<i>Revised Biodiversity Offsets Strategy</i>	Issue 1.3 Issue 1.6 Issue 1.12 Issue 1.18 Issue 1.19 Issue 1.22 Issue 1.23 Issue 1.24 Issue 1.25 Issue 1.26 Issue 1.27 Issue 5.4 Issue 5.11 Issue 5.12 Issue 5.14 Issue 5.15 Issue 5.16 Issue 5.30 Issue 5.31	Issue 5.34 Issue 5.37 Issue 10.6 Issue 10.13 Issue 10.14 Issue 10.15 Issue 10.16 Issue 10.21 Issue 10.22 Issue 10.35 Issue 11.3 Issue 11.4 Issue 11.5 Issue 12.3 Issue 12.5 Issue 12.7 Issue 12.20 Issue 13.4 Issue 13.16	Section 4.3.4 and Attachment B
Additional detail on rehabilitation completion criteria for fauna	Issue 1.16 Issue 1.20 Issue 5.29	Issue 7.3 Issue 12.13 Issue 12.14	Section 4.3.5
Additional management measures in relation to fire in rehabilitation	Issue 1.8 Issue 1.21 Issue 7.3	Issue 7.4 Issue 12.14	Section 4.3.6
Monitoring of groundwater dependent ecosystems	Issue 1.14 Issue 10.20	Issue 10.28	Section 4.3.7
Additional information on the Erosion and Sediment Control Plan	Issue 5.43 Issue 10.19	Issue 10.29 Issue 12.11	Section 4.3.8

4.3.1 Salvage of Cleared Timber

Overview of Issue

Table 17-1 of the Draft EIS indicates that areas will be cleared of vegetation ahead of mining, and that the cleared vegetation will be burnt. A number of submissions requested that this aspect of the mining process be reconsidered in light of the habitat value that timber could provide in rehabilitation and / or the potential economic value of the timber.

Revised Management Measure

The proponent will consider salvaging and relocating timber cleared ahead of mining activities, for use as fauna habitat in mine rehabilitation. However, this would require significant changes to the way in which clearing and rehabilitation are currently undertaken, and would require the acquisition of bespoke equipment. The proponent is therefore willing to revise its clearing and rehabilitation

procedures to incorporate salvage and relocation of timber, if it can be demonstrated that this activity will provide significantly improved outcomes for fauna and is able to be carried out in a manner that is safe to onsite personnel. To this end, the proponent will commit to undertaking a systematic trial at the existing GEMCO mine in relation to the use of salvaged timber in rehabilitation areas. This trial is proposed to occur prior to the development of the project. The results of the trial will inform the approach adopted for the project with respect to felled timber.

In addition, the proponent would be open to a proposal (and supporting business plan) from the ALC in relation to harvesting timber for a milling project. The ALC's proposed activities would need to comply with health and safety standards (both legislative requirements and the proponent's internal policies and standards), and would need to be undertaken in a manner that does not impact mining operations.

The Commitments Register has been revised to reflect this commitment (refer to Attachment A).

4.3.2 Weed Management

Overview of Issue

Section 7.7.2 of the Draft EIS explains that the proponent has existing procedures in relation to weed management. These procedures include measures for the identification and control of existing weeds and measures to prevent the introduction of weeds in areas disturbed by mining. The Draft EIS indicates that these procedures will be reviewed/revised and applied to project activities, and to the overall management of the project site. A number of submissions on the Draft EIS indicated that further detail on weed management is required. The submissions noted that weed management is particularly important for the project given that there are currently very few weeds in the project site.

Additional Detail on Weed Management

The proponent acknowledges the serious threats that weeds pose to biodiversity, water resources and the success of mine rehabilitation, and has provided the following information on proposed weed management for the project.

The proponent has in place a Weed Management System (WMS) which is consistent with NT legislation. The current WMS is supported by a number of internal procedures designed to manage and control weeds on the proponent's mining and exploration tenements and in Alyangula township. These procedures are readily available to the proponent's workforce and contractors and for the purposes of the project will be cross-referenced in associated contractual obligations. The procedures include:

- Exploration and Weed Hygiene Procedure (PRO-4162);
- Topsoil Management Procedure (PRO-4144);
- Vegetation Clearing Procedure (PRO-4192);
- Weed Management Manual (MAN-4051); and
- Quarantine Inspection Procedure (PRO-3198).

These procedures are regularly reviewed.

Prior to the commencement of the project, the WMS will be updated to ensure that it includes appropriate management controls relevant to the construction and operations phases of the project. Given that there are currently very few weeds in the project site, weed management activities will focus on employee awareness, the identification and reporting of known invasive weeds species, preventing the introduction of weeds, and on the early detection and targeting of weeds before they establish. The activities described below will be undertaken as part of weed management for the project.

Monitoring

- Prior to clearing taking place in the project site, a pre-clearing survey will be undertaken of the area to be cleared. This survey will include identifying any weeds that exist in the area to be cleared. The location of these weeds will be GPS recorded. Specific instructions designed to avoid the spread of weeds during clearing will be prepared as part of the pre-clearing process.
- Areas of mine rehabilitation will be monitored for the presence and distribution of weeds. The location of weeds in areas of mine rehabilitation will be GPS referenced in monitoring reports and recorded as part of the mine site weed management register. Recommended actions that are necessary for controlling weeds will also be recorded and scheduled as part of the proponent's Rehabilitation Mine Services' work program.
- A monitoring program targeting invasive weed species in disturbed areas will be introduced within the project site. The monitoring will be undertaken at the same time as planned mine rehabilitation surveys.
- Weeds that are recorded on the project site, either through pre-clearing surveys, monitoring of mine rehabilitation, the weed monitoring program, or through incidental sighting of weeds will be recorded in the proponent's geographic information system (GIS) database. The database will also include a record of weed control actions that are required in response to the sighting, a record of the actions that have been undertaken, and details of follow up monitoring.

Preventing the Spread of Weeds

Topsoil management and rehabilitation within the project site will be undertaken in the following manner, designed to reduce the spread and establishment of weeds:

- A high native vegetation seeding rate will be used to ensure that vegetation cover out-competes vigorous and persistent weeds. This has been found to be a very effective long term weed management strategy at the existing GEMCO mine.
- Wherever possible, topsoil that has been stripped ahead of mining will be placed directly onto available rehabilitation areas. This eliminates the need for stockpiling of topsoil, reduces the potential for weed infestation from stockpiled soil and increases the chance of establishing a dense native vegetation cover to outcompete weeds.
- Any topsoil that is required to be stockpiled will be managed in accordance with existing topsoil management procedures designed to avoid weed infestation. These procedures include:
 - Direct seeding of stockpiles at a high density to assist in weed control;
 - Managing weeds on the stockpile areas and within the surrounding areas; and
 - If a stockpile becomes infested with weeds, the surface layer of the stockpile will be scalped and placed back in active mining areas where it will be buried.

- Quality control measures will be applied as part of the seed collection and preparation process in order to ensure that weeds are not introduced into the rehabilitation seed mix.
- Any stockpiled topsoil and mulch (if used) will be inspected prior to being used in rehabilitation to ensure that weeds are not introduced into an area.
- In the event that fertilisers are used in rehabilitation, appropriate care shall be taken towards ensuring that they do not stimulate weed growth, seed setting and the spread of noxious or unwanted weeds.
- If seedlings are to be planted they will be inspected for the presence of weeds prior to leaving the nursery.
- A risk based approach will be adopted in relation to vehicle washdown and inspection procedures, as follows:
 - Vehicles that are considered a high risk for the introduction of weeds will be subject to washdown and inspection procedures before entering the project site. High risk vehicles are any vehicles that have been operating in areas that are considered a moderate or high risk for weeds (e.g. areas within the existing GEMCO mine that are subject to existing weed infestations, off-road areas). This will apply to all vehicles that have been working in these areas, including graders, rubber tyre dozers, light vehicles etc.
 - Haul trucks that travel continually between the project site and the Run of Mine (ROM) stockpile at the existing GEMCO mine are considered to be a lower risk for the introduction of weeds. The trucks will follow a set route and the road verges will be routinely inspected for weeds. Weed control measures will be implemented in the event of weeds being recorded along this route. Haul trucks will not be subject to a washdown procedure, provided they follow this set low risk transport route.
- The existing vehicle wash bay facility is located at the mine industrial area adjacent to the Maintenance Workshop. The inspection procedure involves checking the entire piece of equipment for noticeable traces of soil/seeds and plant material. This includes checking the deck area, wheel arches, belly plates, front grill and radiator. Plant or equipment that are observed to contain seeds or plant material will be refused access to the project site until it has been adequately cleaned.
- Personnel working on the project site will undertake a daily check for weed seeds on work clothes or boots prior to entering the project site.
- During the construction phase for the project, contractors and suppliers will be required, as part of the proponent's standard supply contract, to ensure that all plant, vehicles and equipment have been adequately washed down prior to arrival on the island. Prior to arrival on the island, the proponent's nominated representative will be required to inspect all plant and equipment on the Australian mainland to ensure compliance with washdown requirements.

Weed Control

Weed control will include the following:

- Prioritising weed control actions in newly established rehabilitation areas, topsoil stockpiles, roadsides, high traffic areas and park up areas.
- The monitoring described above will determine the scope of weed management control activities. The control methods used will depend on the weed species, and the location and

extent of the weed infestation. An integrated weed management approach which considers appropriate land management practices and physical and chemical controls is currently in place at the existing GEMCO mine and will be applied to the project. Control activities include, but are not limited to, hand weeding and the use of helicopter and/or vehicle mounted spray units for the application of selective herbicides.

- The fire management regime can also be an effective tool in controlling and preventing the spread of weeds. The development of a fire management regime for the project site will be carried out in coordination with the Traditional Owners, via the ALC.

Communication and Reporting

Reporting and consultation in relation to weeds will include the following:

- The proponent will continue to facilitate ongoing consultation with the Traditional Owners, via the ALC, on matters relating to weed management.
- The proponent will report on weed management activities as part of the Mining Management Plan prepared under the NT *Mining Management Act*.
- Site-wide Communication Briefs will be used to alert workers and the Groote Eylandt community of any new weed threats, and to provide weed identification information.
- As part of the site inductions, all staff and contractors will be made aware of their responsibilities regarding weed management in line with the requirements of the WMS.

Weed Management Responsibilities

The following outlines the current internal responsibilities regarding weed management, with a similar structure to be applied to the project:

- The proponent's Rehabilitation Mine Services team has overall responsibility for weed management within the proponent's mining, township and special purpose leases.
- The proponent's Rehabilitation Mine Services team advises and consults on potential weed issues pertaining to mine site rehabilitation. Rehabilitation Mine Services is responsible for updating and reviewing weed management procedures on an annual basis.
- Rehabilitation Mine Services is responsible for implementation of the weed management strategy throughout the proponent's rehabilitation areas in a manner that achieves the most effective result.
- The proponent's Supply Department is responsible for ensuring suppliers are made aware and comply with the proponent's requirements in relation to weed management.

4.3.3 Cane Toads

Overview of Issue

Section 7.6.3 of the Draft EIS explains that the proponent has a Cane Toad Management Plan, which includes measures to prevent the introduction of the Cane Toad (*Rhinella marinus*) to Groote Eylandt. The Management Plan includes an overview of the quarantine measures, an education campaign and contingency measures in the event of an outbreak of Cane Toads occur due to the proponent's activities. The Draft EIS indicated that the Cane Toad Management Plan would be applied to project

activities and would be reviewed and revised as necessary, to ensure that it is appropriate for all project activities. The Draft EIS also contained an additional commitment for the project, namely the introduction of annual audits of the quarantine procedures to confirm their adequacy and make recommendations for continuous improvement. The Draft EIS indicated that the audits would be undertaken by a trained and experienced quarantine officer.

A number of submissions reiterated the importance of preventing the introduction of Cane Toads to Groote Eylandt and requested additional information on the existing Cane Toad Management Plan and the proposed quarantine audits. A small number of submissions also requested additional commitments regarding the strengthening of existing controls to prevent Cane Toad introduction.

Additional Detail on Cane Toad Quarantine Procedures

The proponent acknowledges the serious threat that the Cane Toad poses to the unique biodiversity values of Groote Eylandt, and has provided the following additional information on existing Cane Toad quarantine measures.

The proponent has a Cane Toad Management Plan and associated quarantine procedures in place. The management plan includes monitoring, and, in the event of a Cane Toad being found, reporting and disposal procedures. Current Cane Toad management activities include:

- Cane Toad awareness programs conducted through:
 - Site inductions;
 - Inductions of airport and barge personnel;
 - Contractor inductions prior to arrival on Groote Eylandt;
 - 'Keep Groote Cane Toad Free' signage at the airport, the main road in Alyangula, throughout the accommodation facilities, mess facilities and at the mine and port operations;
 - Community information posters in Alyangula which include the process to be adopted in the event of a Cane Toad being sighted;
 - Information cards on Cane Toads being provided in airplane seat pockets for all commercial flights to Groote Eylandt, and for the proponent's charter flights;
 - In-flight announcements by flight attendants for all commercial flights to Groote Eylandt, and for the proponent's charter flights; and
 - Sitewide Communication Briefs.
- Barge inspections of every barge coming to Milner Bay are undertaken by barge operators. The proponent's Environment Team also undertake periodic inspections of the barges to ensure compliance with quarantine protocols.
- Lockers are provided to all fly-in fly-out staff to store work boots and other luggage on the island, as a means of reducing the probability of accidentally transporting toads.
- Cane Toad-proof fencing designed to contain and prevent toad movement surrounds the perimeter of the Toll Marine Shipping Yards in Alyangula and Darwin. The fences are inspected on a monthly basis, and repairs are undertaken as required, to ensure the integrity of the fencing.

Cane Toad acoustic monitoring devices (designed by the University of Queensland) and cage traps (designed by Frogwatch) are currently being constructed for use on the proponent's Mineral Leases and also in the Alyangula Township. The traps are being constructed as a part of a recent community development program, which is a partnership between the proponent, the ALC, James Cook University and the University of Queensland. The acoustic monitoring devices involve broadcasting the distinctive male Cane Toad mate attraction call, and making use of real time Cane Toad recognition software to detect if there is a response. Should a Cane Toad be detected, a message is transmitted via email or text message to the proponent's Environment Department, which will respond and inspect the trap and surrounding area. The proponent will be responsible for monitoring the Cane Toad traps within its Mineral Leases and within Alyangula, and the ALC Rangers are responsible for all other traps across the Groote Eylandt archipelago.

All Cane Toad incidents which occur within Alyangula or the proponent's Mineral Leases are recorded by the proponent. Cane Toad incidents include interceptions of Cane Toads during quarantine inspections, reported or suspected toad sightings and eradication of toads. Recording incidents in this way enables quantification of the risk by determining the frequency and type of incident so that future planning can be improved. As an additional management measure for the project, the proponent will undertake an annual audit of quarantine procedures to confirm their adequacy and make recommendations for their continuous improvement. The audits will be undertaken by trained and experienced quarantine officers. The audits will review any records of Cane Toads found on the island (including dead toads), and recommend improvements to quarantine processes.

The *Revised Biodiversity Offsets Strategy* that has been developed for the project will also address the potential threat posed by Cane Toads, as discussed in more detail in Section 4.3.4 of the Supplement.

4.3.4 Biodiversity Offsets

Overview of Issue

The Draft EIS contained a Draft Biodiversity Offsets Strategy (BOS), prepared in order to meet the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Draft BOS outlined proposed offsets for predicted significant residual impacts on two fauna species, namely the Northern Hopping-mouse (*Notomys aquilo*) and the Brush-tailed Rabbit-rat (*Conilurus penicillatus*). The Draft BOS proposed offsets for these species in the form of non-land based offsets (i.e. indirect offsets). The offsets were proposed to be provided in the form of well-planned scientific research, relevant to priorities and threats identified for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat.

The Draft BOS indicated that the specific offset programs were still to be finalised. Proposed programs identified and put forward by the proponent included:

- Research into feral cat control, specifically baiting feral cats and ways to minimise impacts of baiting on non-target species (e.g. Northern Quolls).
- Research into the ecological requirements, distribution and threats to the Brush-tailed Rabbit-rat.

- Research into improving the value of mine rehabilitation as habitat for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat.

The Draft BOS indicated that further consultation with stakeholders including the ALC, ALC Rangers and government agencies in relation to the proposed offsets was planned. The Draft BOS therefore, represented a starting point to guide this consultation process.

Over the past six months the proponent has consulted with stakeholders in relation to the findings of the Draft EIS and the content of the Draft BOS. This consultation is described in Section 3 of the Supplement. A number of comments and suggestions in relation to biodiversity offsets were received during the consultation period. In addition, a number of submissions on the Draft EIS raised issues in relation to biodiversity offsets. Key issues include:

1. A request for biodiversity offsets to be extended to include both the Northern Quoll and Masked Owl (northern), unless data is available to confirm that mine rehabilitation provides the full range of habitat values for these species, and that habitat in mine rehabilitation is comparable to the habitat provided in the pre-mining environment.
2. A desire for offsets (or at least a proportion of offsets) to be in the form of direct conservation actions (i.e. on the ground management work), rather than through funding of research programs.
3. Support from a number of stakeholders for offset programs to be directed towards land management actions, particularly feral cat control programs.
4. A request for the proponent to consider the potential to align offsets with conservation initiatives that have recently been developed by the NT and Federal governments. These initiatives specifically relate to the Groote Eylandt Biodiversity Initiative, the Threatened Species Management Plan (TSMP) (that is proposed be developed as an outcome of the Groote Eylandt Biodiversity Initiative), and the Threatened Species Strategy.

Revised Management Measures

The Draft BOS provided a starting point for initiating discussions in relation to potential biodiversity offset programs. The Draft BOS recognised that any proposed research or conservation initiatives would need to take into account any relevant existing or proposed conservation programs or research. In addition, it was recognised that biodiversity offsets would need to be developed with the support of key stakeholders including, but not limited to, the ALC, ALC Rangers, the Federal Department of the Environment (DotE) and the NT Department of Land Resource Management (DLRM). The reason for this is:

- The ALC represents the Traditional Owners of Groote Eylandt;
- The ALC Rangers are responsible for land management activities on Groote Eylandt;
- DotE is the Federal government regulator for the approval of the project under the EPBC Act and the associated biodiversity offsets required by the conditions of the approval; and
- The NT DLRM is the Northern Territory government agency with responsibility for assessment and management of biodiversity and is proposing research and conservation management programs for the island that will likely prove relevant to offsets.

The NT DLRM is currently initiating a research program to guide threatened species conservation on Groote Eylandt (the Groote Eylandt Biodiversity Initiative). This research will guide the development of the Threatened Species Management Plan (TSMP) for Groote Eylandt. The TSMP will be implemented from 2017 onwards and aims to:

- Target Cane Toad biosecurity and feral cat management;
- Provide evidence-based prioritisation of management actions (e.g. maintenance of benign fire regimes and control of environmental weeds);
- Guide and direct management planning by the ALC Rangers; and
- Encourage potential future investment by other stakeholders or industry.

The proponent has now consulted with all of these stakeholders, and received formal submissions on the Draft EIS from each stakeholder. Comments raised as part of this process have been taken into account in progressing the development of the offsets strategy. A Revised BOS has been prepared and is included in Attachment B. The Revised BOS replaces the version that was contained in the Draft EIS.

Key points in relation to the Revised BOS are as follows:

1. The Northern Quoll and Masked Owl (northern) are included in the Revised BOS, in addition to the Northern Hopping-mouse and the Brush-tailed Rabbit-rat. Although the proponent is confident that mine rehabilitation will ultimately provide habitat for the Northern Quoll and Masked Owl (northern), it only recently initiated fauna surveys in rehabilitation and is consequently not in a position at this time to provide long term data confirming this point. In addition, the Northern Quoll and Masked Owl (northern) make use of the same habitat as the two species for which offsets are required to be provided (i.e. the Northern Hopping-mouse and the Brush-tailed Rabbit-rat). Given this common habitat, and the fact that offsets are proposed to provide ecological benefits at a landscape scale (refer point 3 below), the offsets for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat can be designed in a manner that also benefits the Northern Quoll and Masked Owl (northern). Including the Northern Quoll and Masked Owl (northern) in the Revised BOS does not increase the area of habitat for which offsets are required to be provided.
2. The focus of the BOS has shifted from research to direct conservation actions. The proponent is able to make this shift primarily because of the research that DLRM is conducting as part of the Groote Eylandt Biodiversity Initiative. The research that is being coordinated by DLRM will address many of the research priorities described in the Draft BOS, including the control of feral cats (particularly the use and effectiveness of baits) and the ecological requirements and distribution of the Brush-tailed Rabbit-rat. The timing and availability of this research will enable the development and implementation of well-planned management actions on Groote Eylandt.
3. As noted above, DLRM will develop a TSMP for Groote Eylandt, based on the findings of this research. The TSMP is proposed to be developed as an outcome of a consultative process with the ALC and ALC Rangers, community members and other stakeholders on the island (e.g. GEMCO). The TSMP will outline conservation programs and actions for Groote Eylandt, designed to assist threatened species conservation. DLRM is still to secure funding for the implementation of these programs, and is seeking investment by industry and other

stakeholders. This provides an opportunity for the proponent to secure its offsets through contributing to the funding for the implementation of these programs. As noted above, these programs will focus on Cane Toad biosecurity and feral cat management, both of which are highly relevant to the conservation of the four nominated species for which the proponent is providing offsets.

The proponent will continue to work collaboratively with key stakeholders to further develop the offsets proposed. The intent is for a partnership to be established between the proponent, government and the ALC and ALC Rangers.

Further detail on the provision of biodiversity offsets is provided in Attachment B.

It should also be noted that Section 7.7.2 of the Draft EIS indicated that the proponent would undertake localised feral cat trapping within the project site. A number of submissions indicated that this was unlikely to be successful, unless it was undertaken as part of a broader program of feral cat control at an appropriate landscape scale, with effective barriers to recolonisation. In light of the submissions received, and the revision of the Draft BOS to include direct management actions for feral cats, any feral cat control work on the project site will now be undertaken as part of a broader partnering program of feral cat control on Groote Eylandt (undertaken as part of the delivery of biodiversity offsets).

4.3.5 Rehabilitation Completion Criteria for Fauna

Overview of Issue

Section 6 of the Draft EIS describes mine rehabilitation and provides completion criteria for rehabilitation. The completion criteria primarily relate to metrics associated with flora species (e.g. standing tree basal area, density of seedlings etc.). A submission on the Draft EIS requested that the completion criteria be updated to include:

- An evaluation of the success of the rehabilitation for providing habitat for fauna species (including threatened species); and
- Fauna composition (including estimates of density or occupancy rates) in rehabilitation compared with undisturbed areas.

Completion Criteria for Fauna

Section 6.3.4 of the Draft EIS indicates that the proponent's completion criteria will be reviewed to confirm their adequacy for the project site, and amended as necessary. In response to this submission, the proponent will commit to ensuring that this review includes the development of completion criteria relevant to fauna. The completion criteria will facilitate the attainment of the following goal with respect to fauna in rehabilitation:

- Mined areas will be rehabilitated with the objective of creating mature forest and woodland habitat that supports the habitat features and the abundance and diversity of fauna species similar to those within unmined areas, as far as practicable. Rehabilitated areas will be designed such that they are well connected to habitats beyond the project site.

4.3.6 Fire In Rehabilitation

Overview of Issue

The proponent has rehabilitated more than 1,000 ha of land disturbed by mining activities within the existing GEMCO mine site, with rehabilitation varying in age from a few months to over 30 years. Fire is currently excluded from rehabilitated areas to allow vegetation to establish (although it is noted that there are several areas of rehabilitation that have been subject to fire). Fire is a natural part of ecosystem function on Groote Eylandt and fire management has historically been practised by the Traditional Owners. Section 6.2.5 of the Draft EIS indicates that, in the long term, when mining is complete and all sites are rehabilitated, it is likely that the resultant vegetation will be subject to similar frequencies of fire as those occurring in unmined areas. The Draft EIS indicates that fire is likely to influence the vegetation composition and structure of rehabilitation and enable the vegetation to more closely approximate the original forest type.

A number of submissions were received recommending that the proponent develop a program of fire management for rehabilitation whereby controlled burns are introduced into rehabilitation. Submissions raised concerns about delaying the introduction of fire into rehabilitation, noting that this could lead to greater build-up of fuel and hotter, more damaging fires. A submission on the Draft EIS also indicated that the rehabilitation completion criteria for the project should address fire and ensure the fire resilience of the rehabilitation before it is handed back to the Traditional Owners.

Additional Management Measures for Fire in Rehabilitation

The proponent recognises the need for rehabilitation to be subject to controlled burning and is currently working towards a program of introducing controlled burning into rehabilitation. As a commitment for this project, the proponent will undertake a systematic trial program of introducing controlled burning into re-vegetated rehabilitation areas. The results of the trial program will guide the wider introduction of controlled burning into rehabilitation on the project site.

The trial program will draw on the research that is available in relation to best practice fire management in Northern Australia, and will consider issues such as:

- The age of mine site rehabilitation;
- The timing of prescribed burns (i.e. time of year and conditions on the day);
- The proximity of rehabilitation areas to active mining operations and the safety of mine site personnel;
- The frequency of fires;
- The size of the areas subject to controlled burning (with the aim of creating a mosaic of burnt and unburnt areas); and
- Intervals between fires.

The proponent will consult with the ALC in relation to the development of this trial program. The trial program will gather data on the response of rehabilitation to controlled burning. Following the completion of the trial program, procedures in relation to controlled burning of rehabilitation will be developed for the project and reflected in rehabilitation management plans.

Section 6.3.4 of the Draft EIS indicates that the proponent's completion criteria will be reviewed to confirm their adequacy for the project site, and amended as necessary. Completion criteria in relation to the resilience of rehabilitation to fire will be introduced as part of this review, and will be guided by the results of the trial that is proposed to be undertaken.

4.3.7 Monitoring of Groundwater Dependent Ecosystems

Overview of Issue

A number of submissions raised issues in relation to groundwater depressurisation (dewatering) as a result of mining, and groundwater recovery post-mining. These issues were raised, in part due to concerns about potential long term impacts on groundwater dependent ecosystems (GDEs). The Draft EIS predicts that groundwater will recover rapidly following mining and does not predict any significant long term impacts on GDEs. Section 9.4.3 of the Draft EIS provides further detail on the predictions, and Attachment C of the Supplement provides supporting data on groundwater recovery at the existing GEMCO mine.

A number of submissions requested that a monitoring program be developed for the project to confirm that there are no long term impacts on GDEs as a result of groundwater depressurisation due to the project.

Monitoring of Groundwater Dependent Ecosystems

Section 9.5 of the Draft EIS describes the groundwater monitoring network for the project and notes that the monitoring network established as part of the groundwater investigations for the Draft EIS will continue to be utilised throughout the life of the project. This will include recording of groundwater levels from monitoring bores across the project site. Automatic loggers which record standing water levels every few minutes are installed on all monitoring bores. This monitoring is planned to continue and will enable natural groundwater level fluctuations (such as responses to the wet season) to be distinguished from potential water level impacts due to depressurisation resulting from mining activities.

In addition to this existing commitment contained in the Draft EIS, the proponent will develop and implement a program to monitor the condition of GDEs. The Draft EIS has not predicted any impacts on GDEs as a result of groundwater depressurisation, and the purpose of the GDE monitoring program will be to gather data to confirm that there are no changes to the vegetation characteristics of GDEs resulting from changes to groundwater levels due to the project.

Monitoring will be undertaken in the GDEs within the project site that are located beyond the area to be cleared for the project. As detailed in Section 7.5.2 of the Draft EIS, vegetation map units MU3, MU10a, MU11, MU16 and MU31 are associated with shallow occurrences of groundwater. Vegetation within these map units will be subject to monitoring. Figure 1 shows the location of these map units beyond the project's disturbance footprint.

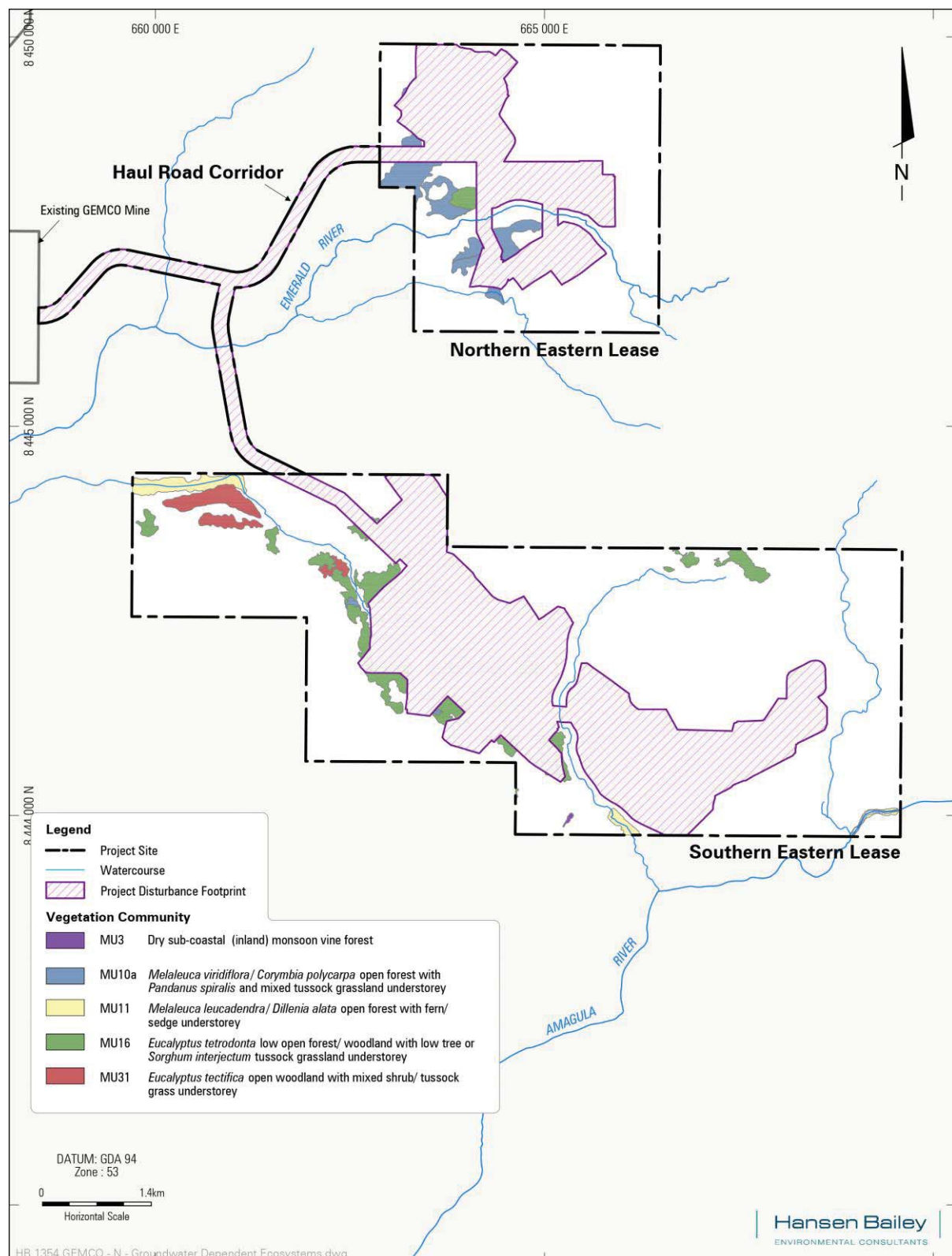


Figure 1 Groundwater Dependent Ecosystems beyond the Project Disturbance Footprint

The monitoring will be undertaken through:

- Aerial photograph interpretation (API) and vegetation community ground-truthing. The API and vegetation ground-truthing will assist in determining the extent of assessed GDEs, and will identify appropriate sites for long term monitoring. API will be undertaken every five years during the operational mine life, with the option of some supplementary ground-truthing to confirm the extent of GDE vegetation. Over time, the extent of GDEs will be reviewed to determine any expansion/contraction of areas of groundwater dependent vegetation or key groundwater dependent plant species (for example paperbarks).
- The establishment of permanent vegetation monitoring plots in GDEs. Representative monitoring plots will be established in areas predicted to experience groundwater drawdown due to mining, as well as in areas beyond the predicted limit of drawdown due to mining. Monitoring will record data for a range of variables. These variables are still to be confirmed but may include:
 - Species diversity of vascular plants (native and exotic);
 - Cover and abundance of indicator vascular plants (the indicator species for each vegetation community would be determined following the first round of monitoring);
 - Cover of exotic vascular plants;
 - Stem counts and basal area calculations of woody vegetation;
 - Projective foliage cover of each stratum; and
 - General health (e.g. present of dieback) of dominant trees and shrubs.

These variables have been monitored for many years in rehabilitation on the existing GEMCO mine. Techniques that have been successfully developed at the existing GEMCO mine will therefore be used to monitor GDE vegetation and responses to groundwater drawdown. This will also allow the GDE monitoring to be undertaken at the same time as the ongoing rehabilitation monitoring program.

Data from the monitoring program will be reviewed against groundwater monitoring data collected as part of the groundwater monitoring program. This will allow any changes in the extent and/or condition of GDEs to be assessed in relation to groundwater levels, and will allow any impacts on GDEs to be detected. The monitoring program will commence one year prior to the commencement of mining within 2 km of GDEs in order to establish the baseline condition of vegetation.

In the event of any impacts on GDEs being identified, adaptive management measures will be employed. The nature of the management measures would be influenced by the cause and nature of any impact on GDEs, and the management measures would include tailored responses to specific issues. Management measures may range from a commitment to additional monitoring, through to changes to the short term mining schedule and mine layout.

4.3.8 Erosion and Sediment Control Plan

Overview of Issue

The Draft EIS indicates that an Erosion and Sediment Control Plan will be prepared prior to the commencement of construction activities. A submission on the Draft EIS provided a set of principles that should be considered in preparing the Erosion and Sediment Control Plan, and provided details of various guidelines that should be considered in preparing the plan.

Erosion and Sediment Control Plan

The requirements in relation to the Erosion and Sediment Control Plan have been revised to reflect the issues raised in this submission. The details of the Erosion and Sediment Control Plan are provided below.

An Erosion and Sediment Control Plan will be prepared prior to commencement of the project. As requested by the Department of Land Resource Management, the Erosion and Sediment Control Plan will be developed in accordance with the *International Erosion Control Association Best Practice Erosion and Sediment Control guidelines* and the *New South Wales Managing Urban Stormwater: Soils and Construction, Volume 2E – Mines and Quarries*. All erosion and sediment control works will be constructed in accordance with these publications and the relevant *NT Erosion and Sediment Control Guidelines Technical Notes*.

The plan will be closely linked to (but distinct from) the Water Management Plan. The Erosion and Sediment Control Plan will include details of permanent and temporary erosion and sediment control methods and treatments to be implemented during the construction, operations and post-mining phases. The Erosion and Sediment Control Plan will specifically include:

- A detailed description of the existing catchment and drainage setting in terms of the potential for erosion and sources of sediment.
- A description of the proposed drainage control measures for managing stormwater runoff and preventing gully and rill erosion. This will include design volumes, dimensions and grades for any drainage structures such as bunding and collection drains.
- A description of the proposed management of erosion and sedimentation issues related to vegetation clearance, exposed soils and surfaces, road formation and drainage, and watercourse crossings.
- A description of the proposed sediment control measures for containing and settling any entrained sediments in stormwater runoff or site drainage. This will include design volumes, dimensions and sediment retention parameters for any sediment control structures such as sediment ponds and traps.
- Figures showing the pre-mining setting, areas of proposed disturbance and clearing, and an appropriate set of engineering plans for all erosion and sediment control measures.

The Erosion and Sediment Control Plan will be submitted to the Department of Mines and Energy to ensure that all proposed measures are implemented in accordance with relevant regulatory requirements.

5 RESPONSES TO SUBMISSIONS ON THE DRAFT EIS

The following section contains the submissions received by the proponent on the Draft EIS, and provides a response to each identified issue. Each submission has been provided verbatim as per the text in the original submission (i.e. no changes to spelling or grammar have been made). Copies of the original submissions are provided in Attachment F of the supplement.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

The submission provided by the NT Environment Protection Authority (NT EPA) incorporates comments that were provided by the Federal Department of the Environment.

Issue 1.1. Life of asset planning – Tailings and middlings

The draft EIS states that the “*current system for managing tailings and middlings will be extended to include tailings and middlings from the project [GEMCO Eastern Leases Project]*” and the “*life of asset planning process...ensures that sufficient capacity is available to meet tailings storage requirements associated with ongoing and future mine production, whilst ensuring that tailings are stored and managed with no significant adverse environmental impacts*”. The life of asset planning process for tailings and middlings management or details regarding the capacity of the existing tailings storage facilities are not detailed in the draft EIS, and as such, the draft EIS has not demonstrated that:

1. there will be sufficient capacity, and the appropriate conditions, at the existing GEMCO mine to meet future tailings storage requirements
2. tailings and middlings generated from the GEMCO Eastern Leases Project can be handled and stored in a manner that will ensure there are no environmental impacts.

It is also unclear whether new tailing storage facilities may be required in the event that life of asset planning identifies that the current facilities cannot accommodate additional tailings and middlings generated from the GEMCO Eastern Leases Project. Facilities may need to be considered outside of this assessment and/or the existing environmental approvals if additional tailing storage facilities are required. Specific details regarding the life of asset planning process; the capacity and integrity of the proposed tailings storage facilities, including details of the location, layout, factor of safety rating, expected design life and permeability, to enable an assessment of the acceptability of the proposed management of the tailings and middlings should be included in the Supplement.

Tailings Management

A *Conceptual Tailings Management Report* is provided in Attachment D of the Supplement. This report provides additional details on the remaining life of mine tailings management to address the specific issues raised in this submission. The Conceptual Tailings Management Report provides a life of mine tailings balance that demonstrates that excess tailings storage capacity will be available at

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

each year of the remaining mine life. The Conceptual Tailings Management Report provides detailed design, management and monitoring measures for the storage of tailings. These measures will be implemented over the remaining mine life to ensure that tailings storage will not give rise to significant adverse environmental impacts.

Middlings

As discussed in Section 3.6.5 and 3.7.4 of the Draft EIS, middlings are reused in haul road construction and maintenance activities. Prior to their use for haul road construction and maintenance activities, middlings are temporarily stored at the dedicated middlings stockpile located adjacent to the mine concentrator (refer to Figure 3-10 of the Draft EIS). The middlings stockpile inventory is managed to ensure that sufficient middlings are available for planned future haul road works. Unlike tailings, middlings are not permanently stored in emplacements, and the additional middlings generated from processing project ore will be used in the additional haul road construction and maintenance activities associated with the project. Section 3.7.4 of the Draft EIS describes the geochemical properties of the middlings that will be generated from project ore. It explains that the middlings are non-acid forming, and generate runoff and seepage exhibiting neutral pH, low salinity and low concentrations of metals.

Issue 1.2. Mine planning – 1% Annual Exceedance Probability

The draft EIS defines the ‘buffer’ as the mine planning constraint developed for the protection of watercourses. The buffers were designed and located to minimise the operational impacts of the GEMCO Eastern Leases Project by limiting the interaction between proposed quarries and flooding events. This approach provides the quarries with protection from watercourse flooding for all events up to and including the 1% Annual Exceedance Probability (AEP) flood event. The draft EIS indicates that *“integrated mine planning and environmental impact assessment was conducted to ensure the key watercourses traversing the project site were not significantly impacted while maintaining an efficient and economic mine plan”*.

It is understood that the 1 % AEP flood event *“was selected to avoid disturbance of the main channels of the watercourses and ensure that there would be no interference with surface water flows”*. However, there is very little discussion or justification for the appropriateness of the 1 % AEP flood event for the protection of riparian vegetation, which also require consideration of a suitable buffer (see: Department of Natural Resources, Environment, The Arts and Sport (2010) *Land Clearing Guidelines*, Department of Natural Resources, Environment, The Arts and Sport, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/data/assets/pdf_file/0018/5526/NT-Land-Clearing-Guidelines-2010_040310_Updated-April-2013.pdf). This is particularly relevant because riparian vegetation would be cleared as part of the proposed action, primarily for the construction of the haul road crossing.

The Supplement should include a discussion on:

- the appropriateness of the 1 % AEP flood event buffer for the protection of riparian vegetation, in consideration of NT Guidance material (e.g. Department of

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Natural Resources, Environment, The Arts and Sport (2010) *Land Clearing Guidelines*, Department of Natural Resources, Environment, The Arts and Sport, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/data/assets/pdf_file/0018/5526/NT-Land-Clearing-Guidelines-2010_040310_Updated-April-2013.pdf

- how the selection of buffers relate to stream order (see: Department of Land Resource Management, Factsheet: *Vegetation Management in the Northern Territory, Native Vegetation Buffers and Corridors*, Department of Land Resource Management, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/data/assets/pdf_file/0020/5357/Veg-Management-Factsheets_Buffers_Feb2013.pdf)
- the potential impacts on watercourses if a flood event is greater than the predicted 1 % AEP and how the excess water will be managed, in consideration of mine water discharge.

Riparian Vegetation

Section 5.1.2 of the Draft EIS *Terrestrial Ecology Report* (Appendix C) explains that vegetation communities MU11 and MU20 consist of riparian vegetation. Riparian vegetation comprises 86 ha of the project site. As shown in Table 7.1 of the Draft EIS *Terrestrial Ecology Report* (Appendix C), the majority of the riparian vegetation within the project site will be undisturbed, with only 5 ha of riparian vegetation proposed to be cleared. This equates to 6% of the riparian vegetation on the project site. The proposed clearing of riparian vegetation is associated with the construction of haul road crossings of watercourses, and with mining in areas of overland flow that support riparian vegetation.

The NT *Land Clearing Guidelines* are intended to guide development, particularly development applications under the *Planning Act* and the clearing of land for agricultural, industrial and urban development purposes. Mining developments, however, are regulated by the *Mining Management Act* rather than the *Planning Act*. Mining applications are not, therefore, required to formally consider the Land Clearing Guidelines. Nevertheless, there are sections of the guidelines that provide useful information regarding the assessment of sensitive or significant vegetation types, including riparian vegetation. As stated in Section 7.3.2 of the Draft EIS, these sections of the guidelines were considered in the assessment of the environmental impacts of the project on sensitive vegetation communities, including impacts on riparian vegetation communities.

The guidelines note the range of factors that should be considered in reviewing a proposal to clear vegetation. These factors include whether the clearing is necessary for the intended use. In planning the project, riparian vegetation has already been avoided as far as possible, with significant manganese reserves being left unmined in order to avoid impacts on watercourses and riparian vegetation. The limited area of riparian vegetation that is proposed to be cleared is therefore considered necessary in order to allow safe access and to optimise the ability to mine the manganese resource. In particular, it is necessary to clear riparian vegetation to enable the construction of haul road crossings of watercourses. The project cannot proceed without these crossings.

As discussed in Section 10.3 of the Draft EIS, detailed modelling was used to determine the extent of flooding associated with a 1 in 100 year flood event (i.e. the 1% AEP) of the watercourses that

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

traverse the project site. Buffers between watercourses and mining areas were defined based on this modelling. These buffers were primarily developed to reduce the potential for impacts on the watercourses, however, they are also of a sufficient width that they encompass the riparian vegetation. As a consequence, the buffers are deemed suitable for protecting riparian vegetation. Any additional measures therefore to extend the width of the buffers between watercourses and mining areas would not protect any additional riparian vegetation.

Stream Ordering

The *Vegetation Management in the Northern Territory, Native Vegetation Buffers and Corridors* factsheet, which is derived directly from the *Land Clearing Guidelines*, recommends minimum buffer widths for the protection of riparian vegetation based on stream order. As discussed above, these guidelines are intended to provide general guidance in relation to the protection of riparian vegetation for agricultural, industrial and urban development purposes, and are therefore not directly relevant to mining activities. However, as noted above, the buffers that have been delineated around the watercourses are based on hydrological modelling conducted for the project and, importantly, also protect the riparian vegetation mapped within the project site.

Design Flood Event Greater than 1% AEP

The project has been designed to ensure that the quarries will be located outside of the 1 in 100 AEP flood envelope of the watercourses that traverse the site. However, it is possible, with a very low likelihood, that a larger flood event could occur that is more extreme than those modelled in the Draft EIS. While it is unlikely that an event larger than a 1 in 100 AEP flood event would occur within the short 13 year operating life of the project, such an event could result in flood encroachment on the proposed quarry footprints. The potential for quarry inundation under extreme flood conditions is reduced by the proposed mining sequence which involves only a small proportion of the proposed mining footprint being active at any point in time during the mine life.

Active quarries are maintained in a dewatered state to allow mining to progress. In the unlikely event that an extreme flood occurred and flood waters inundated the active quarry it is likely that floodwaters would accumulate rapidly within the quarry.

Any flood waters that inundate the pit would be broadly comparable in terms of water quality to the flood waters outside the pit. Pit water quality would only be expected to deteriorate if the water was to be stored in the pit for an extended period. However, upon recession of floodwaters, any accumulation of floodwater in the pit would be pumped to the designated water storages for use as dust suppression water supply. Any controlled release of mine water could only be undertaken in accordance with the contingency discharge limits presented in the Draft EIS. These water quality limits are designed to ensure that released water is within the limits of natural variation at the point of release. This will ensure that there are no detectable changes in the baseline water quality and ecosystem values in the unlikely event of quarry water discharge.

In conclusion, based on the mine planning sequence and the buffers between the quarries and watercourses, a flood larger than the 1 in 100 AEP event is therefore considered unlikely to result in significant inundation of mining areas. In the unlikely event of quarries being inundated due to a flood larger than the 1 in 100 AEP event, the excess water would be managed as part of the mine water management system in order to avoid adverse water quality impacts.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Issue 1.3. Northern quoll

The draft EIS is deficient in information on the northern quoll (*Dasyurus hallucatus*). The proposed action would result in the loss of 6 ha of potential denning habitat for the species and approximately 1500 ha of suitable foraging habitat. Insufficient information has been provided to ensure that the rehabilitated areas sufficiently offset the loss of these habitat types. In particular, no evidence is provided to ensure that the rehabilitated areas provide the same quality of potential denning and foraging habitat for the species. The rehabilitated areas have not been evaluated from a floral or faunal perspective relative to baseline data pre-clearance or relative to undisturbed areas to determine if rehabilitated areas offset the loss of suitable habitat for *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened species. Therefore, it is difficult to determine that the proposed action will not have a residual significant impact on the northern quoll simply because there are records of the species within rehabilitated areas.

The Supplement should include a discussion on the significant impacts to northern quoll, including:

- loss of potential denning habitat, which is considered critical for the species
- effort to offset the loss of potential denning habitat
- the *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the endangered northern quoll, Dasyurus hallucatus*

Residual significant impacts to the northern quoll are either dismissed or not adequately discussed or addressed. Please refer to the documents and information provided below:

The draft EIS indicates that 6ha of sandstone woodland and rock outcrops will be cleared as result of the proposed action. The *National Recovery Plan for the Northern Quoll* (p.4, 5) states:

‘Therefore habitat critical to survival is that where northern quolls are least exposed to threats or least likely to be in the future. Given the threats outlined below, two particular broad habitat types fall into this category: rocky areas and offshore islands.

Rocky areas provide prime habitat for northern quolls (Begg 1981, Braithwaite and Griffiths 1994, DEWHA in prep.) and many other declining animal species (Freeland et al. 1988, Burbidge and McKenzie 1989). Recent modelling of island populations in the Northern Territory established that occurrence of northern quolls was related to ruggedness or topographic complexity (Woinarski et al. 2007). Analyses by Woinarski et al. (2008) show that northern quoll declines in Queensland have mainly been in lowland and flatter (less rugged) areas and a recent survey found the most abundant remnant populations on the Queensland coast were at sites with large boulders (Foster and Oakwood pers. comm. 2008).

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Rocky areas retain water and have a diversity of microhabitats, so support higher floristic diversity and productivity and thus greater prey density and/or diversity compared to non-rocky adjacent country (Burnett 1997). In addition, cats forage less effectively in rocky areas. Their topographic complexity may also serve to ameliorate fire impacts, and they are typically not used for livestock production. Whilst rocky habitats support denser populations of quolls, the diverse and dispersed nature of rocky areas makes them very difficult to define or map on a national scale'

The *Environment Protection and Biodiversity Conservation Act 1999* referral guidelines for the endangered northern quoll, *Dasyurus hallucatus* (p.17, Table 2) indicates the following:

Actions that have a high risk of significant impact are those which result in the following:

- 'actions which remove known¹ habitat critical to the survival of the species
- actions which remove known foraging and dispersal habitat in toad invaded areas
- actions which remove > 5 ha of known foraging and dispersal habitat in areas not yet invaded by Cane Toads
- actions which remove >10 ha of potential² habitat critical to the survival of the species
- actions which remove >200 ha of potential foraging and dispersal habitat.'

The disturbance footprint clearly triggers a number of the criteria for significant impact to the northern quoll including the removal of 6 ha of potential critical habitat (sandstone woodland and rock outcrops habitat type) as identified in the *National Recovery Plan for the Northern Quoll*. The fact that northern quoll have been recorded in rehabilitated areas does not provide surety that residual significant impacts to northern quoll have been adequately addressed. More information is required to determine the flora and fauna composition within rehabilitated areas and how this compares to baseline data pre-clearing; and evidence of habitat usage or the density of northern quolls in revegetated areas compared to undisturbed areas and/ or areas pre-clearance. This information is vital to understanding if rehabilitated areas offset the loss of critical denning and foraging habitat for the northern quoll.

If usage and density is significantly lower in rehabilitated areas, then the project will reduce the area of occupancy for a threatened species and affect habitat critical to the survival of the species as defined by the Department's Significant Impact Guidelines 1.1 for an endangered species.

1 Known habitat critical to the survival of the species is habitat critical to the survival of the species where northern quoll is recorded on site during surveys, or where no surveys were conducted in suitable habitat.

2 Potential habitat critical to the survival of the species is habitat critical to the survival of the species occurring within the modelled known / likely distribution of the northern quoll.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

The proponent has revised the Biodiversity Offsets Strategy for the project to include offsets for the Northern Quoll. The *Revised Biodiversity Offsets Strategy* is provided in Attachment B of the Supplement. However, responses to the individual points raised in this submission are provided below.

The Draft EIS acknowledges the conservation significance of the Northern Quoll population on Groote Eylandt. The *Terrestrial Ecology Report* (Appendix C of the Draft EIS) indicates that the population is considered to have high conservation significance and represents an important population.

As noted in the submission, Northern Quoll Referral Guidelines (*Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the endangered northern quoll, Dasyurus hallucatus*) are relevant to the assessment of impacts on the Northern Quoll.

The Northern Quoll Referral Guidelines provide the following guidance for determining the significance of impacts:

High risk of significant impacts: referral recommended:

- Actions which remove known³ habitat critical to the survival of the species
- Actions which remove known foraging and dispersal habitat in toad invaded areas
- Actions which remove > 5 ha of known foraging and dispersal habitat in areas not yet invaded by cane toads
- Actions which remove >10 ha of potential⁴ habitat critical to the survival of the species
- Actions which remove >200 ha of potential foraging and dispersal habitat.

Uncertainty: referral recommended

- Actions which restrict northern quoll dispersal by creating barriers between populations
- Actions which may increase traffic volumes increasing the risk of mortality and population fragmentation
- Actions which may introduce cane toads to areas which are not yet exposed to cane toads
- Actions which have inappropriate quarantine measures in place for movements between offshore islands
- Actions which may increase the risk of late dry season high intensity fires to the area
- Actions which may alter habitat structure through the introduction of invasive species.

Low risk of significant impacts: referral may not be required but you may refer for legal certainty

- Actions in which impacts occur outside the modelled distribution of the northern quoll
- Actions which avoid habitat removal in accordance with the guidance on habitat removal above, adopt and implement best practice mitigation and have a management plan in place to monitor northern quoll populations.

³ Known habitat critical to the survival of the species is habitat critical to the survival of the species where northern quoll is recorded on site during surveys, or where no surveys were conducted in suitable habitat.

⁴ Potential habitat critical to the survival of the species is habitat critical to the survival of the species occurring within the modelled known / likely distribution of the northern quoll.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

The Draft EIS acknowledges that the project will remove known foraging and breeding habitat for this species and Section 7.6.6 of the Draft EIS quotes the area of habitat to be removed (i.e. 1,525 ha). It is acknowledged that this exceeds the threshold for a high risk of significant impact under the Northern Quoll Referral Guideline. The guideline is, however, intended to provide broad advice to assist in determining whether a referral under the EPBC Act should be made for the species. The Northern Quoll Referral Guideline acknowledges that additional site-specific information and factors may be relevant to the decision on whether the project will have a significant impact on the species. In the case of this project, the decision should have regard for the mine rehabilitation that will be undertaken. Areas disturbed by project activities will be progressively rehabilitated to open woodland and will provide habitat for the Northern Quoll. As noted in Section 7.6.2 of the Draft EIS, the species has been recorded in mine rehabilitation at the existing GEMCO mine. The availability of mine rehabilitation means that the impact on the Northern Quoll should not be considered to be a permanent impact.

It is acknowledged however, that at this point in time, there is limited evidence available to support the conclusion that mine rehabilitation will provide a full range of habitat values for the Northern Quoll (e.g. breeding habitat). The submission has requested evidence in relation to:

- The flora and fauna composition within rehabilitated areas and how this compares to baseline data pre-clearing; and
- Evidence of habitat usage or the density of northern quolls in revegetated areas compared to undisturbed areas and/or areas pre-clearance.

The submission notes that if usage and density is significantly lower in rehabilitated areas, then the project will reduce the area of occupancy for a threatened species and affect habitat critical to the survival of the species. This would necessitate the provision of biodiversity offsets.

As noted in Section 6.2.4 of the Draft EIS, the proponent has recently initiated fauna monitoring in mine rehabilitation. The survey work undertaken as part of the preparation of the Draft EIS confirmed the presence of Northern Quolls in mine rehabilitation, but there is currently no data in relation to the species' density within the rehabilitation or its use of rehabilitation (e.g. for foraging, denning etc.). There is also limited data in relation to the density of Northern Quolls elsewhere on Groote Eylandt. Collection of this data would require an intensive, long term monitoring program, which is not feasible within the timeframe of an EIS. Consequently, although the proponent is confident that such a monitoring program would support the findings of the Draft EIS, offsets will be provided for the Northern Quoll as a precautionary measure, given that long term monitoring data is not available at the time of lodgment of the Supplement.

Section 4.3.4 of the Supplement provides a summary of the *Revised Biodiversity Offsets Strategy* and a copy of the revised strategy is included in Attachment B of the Supplement. The *Revised Biodiversity Offsets Strategy* will include direct action on issues such as Cane Toad quarantine measures and feral cat control on Groote Eylandt. The *National Recovery Plan for the Northern Quoll Dasyurus hallucatus* (Northern Quoll Recovery Plan) indicates that Cane Toads are the main threat to this species, and indicates that feral predators may also impact Northern Quolls through competition for food or direct predation. The Northern Quoll Recovery Plan indicates that feral cats, in particular, pose a threat to Northern Quolls.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

The Northern Quoll Recovery Plan contains the following specific objective:

- “Protect northern quoll populations on offshore islands from invasion and establishment of cane toads, cats and other potential invasive species” (Specific Objective 1, page 11).

The *Revised Biodiversity Offsets Strategy* is consistent with this objective, given that it will focus on Cane Toad quarantine measures, as well as feral cat control, on Groote Eylandt (i.e. an offshore island).

Issue 1.4. Potentially acid forming material

The draft EIS identifies the presence of potentially acid forming (PAF) material in the overburden at the north-west section of the Southern Eastern Leases. It is understood that the PAF material would be handled and buried in accordance with the measures provided in Section 11 and Appendix A of the draft EIS. It is unclear whether these measures accord with National Standards or are suitable to mitigate the potential impact on surrounding waterways, including groundwater. More information is required regarding the specific management of PAF to protect water resources and potential impacts on EPBC listed species (e.g. is sufficient non-acid forming material available to buffer / encapsulate PAF?)

Overburden from a small area in the Southern Eastern Lease may be potentially acid forming (PAF). Three samples of PAF overburden were sourced from below 18 m depth at two separate drill holes located at the north-western end of the Southern Eastern Lease. The material from this small area has a lower factor of safety than the majority of the overburden material at the project site. Given the highly weathered nature of the laterite, these samples are considered to be an anomaly rather than representative of the broader geochemistry of the project site.

However, this PAF material represents a small fraction of the bulk overburden material that will be generated by the project. The small proportion of PAF material from this area would be buffered by the significant excess alkalinity of the large majority of the overburden materials found on the site. As noted in the Draft EIS Geochemistry Report, the bulk excavated overburden material therefore has a high factor of safety with respect to potential for acid generation.

Nevertheless, as a precautionary measure, specific management measures for these materials are proposed in the Draft EIS. These include additional geochemical testing and selective handling and placement of the material.

There are no national standards for management of PAF materials. The measures proposed in the Draft EIS are consistent with the Department of Industry, Tourism and Resources (DITR) Leading Practice Sustainable Development Program for the Mining Industry guidance document *Managing Acid and Metalliferous Drainage* (2007). This document reflects best practice for the management of PAF materials and is the *de facto* industry standard.

These measures are designed to ensure that any minor PAF component of the bulk overburden material generated by proposed mining activities will not result in acid mine drainage to surface water or groundwater, and mitigate the potential for significant adverse impacts on EPBC Act listed species.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

It should also be noted that the existing GEMCO mine has been operating for 51 years and the proponent has advised that PAF overburden materials have not been encountered and there are recorded incidences of acid generation from overburden. Given that the geology in the Eastern Leases is similar to the geology at the existing GEMCO mine, this would support the conclusion in the Draft EIS that there is limited potential for PAF materials within overburden to give rise to acid generation or environmental harm.

No additional management measures are therefore necessary.

Issue 1.5. 3.93 Transportation on Public Access Roads

It is unclear from the draft EIS whether the increased material usage during construction will result in an increase in the shipment of goods from the mainland. This could result in the consequential increase in the risk of introducing invasive species and should be addressed in the Supplement.

Section 3.9.3 of the Draft EIS details the materials that will be required for the short-term construction phases. The transport of these materials may necessitate additional shipments from the mainland during the construction phases. No additional shipments are anticipated during operations. In response to this, and other submissions, additional information has been provided in Sections 4.3.2 and 4.3.3 in relation to measures to prevent the introduction of weeds and Cane Toads, respectively. These measures will operate throughout the life of the project, including the construction phases.

Issue 1.6. General

The draft EIS indicates that the risk of the GEMCO Eastern Leases Project to listed threatened species will be significantly reduced by the proposed mine rehabilitation and closure plan. However, there will be a time lag between the impact and the implementation of mitigation measures, which is not addressed in the risk assessment. There is no baseline comparison to determine the habitat value, usage etc. of rehabilitated areas compared to unaffected areas, which makes it difficult to ascertain the effectiveness of rehabilitation as a mitigation measure.

It is acknowledged that there will be a time lag between clearing and the establishment of rehabilitation. However, the effect of the time lag is lessened by the staged nature of the clearing. By the time that clearing associated with the final stages of mining is undertaken, areas cleared at the start of the mine life would have been rehabilitated and the rehabilitation would be well progressed. This significantly reduces the scale of the impact at any one point in time.

Please refer to the response to Issue 1.3 in relation to data on the habitat value of rehabilitation. As noted in the response to this issue, fauna monitoring in rehabilitation has only recently been initiated and consequently long-term baseline data in relation to habitat value and usage is not currently available. Although the proponent is confident that long term monitoring would support the findings of the EIS in relation to the value of the rehabilitation for threatened species, offsets will be provided for the Northern Quoll and Masked Owl (northern) as a precautionary measure. The Biodiversity Offsets Strategy has been revised to include these additional species and the *Revised Biodiversity*

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Offsets Strategy is included in Attachment B. The inclusion of these two species in the *Revised Biodiversity Offsets Strategy* means that offsets are proposed to be provided for all of the threatened species listed under the EPBC Act identified as being present within the project site.

Issue 1.7. 6.2.1 Statutory Requirements and Corporate Guidelines

The draft EIS states that the “*The NT Mining Management Act, requires that mining companies pay a security deposit to provide for the rehabilitation of mineral leases*”. Describe the criteria used for determining the security deposit for the GEMCO Eastern Leases Project and the expected value of the security deposit, if available.

As indicated in the NT Department of Mines and Energy (DME) guidance document *Advisory #: AA7-013 Security Calculation Procedure Guide*, security will be applied to all Authorisations granted under the *NT Mining Management Act*. The Minister will determine the level of security commensurate with protecting the community from closure liabilities and optimising the benefits to the community from the proposed project. The calculation of securities is based on the actual cost of rehabilitation, taking into consideration the disturbance footprint, environmental risk and expected project life. Securities are regularly reviewed and adjusted taking into consideration progress of rehabilitation, any decommissioning of infrastructure, as well as new or expanded activities.

The proponent will utilise the DME Security Calculation Procedure and Security Calculation Tool in accordance with the *Mining Management Act* to assess the level of security required for the various stages of the project. In accordance with DME guidance, the assessment will be submitted to the DME with the Mining Management Plan (MMP) for the project on a regular basis. The existing GEMCO mine currently submits MMPs every three years.

A security value is therefore not able to be calculated at this stage of the project, given the value will be determined based on the yearly disturbance footprint, which, as discussed in Section 3.7 of the Draft EIS, will vary from year to year.

Issue 1.8. Fire Management

The draft EIS notes that fire would be restricted from the rehabilitated areas, wherever possible, to allow for floral species to establish. After several years it could be difficult to introduce a controlled or traditional fire regime due to the changes in the species composition and habitat structure of the area (e.g. large build-up of fuel). More information should be provided on how the fire regimes will be controlled within the rehabilitated areas after mine closure, which particular reference to baseline data to determine the effectiveness of rehabilitated areas in providing habitat for listed threatened species.

The Draft EIS acknowledges the role that fire plays in the ecosystems of Groote Eylandt and notes that rehabilitation will ultimately be subject to fire. In response to this, and other submissions in relation to the introduction of fire into rehabilitation, the proponent has committed to undertaking a trial on prescribed burning of rehabilitation. Section 4.3.6 of the Supplement describes the proposed trial. The trial program will gather data on the response of rehabilitation to prescribed burning.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Following the completion of the trial program, procedures in relation to prescribed burning of rehabilitation will be developed for the project.

Issue 1.9. General

The proposed rehabilitation method identified in draft EIS provides for a uniform landscape and will not replicate all landform types originally found within the project site (e.g. areas of sandy soils, undulations, rocky habitat for northern quolls' dens etc). More information should be provided on how the proposed rehabilitation methods and final landform would provide suitable habitat for listed threatened species.

Although the proponent's rehabilitation is of a high standard and has been confirmed to provide habitat for a range of fauna species (including threatened fauna), it is acknowledged that the rehabilitation will not necessarily replicate all of the microhabitat features and landform types originally found within the project site. In particular, the Draft EIS indicates that the project has the potential to give rise to significant impacts on the Northern Hopping-mouse and Brush-tailed Rabbit-rat. This assessment was made because it is uncertain whether the rehabilitation will be able to provide habitat for these species, given their specific habitat needs (sandy soils in the case of the Northern Hopping-mouse) and lack of evidence of these species in rehabilitation to date. The EIS therefore includes a commitment to provide offsets for this loss of this habitat.

In addition, as detailed in the response to Issue 1.3, offsets are proposed to be provided for the remaining two threatened species listed under the EPBC Act (i.e. the Northern Quoll and the Masked Owl (Northern)). These offsets are being proposed as a precautionary measure, given a lack of long term monitoring data on the value of mine rehabilitation as fauna habitat.

Issue 1.10. Vehicle strike

The GEMCO Eastern Leases Project would operate 24 hours a day, which increases the risk of vehicle strike to nocturnal fauna. Information on traffic management measures to mitigate the impacts of vehicle strike on nocturnal fauna and threatened species listed under the EPBC Act and the Northern Territory *Territory Parks and Wildlife Conservation Act* should be provided in the Supplement, including a baseline of the number of threatened fauna involved in vehicles strikes from the existing GEMCO mine.

The Draft EIS acknowledges the potential for the project to give rise to some mortality of animals as a result of vehicle strike on project haul roads. However, as stated in Section 7.7.2 of the Draft EIS, a site traffic management plan will be developed for the project, which will include requirements for speed limits along internal roads, safe driving practices and policies, and the installation of appropriate signage to increase driver awareness and decrease the risk of vehicles striking fauna.

It should also be noted, as detailed in Section 3.7.7 of the Draft EIS, the project will operate on a campaign basis, i.e. mining will be undertaken in the project site as needed, influenced by mining conditions within the project site and the existing GEMCO mine, as well as ore quality and market

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

considerations. Therefore, although the project may operate 24 hours a day during peak operations, this will not be standard practice, and these peak operations may only be experienced for a few weeks in a year. It is therefore anticipated that impacts due to vehicle strike will not lead to a significant impact on fauna.

The proponent does not collect vehicle strike records for the existing GEMCO mine. It is not possible for heavy vehicles to safely stop along haul roads, to enable the driver to alight from the vehicle to assess a vehicle strike. Safety considerations regarding the risk of passing vehicles colliding with the driver need to be taken into account.

Issue 1.11. 7.6.3 Indirect Impacts

The draft EIS includes an impact assessment of dust on native vegetation but not on faunal species. A justification for this approach should be provided in the Supplement.

As stated in Section K.1 of the Dust Report contained in the Draft EIS *Terrestrial Ecology Report* (Appendix C), flora, specifically vegetation community floristics, was selected for the dust investigation as this allowed for a comparison of several variables (e.g. species composition and abundance) at various defined distances from dust sources. Undertaking a similar study for fauna species would be problematic, given the mobility of fauna species. It is noteworthy that no evidence was found of dust impacting vegetation communities. This finding is important for assessing potential impacts of dust on fauna, as well as on vegetation communities, given that vegetation provides roosting, breeding and foraging habitat for fauna species.

In addition, the disturbance footprint quoted throughout the Draft EIS includes the clearing footprint of open cut mining operations plus a 25 m buffer to account for edge effects such as impacts from dust or noise in areas directly adjacent to operating areas of the mine.

Issue 1.12. 7.6.3 Indirect Impacts

Further information on the proposed management measures to reduce the spread of feral animals along transport vectors (e.g. cat trapping) should be provided in the Supplement.

Feral cats are the key species on Groote Eylandt that may disperse and spread along transport vectors. The proponent has revised its Biodiversity Offsets Strategy to focus on direct management action in relation to the control of feral cats. This management approach will be implemented at an island wide scale, as a collaborative partnership between the ALC, ALC Rangers and government. This integrated, island-wide approach will provide the most effective measure to control feral animals, and will also address control of feral cats within the project site. Further detail is provided in Section 4.3.4 and Attachment B of the Supplement.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Issue 1.13. General

A number of the faunal surveys did not meet the guidelines requirements of the Department of the Environment (e.g. the number of trapping nights for northern quolls was below that recommended by the Departments SPRAT profiles). However, given the large number of individuals recorded across the mine site coupled with the proponent's acknowledgement that habitat for threatened species is found throughout the impact footprint this inadequacy is unlikely to be an issue.

Noted.

Issue 1.14. 7.6.4 Impacts on Vegetation Communities

The effects of water drawdown on groundwater dependent ecosystem are poorly examined, particularly as it relates to the effect of water drawdown during mining activity.

- What evidence is there to determine that post-mining groundwater levels will recover and that groundwater dependant ecosystems will recover?
- What monitoring and adaptive management measures will be implemented to ensure that groundwater dependant ecosystems will not be impacted by the proposed action?
- The past 50 years of mining does not necessarily provide evidence that the proposed action will not have an impact on groundwater dependent ecosystems given the different location of the activities and the ecosystems impacted.

The Draft EIS includes a numerical groundwater model, which makes use of data from groundwater monitoring bores, as well as extensive geological information gathered during the exploration drilling program. The groundwater model predicts rapid recovery of groundwater following mining. However, in response to this, and other submissions in relation to recharge and recovery of groundwater, data has been gathered from the existing GEMCO mine in order to provide evidence of groundwater recovery. The data is provided in Attachment C of the Supplement. It includes groundwater monitoring data from bores in the vicinity of mined areas, as well as data from a bore that has been installed in an area that has been mined and backfilled. This data confirms the findings of the Draft EIS groundwater model and provides confirmation of groundwater recovery post-mining.

Section 9.5 of the Draft EIS describes the groundwater monitoring network for the project and notes that the monitoring network established as part of the groundwater investigations for the Draft EIS will continue to be utilised throughout the life of the project. In addition to this existing commitment contained in the Draft EIS, the proponent will develop and implement a program to monitor the condition of vegetation that may be impacted by changes in groundwater levels. The Draft EIS has not predicted any impacts on vegetation as a result of groundwater depressurisation, and the purpose of the monitoring program will be to gather data to confirm that there are no changes to the vegetation characteristics resulting from changes to groundwater levels due to the project. Section

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

4.3.7 of the Supplement describes the proposed monitoring program. The monitoring program will make use of aerial photograph interpretation and the establishment of permanent vegetation monitoring plots. Data from the vegetation monitoring program will be reviewed against groundwater monitoring data collected as part of the groundwater monitoring program. This will allow any changes in the extent and/or condition of vegetation to be assessed in relation to groundwater levels, and will allow any impacts to be detected. As noted in Section 4.3.7, in the event of any impacts on vegetation communities being identified, adaptive management measures will be employed.

Issue 1.15. 7.6.6 Impacts to Threatened Fauna Species

The draft EIS states that *“the species [northern quoll] is known to occur in areas adjacent to main roads and is assumed to have a relative high tolerance of light and noise”*. In consideration of this statement:

- is there information available to support this conclusion?
- the presence of the species near roads suggest that they will be particularly susceptible to vehicle strike. Are there any known linkages?

The Northern Quoll is widespread on Groote Eylandt, including within developed areas of the island (e.g. around townships). This is consistent with the Species Profile and Threats Database (SPRAT) profile for the species, which indicates that the Northern Quoll occurs in a range of habitats and can occur around human dwellings and campgrounds. The statement in the Draft EIS that the Northern Quoll is “known to occur in areas adjacent to main roads” is anecdotal evidence from local residents and the proponent’s experience on Groote Eylandt, where Northern Quolls are abundant and regularly observed in a range of environments. The Draft EIS should not be interpreted as implying that Northern Quolls are specifically attracted to roads, and hence particularly susceptible to vehicle strike. The statement was intended to indicate that Northern Quolls (on Groote Eylandt) occur in areas exposed to noise and light. The issue of vehicle strike is addressed more broadly in the response to Issue 1.10.

Issue 1.16. 7.7.2 Measures to Mitigate Impacts

The draft EIS does not identify measures to reduce the risk of direct mortality during clearing of habitat for listed threatened species. This will be particularly important during the breeding season for the northern quoll if denning habitat is cleared as:

- the species only breeds once a year
- males die off after mating, therefore the availability of males for the following breeding season relies on the survival of male offspring
- revegetation is unlikely to replace breeding habitat for the species

The completion criteria by which the success of rehabilitation is evaluated is not adequately explained or discussed.

Clearing will be undertaken progressively over the life of the project, minimising the area of Northern Quoll habitat disturbed at any one point in time. Cleared areas will be connected to areas of remnant

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

vegetation, allowing movement of fauna. Mined areas will be rehabilitated with native woodland species consistent with pre-mining vegetation communities, and will be available as Northern Quoll habitat.

Please refer to the response to Issue 1.3 in relation to the potential for rehabilitation to provide habitat for the Northern Quoll. As outlined in the Supplement, offsets will be provided for the Northern Quoll.

In response to this, and other submissions in relation the habitat value of mine rehabilitation, the proponent has committed to revising the rehabilitation completion criteria to address fauna. Section 4.3.5 of the Supplement provides further detail.

Issue 1.17. 8.7.3 Monitoring and Management Plans – Monitoring of Watercourse Crossings

The draft EIS states that periodic inspections will be undertaken following construction to confirm that all culverts are operating effectively and not causing sedimentation. What remediation measures will be undertaken if they are not operating effectively?

Attachment E of the Supplement presents a *Haul Road Crossing Design Overview Report*. This report provides additional information on the haul road crossing designs, assessment of the impacts of the haul road crossings and a description of the monitoring and management measures to be implemented for the haul road crossings. This report also contains a section detailing the remediation work that will be undertaken in the event that the culverts are not operating effectively.

Issue 1.18. 19.4.2 Environmental Management Framework

The draft EIS states that the “*Biodiversity Offsets Strategy will be approved by the Federal Department of the Environment prior to its implementation*”. This statement may be understood as pre-empting the Minister or the Minister’s delegate’s decision. At present the biodiversity offsets strategy does not accord with the EPBC Act offsets policy.

Noted. The intent of this statement was to explain that DotE would have a role in reviewing the Biodiversity Offsets Strategy and making a decision on whether the strategy should be approved. The authors of the Draft EIS did not intend to pre-empt the Minister’s decision in any way.

The Biodiversity Offsets Strategy has been further developed and revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B. The wording referred to in this submission does not appear in the revised strategy.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Issue 1.19. 19.4.3 Mine rehabilitation and closure

With reference to page 19-8:

- What evidence can be provided that the proposed action will not result in a residual significant impact to the northern quoll and if not, why doesn't the biodiversity offsets strategy also provide offsets for the northern quoll?
- What measures are going to be implemented to provide for the loss of 6 ha of potential critical denning habitat for the northern quoll?

Please refer to the response to Issue 1.3.

Issue 1.20. With reference to page 19-11:

- The 'internal completion criteria' should be updated to include an evaluation of:
 - success of rehabilitated areas providing suitable habitat for fauna particularly as it relates to EPBC listed species.
 - floral and faunal composition of the rehabilitated areas relative to baseline evaluations of floral and faunal composition (or undisturbed areas) prior to disturbance.

In response to this, and other submissions in relation the habitat value of mine rehabilitation, the proponent has committed to revising the rehabilitation completion criteria to address fauna. Section 4.3.5 of the Supplement provides further detail.

Issue 1.21. There does not appear to be an explanation of how rehabilitated areas will be managed for fire given the absence of fire during the rehabilitation regrowth period and the presence of increase fuel loads in the rehabilitated areas. Inappropriate fire regimes are a key threat to EPBC Act listed species impacted by the proposed action.

Please refer to the response to Issue 1.8.

Issue 1.22. 6.3 Fauna: Threatened and/ or migratory species.

Section 6.3 of the draft EIS relevant to the northern quoll and northern hopping-mouse should be updated in consideration of:

- the Threat abatement plan for predation by feral cats
- the potential for the sandstone woodland and rocky outcrop habitat to provided suitable denning and therefore critical habitat for the species.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

It is assumed that the submitter is referring to Section 6.3 of the *Terrestrial Ecology Report* (Appendix C of the Draft EIS). This section makes reference to feral cats being a threat to the Northern Hopping-mouse and feral predators (including cats) being a threat to the Northern Quoll. It is acknowledged that the *Threat Abatement Plan for Predation by Feral Cats* is relevant to these species. The *Revised Biodiversity Offsets Strategy* (Attachment B of the Supplement) refers to the *Threat Abatement Plan for Predation by Feral Cats* and notes the consistency of the offset strategy with this plan.

The Draft EIS notes the presence of sandstone woodland and rocky outcrop habitat (refer to Section 7.5.2 of the Draft EIS). It is acknowledged that this is considered to be habitat critical to the survival of the species under the definitions in the Northern Quoll Referral Guidelines. The guideline classifies the full extent of Groote Eylandt as habitat critical to the survival of the species, given that it is an offshore island where quolls are known to exist. Potential impacts on the Northern Quoll are discussed in Section 7.6.6 of the Draft EIS. Further detail is provided in the response to Issue 1.3. In addition, it should be noted that the Biodiversity Offsets Strategy has been further developed and revised since the Draft EIS was published and offsets are now proposed to be provided for the Northern Quoll (refer to Attachment B of the Supplement).

Issue 1.23. 4 Direct and indirect offsets

The biodiversity offsets strategy is not in accordance with EPBC Act offsets policy, particularly in relation to indirect and direct offsets. The EPBC Act offsets policy states (page 8):

“Direct offsets are those actions that provide a measurable conservation gain for an impacted protected matter.

Direct offsets are an essential component of a suitable offsets package. A minimum of 90 per cent of the offset requirements for any given impact must be met through direct offsets.

Deviation from the 90 per cent direct offset requirement will only be considered where:

- *it can be demonstrated that a greater benefit to the protected matter is likely to be achieved through:*
 - *increasing the proportion of other compensatory measures in an offsets package or;*
 - *uncertainty is so high that it isn’t possible to determine a direct offset that is likely to benefit the protected matter. For example, this can be the case in some poorly understood ecosystems in the Commonwealth marine environment*

Conservation gain is the benefit that a direct offset delivers to the protected matter, which maintains or increases its viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

- *improving existing habitat for the protected matter*
- *creating new habitat for the protected matter*
- *reducing threats to the protected matter*
- *increasing the values of a heritage place, and/or*
- *averting the loss of a protected matter or its habitat that is under threat.*

The biodiversity offsets strategy dismisses direct offsets without adequate exploration of the possibilities on Groote Eylandt. There are examples throughout Australia in which proponents offset residual significant impacts through addressing threats to EPBC Act listed matters, thereby providing a measurable conservation gain. Commonly, proponents will provide funding to appropriate programs to address threats such as feral predators and herbivores, weeds, inappropriate fire regimes and grazing.

The Biodiversity Offsets Strategy has been further developed and revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the revised strategy is provided in Attachment B. The revised strategy makes use of direct offsets, achieved through funding a program of conservation action directed toward reducing threats to the species. The *Revised Biodiversity Offsets Strategy* addresses threats such as feral cats, weeds, inappropriate fire regimes and Cane Toads. Feral herbivores and grazing are not relevant in the context of Groote Eylandt.

Issue 1.24. 4.3 Mechanism for project offsets

The draft EIS states that “*direct offsets have very limited potential to achieve conservation gains*”. This statement is not adequately explained, nor is there evidence to indicate that this statement is correct.

Please refer to the response to Issue 1.23.

Issue 1.25. 5 Project offsets

The proposed offsets for research do not accord with the EPBC Act offsets policy. Direct offsets must be an essential component of the offsets package. Research can assist in achieving the outcomes of the direct offset, but must not comprise more than 10 per cent of the offsets package unless it can be demonstrated there is greater benefit to the protected matter, or scientific uncertainty of the effectiveness of a direct offset is high.

Please refer to the response to Issue 1.23.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

Issue 1.26. 5.2 Research Principles

While the proposed research programs have been demonstrated to be useful in some cases, further explanation is required as to how they will lead to either a direct offset and/or measurable conservation gain.

Please refer to the response to Issue 1.23.

Issue 1.27. 5.3.1 Feral cat research

The Australian Government Department of the Environment is currently implementing a national feral cat program³ which includes research undertaken at Groote Eylandt in partnership with the NT Government. Any proposed offset program involving the management of feral cats should provide additional benefits to that being achieved by the existing programs. There is an opportunity to build on the valuable information provided by the federal and territory research program and engage in feral cat eradication on Groote Eylandt, which could demonstrate a measurable conservation gain and therefore qualify as a direct offset.

3 <http://www.environment.gov.au/biodiversity/threatened/publications/factsheet-tackling-feral-cats>

Since the preparation of the Draft EIS, the proponent has had discussions with the Federal Department of the Environment, the Threatened Species Commissioner, and the NT Department of Land Resource Management in relation to biodiversity offsets and the national feral cat program. The proponent has also had several discussions with the ALC and ALC Rangers in relation to biodiversity offsets and feral cat control. These discussions have guided the preparation of a *Revised Biodiversity Offsets Strategy*. The *Revised Biodiversity Offsets Strategy* indicates that the proponent's offsets will be integrated with current government programs in relation to feral cat control. The proposed offsets program would, however, provide additional benefits to current government programs, given that current programs on Groote Eylandt are restricted to research in relation to feral cats, with no funding currently allocated to control of feral cats. Further detail is provided in Section 4.3.4 of the Supplement and in the *Revised Biodiversity Offsets Strategy* (Attachment B).

Issue 1.28. 5.4 EPBC Act Offsets Policy

It has not been demonstrated how indirect offsets will lead to a better outcome than direct offsets for EPBC Act listed species impacted by the proposed action. Direct offsets have not been adequately explored as a viable option, and as such, the proposed offsets program is unlikely to be acceptable to the Department of the Environment.

1. NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

The proposed offsets program does not directly relate to the impacts of the proposed action given that impacts to the northern quoll, particularly the loss of 6 ha of potential critical denning habitat have not been addressed. In addition, there has been no explanation of how the regenerated areas will adequately offset the loss of approximately 1500 ha of suitable foraging habitat for the northern quoll.

6 Conclusions

Residual significant impacts to the northern quoll have not been addressed.

There is not an adequate explanation as to why Groote Eylandt does not provide opportunities for direct offsets. Direct offsets have not been adequately explored, particularly in respect of feral cat management, fire regimes and rehabilitation of impacted areas to the benefit of the northern hopping mouse and the brush-tailed rabbit rat.

Please refer to the response to Issue 1.23, which explains that the Biodiversity Offsets Strategy has been revised to remove reference to indirect offsets.

The *Revised Biodiversity Offsets Strategy* also includes offsets for the Northern Quoll, as explained in the response to Issue 1.3.

2. DEPARTMENT OF BUSINESS

Issue 2.1. The Department of Business (DoB) does not have any major issues in relation to the Draft EIS.

DoB notes that this project is an additional mining area to be operated as part of the existing mine, and the existing facilities and workforce will be utilised.

The Department has also noted that the project will extend the life of the existing mine by four years and will continue to provide socio-economic benefits to the economy of Groote Eylandt as well as the broader Territory economy.

The agency contact officer for this matter, Mr Shiw Murti, Principal Economist, can be contacted on 8999 5139.

Noted.

3. DEPARTMENT OF HEALTH – ENVIRONMENTAL HEALTH

Issue 3.1. It is noted that the expansion of the mining operation into the Eastern Lease area relies upon infrastructure within the existing lease areas for processing ore and supporting mining activities.

Noted.

Issue 3.2. The following is offered with respect to Air Quality:

- The Draft EIS recognises sensitive receptors about the mine site and current processors but does not specifically outline whether these sites will be monitored as part of an ongoing air quality monitoring network
- It is therefore suggested that the EIS address sensitive receptors including monitoring of the community of Angurugu for air quality factors related to human health and amenity including size and chemical composition of particulate matter

The proponent currently operates an air quality monitoring program that measures air quality parameters (including PM₁₀) near Angurugu (sensitive receptor R1) and near Yedikba (sensitive receptor R2). Section 12.9 of the Draft EIS states that the existing air quality monitoring program will continue, and that dust will be monitored on an ongoing basis at Angurugu and Yedikba.

It should also be noted that Angurugu is located approximately 500 m from the existing GEMCO mine, and over 6.5 km from the Eastern Leases project site, and therefore additional monitoring, beyond the current air quality monitoring program, is not considered to be warranted for this project.

4. DEPARTMENT OF HEALTH – MEDICAL ENTOMOLOGY

Issue 4.1. There are no Medical Entomology comments on the above draft EIS. Mosquito issues are covered by their commitment to carrying out mosquito monitoring and control.

Noted.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.1. The Draft EIS identifies most of the biodiversity values within the mineral lease area and assesses the potential risks to these values. The baseline flora and fauna surveys in the project area are generally adequate for the identification of species present.

Noted.

Issue 5.2. Based on available data and expert knowledge of the current distribution and ecological requirements of relevant species, the Draft EIS correctly identify Matters of National Environmental Significance (MNES) potentially affected by the development; and provides a reasonable assessment of habitat values for these species within the project area.

Noted.

Issue 5.3. However, the low intensity of fauna sampling within the project area and the simple island-wide habitat mapping provided in the Draft EIS does not provide sufficient context to accurately assess the relative importance of the project area for each of these species and their preferred habitats.

The ecology survey for the Draft EIS was undertaken in accordance with relevant Federal and Territory legislation and guidelines (as listed in Sections 7.3.1 and 7.3.2 of the Draft EIS), including the current NT survey guidelines and the requirements of the Terms of Reference for the Draft EIS. The sampling density was deemed suitable for the purpose of preparing the EIS, and provided a good record of fauna species within the project site. The sampling density is consistent with other similar environmental assessments undertaken for mining projects. Section 7.4.2 of the Draft EIS provides a reconciliation of the survey intensity against relevant guidelines, with further detail provided in the *Terrestrial Ecology Report* (Appendix C of the Draft EIS).

A high level habitat map of the remainder of the island was prepared and included in the Draft EIS for the purpose of providing context for the impacts. Preparing more detailed mapping for areas beyond the project site is beyond the scope of the study and unrealistic within the timeframe of an EIS. It is also noted that access to the remainder of the island is restricted and the proponent is only permitted by the Anindilyakwa Land Council (ALC) to undertake work within its mining and exploration tenements.

The proponent does, however, appreciate that it would be valuable to have more information about the threatened species that occur within the project site, including their habitat use and distribution. To this end, the proponent has funded a PhD study into the Northern Hopping-mouse. This study is considering issues such as the distribution and habitat requirements of the Northern Hopping-mouse.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.4. Similarly, the assessment of use by native fauna of existing rehabilitation areas is based on minimal data, and should not be used to draw conclusions on the residual risk to the significant species occurring in the project area.

It is acknowledged that, at this point in time, there is limited evidence available on mine rehabilitation as habitat for threatened species. As indicated in Section 6.2.4 of the Draft EIS, the proponent has only recently initiated fauna monitoring in mine rehabilitation. It is noteworthy that the survey work undertaken as part of the preparation of the Draft EIS confirmed the presence of Northern Quolls in mine rehabilitation. It is, however, acknowledged that there is currently no data in relation to the species' density within areas of mine rehabilitation or its use of rehabilitation (e.g. for foraging, denning etc.). Collection of this data would require an intensive, long term monitoring program, which is not feasible within the timeframe of an EIS.

The Draft EIS noted that the Northern Hopping-mouse and Brush-tailed Rabbit-rat have not been recorded in mine rehabilitation and it is uncertain whether mine rehabilitation would provide habitat for these species. Given this uncertainty, the Draft EIS commits to offsets being provided for these two species. However, the Draft EIS concluded that the project was not predicted to have a significant, residual impact on the Northern Quoll or the Masked Owl (northern), given that habitat for these species would ultimately be created in mine rehabilitation areas. The submission has, however, noted that conclusions on residual risks to significant species cannot be drawn in the absence of more detailed information on the habitat value of rehabilitation. Although the proponent is confident that more detailed information, gathered through long term monitoring, would support the EIS's conclusions, it is acknowledged that this information is not currently available. Therefore, as a precautionary measure, and in response to submissions received on the Draft EIS, the proponent has extended the Biodiversity Offsets Strategy to include offsets for the Northern Quoll and Masked Owl (northern). The inclusion of the Northern Quoll and the Masked Owl (northern) in the *Revised Biodiversity Offsets Strategy* means that offsets are now being provided for all four threatened species listed under the EPBC Act (i.e. the Northern Quoll, the Masked Owl, the Northern Hopping-mouse and the Brush-tailed Rabbit-rat).

Section 4.3.4 of the Supplement provides a summary of the *Revised Biodiversity Offsets Strategy* and a copy of the revised strategy is included in Attachment B of the Supplement. It is noted that, as part of the revision of the Biodiversity Offsets Strategy, offsets are now proposed to be provided in form of direct management action, rather than through supporting research. Offsets are proposed to be provided through providing funding towards the implementation of the Threatened Species Management Plan that DLRM is developing for Groote Eylandt. As detailed in Section 3 of the Supplement, a number of discussions have been held with DLRM in this regard.

Issue 5.5. The Draft EIS confirmed the presence in the proposed mining area of all four Environmental Protection and Biodiversity Conservation (EPBC) Act-listed threatened terrestrial fauna species known from Groote Eylandt (Northern Quoll, Masked Owl, Brush-tailed Rabbit-rat, Northern Hopping Mouse). Major risks are associated with direct loss of habitat for the threatened species, potential increased risk of Cane Toad colonisation, potential increased risk of predation by feral cats, and potential spread of introduced rodents and environmental weeds. More details for each of the key

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

species and threats are provided below.

These comments concentrate on the four threatened terrestrial fauna species, as these are the most significant matters to which the proposal poses the greatest risk.

Responses are provided to the individual issues raised below.

Issue 5.6. The Draft EIS is accurate in the assessment of the likelihood of occurrence of other threatened and migratory fauna species (Table 6.7) and the Department considers that the project does not pose a significant risk to any of these species apart from those discussed below.

Noted.

Issue 5.7. The Draft EIS also correctly identifies that no threatened plant species are likely to occur in the project area, and available data suggests that the area is not likely to contain important habitat for other significant (restricted, data deficient or near-threatened) plant species.

Noted.

Issue 5.8. The potential impacts of the project on aquatic ecology are not considered here, other than to note that there are no threatened aquatic species known within or near the project area, and that measures to prevent impacts on groundwater and surface water have been addressed in detail in the Draft EIS.

Noted.

Issue 5.9. Comments are also provided in relation to habitat mapping and vegetation (fauna habitat rehabilitation), as these are important for assessment of the risk to biodiversity from the project.

Noted.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.10. Masked Owl

The Draft EIS confirmed the presence of Masked Owl (listed as Vulnerable under the EPBC Act) in the project site. The EIS correctly identifies that these individuals are considered to represent an important population as defined by the Significant Impact Guidelines 1.1 for MNES under the EPBC Act.

Noted.

Issue 5.11. However the Draft EIS may have under-estimated the risk of the proposed project to this species, for the following reasons:

- The estimated area of occupancy for Masked Owls is based upon the assumption of uniform population density throughout forests and woodlands on the island, but this is unlikely to be the case. Masked Owls typically have patchy distributions and in other parts of their range likelihood of occurrence is higher in “old-growth” forests with relatively large trees and well developed hollows (> 40cm diameter). Most of the habitat affected by the GEMCO development is described as “old growth” forest (MU4) and is more likely to support Masked Owls than other woodland vegetation types. Therefore the proposed development may reduce the area of occupancy by a substantially larger amount than the stated 0.8% for the Groote Eylandt population.

The Draft EIS mapped broad habitat types on Groote Eylandt as:

- Closed Forest;
- Open Forest;
- Sandstone Woodland; and
- Coastal Complex/Dunes.

Under these broad habitat groupings, the Eastern Leases contains Open Forest and Sandstone Woodland. It was assumed that the full extent of these vegetation types within the Eastern Leases would provide habitat for the Masked Owl (northern). This, in itself, is a conservative assumption because the patchy distribution of the Masked Owl (northern) may mean that only parts of the Eastern Leases provide habitat for the species. Similarly, it was assumed that the full extent of these habitat types beyond the Eastern Leases would provide habitat for the Masked Owl (northern). This is considered to be a reasonable assumption for the purposes of placing the habitat loss into context. There is no basis for the assumption that the Eastern Leases contains a higher proportion of “old growth” forest than other wooded areas on Groote Eylandt or that the Masked Owl (northern) is found at higher densities in the Eastern Leases compared to elsewhere on the island. The number of records of the Masked Owl (northern) within the Eastern Leases is a function of the survey effort in this area compared to elsewhere on Groote Eylandt.

Finally, notwithstanding the discussion above, the proponent has revised the Biodiversity Offsets Strategy to include offsets for the Masked Owl (northern). As detailed in the response to Issue 5.4,

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

this revision was made as a precautionary measure, given that long term monitoring data on the habitat value of mine rehabilitation for threatened species is not available at this point in time.

Section 4.3.4 of the Supplement provides a summary of the *Revised Biodiversity Offsets Strategy* and a copy of the revised strategy is included in Attachment B of the Supplement.

- Issue 5.12.**
- The Draft EIS suggests that rehabilitation of the site could be expected in the long term to provide foraging areas for the species, and therefore is unlikely to reduce the area of occupancy of the species in the long term. However, this species depends upon large tree hollows for roosting and reproduction, and these resources comprise critical components of the species' habitat. The time taken for savanna open forest or woodland to reach ecological maturity and develop hollows is at least 65 years (Woinarski & Westaway 2008) and likely considerably longer to develop large hollows suitable for Masked Owl. Tree hollow development requires (amongst other factors) fire, which is largely excluded from mine rehabilitation areas, further extending the expected time for hollow development. The assessment of existing mine rehabilitation areas provided no evidence that these areas could support Masked Owl, either directly from comparable population densities or home ranges, or indirectly from evidence that suitable hollows for this species have developed, or that food resources for Masked Owls are returning to pre-clearing densities and species composition.

The removal of suitable Owl habitat by the GEMCO development should therefore be carefully considered a long-term residual detriment to the Groote Eylandt population, and it would be appropriate to consider environmental offsets for this impact.

Please refer to the response to Issue 5.4, which explains that offsets will be provided for the Masked Owl (northern). Offsets are being provided as a precautionary measure, given that long term monitoring data on the habitat value of mine rehabilitation for threatened species is not available at the time of lodgement of the Supplement. The *Revised Biodiversity Offsets Strategy* is provided in Attachment B of the Supplement.

Issue 5.13. Northern Quoll

The Draft EIS confirmed the presence of the Northern Quoll (listed as Endangered under the EPBC Act) in the project site. The Draft EIS also correctly identifies the Groote Eylandt population as having very high conservation significance and an important population under the Significant Impact Guidelines.

Noted.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.14. The Draft EIS concludes that the project will not have a significant impact on the Northern Quoll, but this may underestimate the residual risk to this species, for the following reasons:

- The Draft EIS states that the Northern Quoll population on Groote shows no evidence of decline. However, no information is available on medium-term population trends on Groote to support this assumption. There is accumulating evidence that island populations of other mammal species, including some species on Groote Eylandt, are declining, so caution is required in predicting the stability of the quoll population on Groote Eylandt, and minimisation of all pressures on the species is desirable. The identified risks from increased predation from feral cats and increased potential for disease transmission from feral cats and feral rodents are also relevant to Northern Quoll populations in the project area.

The research in relation to the general decline of mammal species is noted. However, the proponent is not aware of any research on Groote Eylandt in relation to population trends for the Northern Quoll and a large number of Northern Quolls were captured as part of the Draft EIS survey work, including in areas of mine rehabilitation. Nevertheless, the pressures on the species are acknowledged. As noted in response to Issue 5.4, biodiversity offsets will be provided for the species. Offsets will focus on feral cat control, as well as quarantine measures for Cane Toads. As detailed in the *Revised Biodiversity Offsets Strategy* (Attachment B), DotE's conservation advice for the Northern Quoll acknowledges Cane Toads and feral predators (such as feral cats) as threats to the species.

Issue 5.15. • The Draft EIS states that Northern Quoll has been demonstrated to use rehabilitated vegetation within the existing mine area. However, with only limited data available, the significance of quolls being recorded in some rehabilitation areas must be interpreted cautiously. More detailed data is required on relative population density in comparable rehabilitated and undisturbed habitats, and the trajectory of "recovery" of quolls into rehabilitated habitats, before it can be concluded that there is no residual detriment to Northern Quoll populations from mining within the project area.

Please refer to the response to Issue 5.4, which explains that offsets will be provided for the Northern Quoll. Offsets are being provided as a precautionary measure, given that long term monitoring data on the habitat value of mine rehabilitation for threatened species is not available at the time of lodgement of the Supplement. The *Revised Biodiversity Offsets Strategy* is provided in Attachment B of the Supplement.

Issue 5.16. • The most severe risk to Northern Quoll on Groote Eylandt is the introduction and spread of Cane Toads, which has the potential to cause island wide extinction of the Northern Quoll. This is recognised in the Draft EIS as a high risk, even after mitigation. The treatment of this issue within the Draft EIS is predicated on the assumption that the development of the Eastern Leases poses no additional risk

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

(in relation to Cane Toad introduction) to that already present from the existing mine. This may be questionable (see below) but, nevertheless, the EIS provided an opportunity to reassess the risk treatment across the whole mining operation, including the potential for additional offsetting of the significant residual risk.

In response to this, and other submissions, Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected. In addition, the *Revised Biodiversity Offsets Strategy*, provided in Attachment B, indicates that biodiversity offsets are proposed to be secured through providing funding toward the implementation of the Northern Territory Government's Threatened Species Management Plan. Quarantine measures for Cane Toads are proposed to be a key component of this plan.

Issue 5.17. Brush-tailed Rabbit-rat

The Draft EIS confirmed the presence of the Brush-tailed Rabbit-rat (listed as Vulnerable under the EPBC Act) in the project site. The Draft EIS correctly identifies that the proposed development area support an important population of this species as defined by the Significant Impact Guidelines. The Draft EIS identifies that the project may have a significant impact on the rabbit-rat and evaluates the mitigated risk as Medium. However, data for this species is sparse and there is uncertainty around this risk assessment, with the potential for the risk to be more severe.

The remainder of this submission provides further detail on the submitter's issues in relation to the Brush-tailed Rabbit-rat. Responses are provided to the individual issues raised below.

Issue 5.18. There has been sufficient biodiversity survey across Groote Eylandt to indicate that rabbit-rats have a patchy, and possibly highly restricted, distribution on Groote Eylandt. Ecological information from other locations indicates that the species generally prefers taller eucalypt open forest with low cover of annual grass and bare ground, and where the impact of fire is less severe (Firth et al. 2006). While open forest and woodland occur extensively on Groote Eylandt, a more subtle combination of habitat features is likely to determine rabbit-rat distribution. These factors are poorly known, and no appropriate finer scale habitat mapping available. Consequently the area of Groote occupied by this species is almost certainly substantially lower than estimated in the Draft EIS, and the proposed development will likely remove a much larger proportion of occupied habitat than the 0.6% stated in the Draft EIS.

The Draft EIS made the assumption that the Brush-tailed Rabbit-rat would make use of all vegetation types within the project site. This is a conservative assumption because the patchy distribution of the species, and its requirement for a subtle, poorly understood combination of habitat features, may mean that only parts of the Eastern Leases provide habitat for the species. Much of the project site would not meet the description provided in the submission (i.e. "taller eucalypt open forest with low

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

cover of annual grass and bare ground, and where the impact of fire is less severe"). Similarly, it was assumed that the full extent of these habitat types beyond the Eastern Leases would provide habitat for the Brush-tailed Rabbit-rat. This is a reasonable assumption for the purposes of placing the habitat loss into context. The number of records of the Brush-tailed Rabbit-rat within the Eastern Leases is a function, at least in part, of the heightened survey effort in this area compared to elsewhere on Groote Eylandt. The response to Issue 5.19 provides further detail on this point.

Finally, notwithstanding the discussion above, the *Revised Biodiversity Offsets Strategy* includes offsets for the Brush-tailed Rabbit-rat, given that the Draft EIS concluded that the project had the potential to give rise to a significant, residual impact on this species.

Issue 5.19. Inclusive of the record reported in the Draft EIS there are only four records of this species on Groote post 2002, three of which are within the proposed development area and one is immediately adjacent. All other records from Groote Eylandt predate 1976. Given the widespread and continuing decline of this species throughout most of the rest of its range, including some other island populations (Department of Land Resource Management unpublished data; H. Davies, Melbourne University, pers. comm.), it is possible that the Groote Island population is also declining, which emphasises the significance of recent records for the species within or close to the project area.

It is acknowledged that the distribution and density of the Brush-tailed Rabbit-rat is poorly understood, and that it is possible that the Groote Eylandt population is declining.

However, the fact that the recent records for this species are located within or adjacent to the project site does not necessarily imply that the project site is preferential habitat for this species, or more important than the remainder of habitat on Groote Eylandt. The density of records is likely to be as a result of the fauna survey effort. As part of the preparation of the Supplement, a review of other published fauna surveys on Groote Eylandt was undertaken and has confirmed that the level of survey effort in the Eastern Leases and immediately surrounding areas significantly exceeds that undertaken on the remainder of the island. Many of the studies in and around the Eastern Leases are associated with the proponent's operations and have therefore been initiated by the proponent. It is also likely that the relative ease of accessing this area (i.e. via the Dalumba Bay Road, or the proponent's exploration tracks) compared to more remote and inaccessible areas on Groote Eylandt has contributed to the intensive survey in this area.

Nevertheless, the proponent acknowledges and understands the significance of having recorded the Brush-tailed Rabbit-rat within the project site, and offsets are proposed to be provided to counterbalance any impact that the project may have on this species.

Issue 5.20. As shown by the rehabilitation surveys described in the draft EIS, introduced rodents House Mouse *Mus musculus* and Black Rat *Rattus rattus* may colonise rehabilitated areas, including in the future those within the project area. While limited detail is provided, proposed feral animal control measures are unlikely to be effective in mitigating their establishment. Experience from the mainland Top End shows that colonisation by Black Rat of disturbed areas provides a vector for this species' wider

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

dispersal into undisturbed adjacent habitats. These introduced rodents have the potential to compete with the Brush-tailed Rabbit-rat and spread disease, and therefore may not only impede recolonisation of rehabilitated areas but pose a wider threat to the populations of rabbit-rats and hopping mouse in undisturbed habitats on Groote Eylandt.

In recognition of the threats that introduced rodents pose to biodiversity, the Federal Government has developed the threat abatement plan to reduce the impacts of introduced rodents on biodiversity on Australian offshore islands of less than 100,000 hectares (SEWPaC, 2009b). The recommended framework for management is as follows (SEWPaC, 2009b; SEWPaC, 2009a):

- Removal of the threat by eradicating the rodents where this is feasible;
- Mitigation of the threat where eradication is not feasible by efficient and effective sustained control of the rodents; and
- Reduction of the risks of invasion or reinvasion of rodents onto islands where they do not occur or have been eradicated.

It is clear that control of rodents would require an island-wide approach to the issue, although this would be a challenging program given the large size of Groote Eylandt (228,500 ha). The NT Government is proposing to develop a Threatened Species Management Plan for Groote Eylandt to identify priority areas on Groote for targeted threatened species management. Although introduced rodents are not specifically listed in available documentation in relation to this management plan, they are an issue worthy of consideration. As detailed in the response to Issue 5.4, offsets for the project will involve providing funding toward the implementation of this management plan.

The management measures listed below will assist toward minimising the risks posed by introduced rodents within the project site:

- Implementation of the proponent's Quarantine Inspection Procedure to avoid additional introductions of pest species to Groote Eylandt;
- Appropriate disposal of rubbish;
- Rehabilitation of mined land to re-establish suitable habitats for native rodents;
- Restoration of habitat connectivity to intact patches of habitat; and
- Monitoring of feral animal populations in mine rehabilitation.

Issue 5.21. The Draft EIS indicates that there is no evidence for Brush-tailed Rabbit-rat occurring within previously rehabilitated areas, so it prudent to assume that clearing of habitat has a residual detriment.

Based on available information, it appears that the project may pose a high risk to this species, which is not readily mitigated, and it would be appropriate to consider environmental offsets for this residual detriment.

Noted – this is consistent with the findings of the Draft EIS and offsets are proposed to be provided for this species.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.22. Northern Hopping Mouse

The Draft EIS confirmed the presence of the Northern Hopping Mouse, listed as Vulnerable under the EPBC Act, in the project site. The Draft EIS identifies that the proposed development supports an important population of this species as defined by the Significant Impact Guidelines and that the proposed development is likely to contribute to local population decline. As for the rabbit-rat, available data suggest that the hopping mouse occurs patchily on Groote Eylandt, and does not occupy all habitat within that broadly defined as “potentially suitable” for the species. Therefore the proposed development may remove a much larger proportion of occupied habitat than the 0.6% stated in the Draft EIS.

Please refer to the response to Issue 5.11 and Issue 5.18, given that the discussion in these responses is equally relevant to the Northern Hopping-mouse.

Issue 5.23. While Northern Hopping Mouse was apparently previously common in at least some areas on Groote Eylandt (Dixon & Huxley 1985, Woinarski et al. 1999), recent extensive surveys using methods highly sensitive to its detection suggest that this species has undergone a substantial decline on Groote Eylandt. Assessment of its status is also complicated by evidence that some surveys based solely upon spoil heaps are likely to be unreliable (Diete et al. 2015). The species is now known to be extant in only three areas (R. Diete, Qld University, pers. comm.), inclusive of the record reported in the Draft EIS within the project area. Consequently, the confirmed occurrence of the species in the project area must be regarded as significant, and clearing and fragmentation of suitable habitat within the project area to pose a moderate to high risk to the population. As this species has not been recorded as recolonising rehabilitation areas, this risk is not readily mitigated.

The Draft EIS also acknowledges that the species has not been recorded within mine rehabilitation and consequently offsets will be provided for this species.

The Draft EIS acknowledges the significance of recording the Northern Hopping-mouse within the project site, and notes that the project site supports an important population of the species (as defined under the EPBC Act). It is also acknowledged that the species appears to be in decline.

However, the comment that the species is only known to be extant in three areas (inclusive of the project site) is worthy of further consideration. The submission correctly notes that past records of the Northern Hopping-mouse based on spoil heaps are unreliable. The Draft EIS did not include these records for this reason. There are, however, very few studies that have been undertaken using methods suitable for detecting the Northern Hopping-mouse, and even with the use of the correct methods, the species is elusive and difficult to record.

The distribution and population size of this species is therefore not well understood and the record from within the project site is due, at least in part, to the heightened survey effort in the project site compared to elsewhere on Groote Eylandt.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.24. The discussion for Brush-tailed Rabbit-rat (above) of the potential impacts of feral rodents applies equally to Northern Hopping Mouse.

Please refer to the response to Issue 5.20.

Issue 5.25. Habitat mapping

Vegetation mapping was undertaken within the project area at a moderately fine scale, using aerial photo interpretation supported by field survey and validation. This resulted in the mapping and description of thirteen vegetation communities within the project area. Somewhat unusually, the more extensive eucalypt open forest communities (notably MU4) are of greatest significance as potential habitat for threatened terrestrial vertebrate species. It should be noted however that, even at this scale of mapping, the significant species may have a patchy distribution within a vegetation community. The species distribution may be influenced by subtle environmental factors beyond the resolution of mapping, as well as spatial and temporal variation due to short- and longer-time fire history.

It is noted that Issue 5.11, Issue 5.18 and Issue 5.23 also suggest that the distribution of several threatened species is poorly understood and that the distribution may be patchy and influenced by subtle environmental factors. Please refer to the responses to these issues.

Issue 5.26. Unfortunately, vegetation/habitat mapping for the whole of Groote Eylandt is only available at a coarse scale, and this is further simplified in the Draft EIS to five broad habitat types (e.g. Figure 7.3). This means that it is very difficult to meaningfully quantify the level of habitat disturbance in the context of the extent of that habitat across the entire Groote Eylandt. The statement in the Draft EIS that the area of Open Forest within the disturbance footprint is only 1.28% of the total area of this habitat on Groote Eylandt is true in the coarsest sense, but this is not necessarily informative about the proportion of high quality, occupied habitat for each for the key threatened species that will be removed.

Please refer to the response to Issue 5.3 in relation to habitat mapping beyond the project site.

Issue 5.27. Similarly, as discussed above for individual threatened species, statements in the Terrestrial Ecology Report (Appendix C) for the Draft EIS regarding the proportion of potential habitat for each threatened species that will be cleared during the project are likely to be substantial underestimates of the real proportion of occupied habitat that will be impacted.

Please refer to the responses to Issue 5.11, Issue 5.18 and Issue 5.23.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.28. Vegetation Rehabilitation

Mined areas are rehabilitated following mining, and the use of mined areas by native biota, and particularly key threatened species, is relevant to determining the residual impact of this project. A brief study of fauna use of “mature” mine rehabilitation is presented in the appendices of the Terrestrial Ecology Report. This is based on fauna survey over a four day period at 3 sites, and 169 camera-nights at 4 sites. Some additional data is drawn from previous surveys (URS Australia Pty Ltd, 2012) although details of the site locations and sample intensity is not provided in the draft EIS. The current report states that sites were in mine rehabilitation aged between 19 and 27 years, although no further information about the spatial context of these sites is provided.

While studies of fauna use in mine rehabilitation are definitely required, the studies reported in the Draft EIS have very low sample intensity (both in number of sites and period of sampling), and can provide only very limited information about the potential for key threatened species, or fauna more generally, to recolonize rehabilitated areas.

Please refer to the response to Issue 5.4.

Issue 5.29. Explicit “completion criteria” are also required by which to assess the success of rehabilitation.

The Terrestrial Ecology Report describes the presence of species in rehabilitation sites and states that 56% of native (vertebrate) fauna species recorded in the project site are also recorded from rehabilitation sites, which is one basic metric for rehabilitation outcomes. However, the presence of a species in rehabilitation areas is not very informative about the value of those areas as habitat for that species. More sophisticated metrics or completion criteria are required to assess the potential value of rehabilitation areas for key threatened, including estimates of density or occupancy rates relative to undisturbed habitat, and much more intensive sampling is required to develop an understanding of the trajectory of any recovery of threatened species into rehabilitation areas.

Section 6.2.4 of the Draft EIS describes completion criteria for rehabilitation at the existing GEMCO mine and Section 6.3.4 notes that the completion criteria will be reviewed to confirm their adequacy for the project site, and amended as necessary. In response to this, and other submissions in relation to the habitat value of mine rehabilitation, the proponent has committed to revising the rehabilitation completion criteria to address fauna. Section 4.3.5 of the Supplement provides further detail.

However, it should be noted that, although the proponent will continue to undertake rehabilitation in a manner that creates habitat for a wide range of fauna species, including threatened species, biodiversity offsets are now proposed to be provided for all EPBC Act listed species (refer Section 4.3.4 of the Supplement).

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.30. Cane Toads

The Draft EIS correctly identifies establishment of Cane Toads as a severe threat to the biodiversity of Groote Eylandt, and particularly as an extreme risk to the highly significant population of Northern Quoll. The proposed development, as an extension of existing mining activity, poses continuing and possibly increased risk of toad establishment due to continuing and possibly increased freight movement and human transport to the island. Expansion and increased use of transport routes to the eastern leases also has the potential to facilitate more rapid and wider dispersal of toads on Groote if they are introduced. Even with the introduction of a small number of toads, probability of establishment and dispersal over the entire island will be high, and eradication is likely to be very difficult or impossible. The Draft EIS identifies that an existing Cane Toad Management Plan and associated quarantine procedures will be strengthened by the implementation of formal quarantine audits, although no further details of the Cane Toad Management Plan or the auditing process are provided. Given that Cane Toads have emerged relatively recently as a significant risk associated with the GEMCO mine operation on Groote Eylandt, this Draft EIS provides an opportunity to review and potentially strengthen management of this risk, particularly as the mitigated risk is still assessed as High in the Draft EIS (p 4-16). There is also potential for environmental offsets to contribute to reducing the risk of Cane Toad introduction across the island as a whole, through support for quarantine and surveillance activities undertaken by the Aninidilyakwa Land Council and rangers.

In response to this, and other submissions, Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected. In addition, the *Revised Biodiversity Offsets Strategy*, provided in Attachment B, indicates that biodiversity offsets are proposed to be secured through providing funding toward the implementation of the Northern Territory Government's Threatened Species Management Plan. Quarantine measures for Cane Toads are proposed to be a key component of this plan.

Issue 5.31. Feral Cats

Feral cats are strongly implicated in the widespread decline of small and medium-sized mammals across northern Australia. Areas where most threatened mammal species persist are either free of cats, or retain habitat characteristics that ameliorate cat predation. Ecologically benign fire regimes and absence of grazing by introduced herbivores helps retain complex habitat structure and other resources important for small mammals, and reduces the impacts of cat predation. These factors are strongly implicated in the persistence of some threatened species on Groote Eylandt compared to the mainland. Nevertheless, there is accumulating evidence that the Northern Hopping Mouse is in decline on Groote Eylandt, and this may also be the case for Brush-tailed Rabbit-rat and, given the absence of other known or potential causal factors, cat predation is likely to be a major factor in these declines. Locations on the island where these threatened species are known to be extant are of particular

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

significance as it suggests that habitat quality has remained high in these areas, including factors that reduce cat density and/or ameliorate predation pressure.

The risk that feral cats pose to small and medium-sized mammals across Northern Australia is acknowledged in the Draft EIS. The control of feral cats is a key element of the *Revised Biodiversity Offsets Strategy*, which is provided in Attachment B of the Supplement.

Issue 5.32. The Draft EIS correctly identifies the risk of increased impacts from feral cats created by the development, through clearance of vegetation and expanded road network, creating disturbed areas and corridors that are likely to increase feral cat dispersal and facilitate hunting efficiency.

Noted.

Issue 5.33. Additionally, cats are the primary vector for toxoplasmosis, which has been implicated as a factor in the decline of some mammal species and is now highly prevalent in Eastern Quoll in Tasmania. Transmission of toxoplasmosis to native mammal species has already occurred elsewhere in the Top End of the NT. Increased feral cat numbers or cat activity in the proposed development area may also pose an increased risk of disease transmission to threatened mammal species.

Noted.

Issue 5.34. The management and control measures identified in the Draft EIS to mitigate the threat posed by feral cats are not adequate or practical. Localised cat trapping is ineffective at reducing cat numbers in open populations. Currently the only effective way to mitigate the impacts of feral cats on native wildlife is with sustained baiting and ultimately eradication programs at appropriate landscape scales, with effective barriers to recolonization such as cat eradication on entire islands or within large predator-proof enclosure fences.

The *Revised Biodiversity Offsets Strategy* includes a commitment to providing funding toward the implementation of the NT government's Threatened Species Management Plan. This plan will focus on feral cat control, and management measures will be informed by a program of research into methods of feral cat control, including baiting undertaken at an appropriate landscape scale.

Section 4.3.4 of the Supplement provides a summary of the *Revised Biodiversity Offsets Strategy* and a copy of the revised strategy is included in Attachment B of the Supplement. As noted in Section 4.3.4, the proponent has revised its commitment to cat trapping and any feral cat control work on the project site will now be undertaken as part of a broader program of feral cat control on Groote Eylandt (undertaken as part of the delivery of biodiversity offsets via contributing funding towards the implementation of the Threatened Species Management Plan).

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.35. Introduced Rodents

The mine rehabilitation study in the Terrestrial Ecology Report showed that the introduced rodents House Mouse *Mus musculus* and Black Rat *Rattus rattus* have colonised rehabilitation areas in the GEMCO leases. Not only may these species also colonise future rehabilitation areas within the new project area, but these may act as source populations for a gradual spread into adjacent extensive undisturbed vegetation, which has been recently observed to occur in many areas in the Top End mainland. These introduced rodents potentially compete with the Brush-tailed Rabbit and Northern Hopping Mouse, or may spread disease, and therefore not only impede recolonisation of rehabilitated areas by native species but pose a wider threat to threatened mammal populations on Groote Eylandt.

Proposed feral animal control measures will not be effective in mitigating their establishment. Without very careful design, baiting to control introduced rodents has the potential for adverse impacts on native threatened rodent species.

Please refer to the response to Issue 5.20. Please note that the Draft EIS does not propose a program of baiting rodents.

Issue 5.36. Biodiversity Offsets

The Draft EIS identifies that in accordance with the EPBC Act Environmental Offsets Policy, biodiversity offsets are required to offset any significant, residual impacts. The Draft EIS states that the project has the potential to give rise to significant residual impacts for the Northern Hopping-mouse and Brush-tailed Rabbit-rat and a Biodiversity Offset Strategy (Appendix E) has been prepared with proposed offsets relating to these species. In general these are “indirect” offsets involving research in to the ecology of, and threats to, these species.

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Issue 5.37. A detailed analysis of the Biodiversity Offset Strategy has not been undertaken, as this is not necessarily appropriate at this stage of the EIS process. However, the following general comments are made in relation to potential environmental offsets:

- The residual risk to each of the four key MNES species is at least Medium (see Table 4.5 and the summary of this assessment), so it would be appropriate to consider offsets in relation to each of these species.
- For all species, landscape-scale actions that improve conservation security of the species within Groote Eylandt as a whole are likely to be most effective.
- Such actions would address the most important threatening processes affecting each species including more stringent quarantine and surveillance to prevent Cane Toad establishment; landscape-scale management of feral cats and introduced rodents; and maintenance of ecologically benign fire regimes.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

- While further research may be required to most effectively manage these species and key threats, it is preferable that this research is embedded as part of an adaptive management process within offsets that also have a significant on-ground management component.

The Biodiversity Offsets Strategy has been further developed and revised since the Draft EIS was published. As noted in Section 3 of the Supplement, the proponent has met with DLRM on several occasions specifically to discuss biodiversity offsets. These meetings have helped to shape the *Revised Biodiversity Offsets Strategy*. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B. The *Revised Biodiversity Offsets Strategy* now indicates that offsets will be provided for all four MNES species.

The *Revised Biodiversity Offsets Strategy* makes use of direct offsets, achieved through funding a program of landscape-based conservation action, rather than research. Offsets will include activities such as feral cat control and improving Cane Toad quarantine measures, as suggested in this submission.

Issue 5.38. Flora/ Fauna Summary

- Groote Eylandt is a critical refuge for northern Australian biodiversity and has a high level of ecological integrity unmatched elsewhere on the mainland or other large offshore Australian islands. As long as the integrity of Groote Eylandt is maintained, this refuge value is likely to increase into the future as threatening processes continue or intensify on the mainland and largest islands of Northern Australia.
- The Draft EIS correctly identify the matters of national environmental significance (MNES) potentially at risk from this development, notably four threatened terrestrial fauna species – Northern Quoll, Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse.
- The sampling done for the Draft EIS was adequate to demonstrate that each of the four species occur within the project area, although for at least three of these species with sparse and/or patchy distribution (Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse) sampling intensity was too low to provide a precise delineation of high quality habitat occupied by the species.
- Vegetation communities (and by extension fauna habitats) have been mapped at a moderately fine scale within the project area and the most extensive habitat type (“old growth” open forest) is potentially suitable habitat for each of the key MNES species.
- Vegetation communities or habitat types are only mapped at very coarse scales for Groote Eylandt as a whole, making it difficult to assess the significance of important habitats in the project area in a whole-island context. Given the sparse and patchy distribution of three of the key MNES species (Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse), it is likely that the estimates presented in the Draft EIS of the proportion of available habitat affected by the project are substantial underestimates of the proportion of occupied habitat affected.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

- The distribution of the few recent records for the Brush-tailed Rabbit-rat, and accumulating evidence for decline of Northern Hopping Mouse mean that evidence for their current presence within the project area is highly significant.
- There is only sparse information about the extent and rate of recolonisation of rehabilitated areas by the key threatened species, and the ultimate recolonisation at densities similar to pre-mining levels by any of these species cannot be assumed. The assessment in the Draft EIS that the project will not give rise to significant impacts on the Masked Owl is not supported, given the very long time-frame for the development of large hollow-bearing trees in tropical savanna regrowth.
- The development of the Draft EIS provides an opportunity for review and potentially strengthening of the Cane Toad Management Plan to address the high risk to the biodiversity values of Groote Eylandt from accidental introduction and establishment of Cane Toad, and it is recommended that this is addressed in greater detail in the EIS.
- The Draft EIS correctly identifies additional indirect risks associated with the spread of feral cats and introduced rodents, although the local-scale management measures described for these feral animals are unlikely to be effective. Particularly for feral cats, management of this risk must be placed in the context of action to reduce feral cat impacts across landscape scales.
- As the effects of removal of habitat of the four key MNES species are hard to mitigate, the mitigated risk for all four species remains at least Medium (as identified in the Draft EIS) and for some species may be High - for Brush-tailed Rabbit-rat and Northern Hopping Mouse because the project area may contain a significant proportion of occupied habitat on the island; and for the Northern Quoll due to the consequence of accidental introduction and establishment of Cane Toads.
- More precise explanation of the residual risk to Brush-tailed Rabbit-rat and Northern Hopping Mouse will be difficult without very extensive and intensive survey using techniques appropriate to detecting these species across the entire island.
- Environmental offsets may be required to offset the residual risks from this project to each of the key MNES species. Appropriate environmental offsets would improve the conservation security of these threatened species across the whole of Groote Eylandt through more stringent quarantine and surveillance to avoid Cane Toad establishment; landscape-scale management of feral cats and introduced rodents; and maintenance of ecologically benign fire regimes. While some research may be required to most effectively implement these actions, offsets should primarily be directed towards on-ground action in an adaptive management context.

This issue (Issue 5.38) provides a summary of the flora and fauna issues raised in DLRM's submission, and responses to DLRM's individual issues are provided in the preceding sections.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.39. In regards to Chapter 8 Aquatic Ecology, and Appendix D Aquatic Ecology Report:

Aquatic macroinvertebrates and fish were surveyed at 17 sites, although the objectives (e.g. baseline monitoring data) of the surveys have not been clearly defined.

The aquatic ecology field survey was undertaken to identify the aquatic species present within the project site (including fish and macroinvertebrates), and also to assess habitat conditions to assist in determining the potential for any threatened species to be present within the project site (refer to Section 8.4 of the Draft EIS).

The field surveys were designed to respond to the requirements of the Terms of Reference of the Draft EIS (refer to Section 3.5.3 of the TOR, included in Section 24 of the Draft EIS), with the aim of assessing the potential impact of the project on aquatic species.

As discussed in Section 8.5.3 of the Draft EIS, aquatic macroinvertebrates are also typically used as biological indicators of freshwater ecosystem health. The macroinvertebrates were collected in accordance with AusRivAS methodology, and the results of this assessment are provided in Section 8.5.3 of the Draft EIS.

Issue 5.40. Macroinvertebrate taxa have been identified to (in most cases) family level. This level of reporting prevents assessment of the significance of the local fauna. Most of the families reported are present in streams throughout Northern Australia. The absence of some families may reflect actual absence or be a consequence of inadequate sampling.

Results appear to suggest a depauperate fauna, likely composed of common, widely distributed species. However, without species-level data this can only be guessed. Future assessments could attempt to obtain this type of data.

Macroinvertebrate Identification

Macroinvertebrates were assessed for the purpose of providing an indication of water quality. The assessment was conducted in accordance with various industry-standard statistical methods, which typically require identification to Order or Family level. The analyses used for the project included:

- *EPT Taxa Richness*, which utilises macroinvertebrate Order in assessing taxa that are tolerant to disturbance.
- *SIGNAL analysis*, which utilises macroinvertebrate Family in the bioassessment of water quality by examining macroinvertebrate sensitivity to various pollutants and other physical and chemical factors; and
- *AusRivAS analysis*, which compares site-specific macroinvertebrate Family data to reference sites to classify the site into an ecological integrity band.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

The identification of macroinvertebrates to Family level is consistent with these industry-standard statistical methods, and is therefore considered suitable for the level of information required in an EIS.

Sampling Rigour

As discussed in Section 3.2.7 of the Draft EIS *Aquatic Ecology Report* (Appendix D), macroinvertebrate sampling was undertaken in accordance with the standard methods of the *Australia-Wide Assessment of River Health: Northern Territory AusRivAS Sampling and Processing Manual* (Lloyd and Cook, 2002) (NT AusRivAS sampling manual).

Macroinvertebrate assemblages within the project site were evaluated using data collected specifically on site, but the Draft EIS also drew upon the baseline analysis of freshwater macroinvertebrates contained in the recent URS report *Flora and Fauna Surveys of Western Groote Eylandt* (2012). The URS study sampled sites in both the Angurugu and Emerald River Catchments, including sites that were in larger, wider reaches of these rivers than those found on the project site. The URS report found that the only variables that had significant influence on the variation of macroinvertebrates between sites were measures of riparian habitat structure and, in descending order of importance, included stream width, stream morphology (presence of sand and silt), riparian vegetation cover and the percentage of emergent macrophytes. Wider, lower order watercourses with higher riparian vegetation cover and emergent macrophytes had a higher diversity of macroinvertebrates.

The watercourses of the project site, although pristine, are within the headwaters of the catchments. The watercourses are small and the majority are ephemeral in nature. The watercourses are mostly very narrow, lack emergent macrophytes and have low cover (shading) by riparian vegetation. The results of the macroinvertebrate survey for the project, which indicate that the diversity is relatively low, are therefore consistent with those found by URS for higher order stream reaches within the Emerald and Angurugu Rivers. The low overall diversity of macroinvertebrates found for the Draft EIS studies is therefore likely to be a reflection of the small ephemeral nature of the watercourses of the project site.

It is therefore considered that sufficient sampling has been undertaken within the project site to characterise and understand the patterns of macroinvertebrate biodiversity.

Issue 5.41. The fish survey was confined to safe nettable waters and likely represents an underestimate of the total number of species present.

Fish sampling was undertaken by using a combination of seine netting, which requires the survey team to enter the water with the seine net, or dip netting, which requires the team to stand on the shoreline and dip the net. As noted in the response to Issue 5.40 the majority of watercourses in the project site are small and ephemeral in nature. Survey of these watercourses was not constrained by safety issues related to the presence of saltwater crocodiles, and full representative surveys of fish in these watercourses were undertaken.

However, as discussed in Section 3.2.8 of the Draft EIS *Aquatic Ecology Report* (Appendix D), the aquatic sites located in the deeper waters of some sections of the main channels and tributaries of

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

the Emerald and Amagula Rivers were not surveyed for fish due to the presence of crocodiles. Fish data for these sites were limited to incidental captures from the macroinvertebrate dip netting. The survey data for these watercourses was therefore supplemented by previous fish survey work undertaken on the western side of Groote Eylandt. In particular, aquatic fauna in the deeper water habitats of the Emerald River has previously been surveyed downstream of the project site by Webb (1992) (*Flora and Fauna Surveys on the Western Side of Groote Eylandt, N.T. (1991-92)*) and URS (2012) (*Flora and Fauna Surveys of Western Groote Eylandt*).

Although only five species of fish were recorded within the project site during the surveys for the Draft EIS, these species were found to be consistent with those recorded by Webb in 1992 and URS in 2012. Webb recorded five species of freshwater fish, and URS recorded 11 species. Three of the five species recorded in the project site were also those recorded by Webb, and four of the five were also recorded by URS. It should be noted, the URS and Webb surveys were conducted toward the mouth of the Emerald River, where diversity and abundance is expected to be higher due to the permanent nature of the watercourse at this location.

Studies of fish diversity in the Angurugu and Emerald Rivers by Thorburn and Farmer (2010) (*Report on the Fishes and Turtles of the Angurugu and Emerald Rivers, Groote Eylandt, Northern Territory*) were also consulted and found low fish diversity when compared with the mainland NT. Thorburn and Farmer concluded that this was due to small catchment sizes, limited habitat diversity and geographic isolation from other freshwater systems.

The number of fish species identified during the Draft EIS field surveys therefore closely reflects the findings of previous studies undertaken on Groote Eylandt.

Issue 5.42. As a general note, these types of assessments are undertaken to varying degrees of scientific rigor. Comments would be best made if they were with reference to guidelines for the proponent to design an assessment/monitoring program.

This comment does not appear to be directed toward the proponent.

Issue 5.43. The Department provided comment for GEMCO's Eastern Leases Project as a Notice Of Intent (NOI) in May 2014 (NR2461) and the Draft Terms of Reference (ToR) in September 2014 (DLRM2014/2161) recommending the preparation of an Erosion and Sediment Control Plan (ESCP).

Section 10.8.2 of the Draft EIS identifies that an ESCP will be prepared in accordance with the Department of Land Resource Management (DLRM) Fact Sheets Erosion and Sediment Control Plans for Rural Development and Model Erosion and Sediment Control Plans for Rural Development prior to the commencement of the project. The draft EIS also references the IECA Best Practice Guidelines.

The Department supports the applicant's intention to develop an ESCP for the works; however due to the nature and scope of the works, the Department recommends that the IECA Best Practice Erosion and Sediment Control Guidelines 2008

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

(www.austieca.com.au) and the Soils and Construction Volume 2E Mines and Quarries (<http://www.environment.nsw.gov.au/resources/stormwater/08208soilsconststorm2e.pdf>) are more relevant to and contain information that will assist in the development of effective Erosion and Sediment Controls (ESC) and an ESCP.

The ESCP should include details of permanent and temporary ESC methods and treatments to be implemented during both the construction (development) and operational phases (including post-extraction), and be cross-referenced with the Rehabilitation Plan addressing final landform and drainage and related stabilisation measures, soil management and establishment of vegetation cover, including ground cover standards/targets, monitoring and contingency.

The ESCP should address management of vegetation clearance; management of road formation and drainage, including stabilised crossings and discharge points. Note: soil windrows formed when blading access tracks should be removed to prevent concentration of surface flows, and the Department does not recommend the use of 'V' drains - parabolic or trapezoidal profiles are preferred.

The ESCP can be based on site plan maps and should include Construction Notes on timing of works, flagging of No-Go areas, types of ESC structures to be installed, and reference the Rehabilitation Plan. Map symbols should be used to indicate locations of works, and be referenced in the legend. Standard drawings or other information sheets, giving detail of ESC structures or methodologies, should be included as attachments.

ESCP's and ESC implementation should be to the satisfaction of the Department of Mines and Energy, to ensure the applicant takes sufficient measures to avoid or minimise sediment runoff during both the construction and operational phases, to prevent environmental harm or nuisance.

The proponent acknowledges the recommendations provided in this submission. As detailed in Section 4.3.8 of the Supplement, the Erosion and Sediment Control Plan (ESCP) will be prepared in accordance with the recommended documents and the specific requirements outlined in this submission. Section 4.3.8 clarifies:

- That the ESCP will include details of permanent and temporary measures to be implemented during all phases of the project (including construction, operation and mine closure);
- The interaction between the ESCP and the relevant rehabilitation and mine closure plans; and
- That the ESCP will address management of vegetation clearance; management of road formation and drainage, including watercourse crossings; and
- That the ESCP will be submitted to the Department of Mines and Energy to ensure that all proposed measures are in accordance with relevant regulatory requirements.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

Issue 5.44. An assessment of the NT Weeds Database for the proposed site, surrounding areas and adjoining roads has revealed previous data records of the following:

COMMON NAME	BOTANICAL NAME	DECLARED
Gamba Grass	<i>Andropogon gayanus</i>	Class B
Perennial mission grass	<i>Cenchrus polystachios</i>	Class B
Hyptis	<i>Hyptis suaveolens</i>	Class B
Grader grass	<i>Themeda quadrivalvis</i>	Class B
Ornamental rubbervine	<i>Cryptostegia madagascariensis</i>	Class B
Bellyache bush	<i>Jatropha gossypifolia</i>	Class B

The *Weeds Management Act* (The Act) enables the following weed declarations: Class A (to be eradicated); Class B (growth and spread to be controlled); Class C (not to be introduced into the NT). All Class A and B weeds are also Class C.

All land in the Northern Territory is subject to the Act. The Act states that the owner and occupier of land must - (a) take all reasonable measures to prevent the land being infested with a declared weed; (b) take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land.

Gamba grass is subject to a Statutory Weed Management Plan. Management obligations outlined in this plan must be adhered to by all land holders.

The Draft EIS makes little reference to the management or mitigation of weeds.

It should be noted that gamba grass (*Andropogon gayanus*) and mission grass (*Pennisetum polystachion*) are listed as a 'Key threatening process' under the EPBC Act.

Mission grass is known to be currently present on the island. It has shown potential to successfully colonise rehabilitation sites, roadways and areas containing disturbed soils when soil and vehicle hygiene protocols are not adhered to.

Special mention to Declared Class A weeds bellyache bush (*Jatropha gossypifolia*) and ornamental rubbervine (*Cryptostegia madagascariensis*) is advisable. These are known to occur/have occurred in the townships and community gardens on Groote Eylandt. These weeds are highly invasive, however at this stage considered to be eradicable from the Northern Territory.

The Weed Management Branch of this Department may conduct random inspections of the proposed sites to ensure weeds have not been spread or introduced to the site.

Further information as to management requirements and copy of the Weed Management Plan for Gamba Grass (*Andropogon gayanus*) is available at www.nt.gov.au/weeds or alternatively contact the Weed Management Branch for further advice on (08) 8999 4567.

5. DEPARTMENT OF LAND RESOURCE MANAGEMENT

The proponent acknowledges the serious threat that weeds may pose to biodiversity, water resources and the success of mine rehabilitation. In response to this, and other submissions in relation to weeds, additional information has been developed on the weed management practices that will be adopted for the project. This additional information is provided in Section 4.3.2 of the Supplement. The additional information includes a description of measures to prevent weed infestations, as well as measures to prevent weed colonisation of rehabilitation, roadways and areas within disturbed soils. It describes vehicle hygiene procedures that will be adopted. It is acknowledged that the Weed Management Branch of DLRM may conduct random inspections to ensure that weeds have not been spread or introduced to the site.

6. DEPARTMENT OF LANDS, PLANNING AND THE ENVIRONMENT – HERITAGE BRANCH

Issue 6.1. An extensive archaeological survey has been conducted of the proposed project footprint and an archaeological survey report produced.

Only one archaeological site (object) will be impacted upon by the project and the archaeological object can be relocated to an area outside the project footprint. Permission to do so will be required from the Minister for Lands, Planning and the Environment and the final location will be a matter between the custodians and the proponent.

A Cultural Heritage Management Plan will be prepared which will document the restrictions to be placed on access to the archaeological sites, document a program of awareness training for employees, and outline a program of annual monitoring of changes to archaeological sites.

In the event that unexpected archaeological sites are located, measures have also been established as to how to deal with that.

Heritage Branch is satisfied that all heritage and archaeological issues have been adequately addressed for this project.

Noted.

7. DEPARTMENT OF MINES AND ENERGY

Issue 7.1. The issues identified by DME are considered operational and would be expected to be addressed in the MMP prior to commencement.

Noted.

Issue 7.2. Section 3.6.2 Mining and Rehabilitation method.

Consider stockpiling the cleared vegetation for respreading during rehabilitation instead of burning

In response to this and other submissions on the Draft EIS, the proponent will undertake a systematic trial at the existing GEMCO mine in relation to the use of salvaged timber in rehabilitation areas. The results of the trial will inform the approach adopted for the project with respect to felled timber. Further detail is provided in Section 4.3.1 of the Supplement.

Issue 7.3. Section 6.2.4 Monitoring and Remediation

Completion Criteria could include the measurement of abiotic ecosystem properties at the interface between mined and non-mined areas. I.e. will soil testing be undertaken to confirm presence or absence of bacteria, fungi etc. Is soil structure and function included in completion criteria?

Consider management of 7-10 year rehabilitated areas to include fire i.e. a cool burn. A fire management strategy could be developed to ensure rehabilitated areas are protected from 'hot' fires into the future.

Section 6.2.4 of the Draft EIS describes rehabilitation completion criteria and outlines the data recorded as part of rehabilitation monitoring. There is no proposal to include testing of bacteria, fungi or soil structure as part of completion criteria, nor is this warranted.

The Draft EIS acknowledges the role that fire plays in the ecosystems of Groote Eylandt and notes that rehabilitation will ultimately be subject to fire. In response to this, and other submissions in relation to the introduction of fire into rehabilitation, the proponent has committed to undertaking a trial on prescribed burning of rehabilitation. Section 4.3.6 of the Supplement describes the proposed trial. The trial program will gather data on the response of rehabilitation to prescribed burning. Following the completion of the trial program, procedures in relation to prescribed burning of rehabilitation will be developed for the project. Section 4.3.5 of the Supplement also notes that the proponent's rehabilitation completion criteria will be reviewed for use by the project. Completion criteria in relation to the resilience of rehabilitation to fire will be introduced as part of this review, and will be guided by the results of the trial that is to be undertaken.

7. DEPARTMENT OF MINES AND ENERGY

Issue 7.4. Section 6.2.5 Rehabilitation Status

The rehabilitation should be tested for fire resilience prior to handing back to the traditional owners.

Completion criteria must be agreed by all stakeholders.

Please refer to the response to Issue 7.3.

Issue 7.5. Section 6.3.4 Rehabilitation Methods

Will rehabilitation methods include returning rocky outcrop habitats that may have been removed during clearing?

Section 3.7.6 of the Draft EIS notes that the project does not involve the clearing of any rocky outcrop areas, and the proposed mine plan has been designed to ensure that there will be no disturbance of these areas. Therefore rehabilitation methods are not required for rocky outcrop areas.

Issue 7.6. Section 12.10 Greenhouse Gases

Estimate the GG emissions from burning cleared vegetation.

As noted in the response to Issue 7.2, the proponent is reviewing its approach to the management of felled timber, with a view towards relocating timber to mine rehabilitation, rather than burning it. Further detail is provided in Section 4.3.1 of the Supplement.

It should also be noted that the project site is currently subject to regular fires (annual or biennial) typically conducted as part of cultural or traditional land management practices. The greenhouse gas (GHG) emissions from burning felled timber would not be dissimilar to the emissions from these fires. Clearing of vegetation within the project site will not occur at once, and will be staged progressively over the 13 year mine life of the project. Areas that have been cleared of vegetation ahead of mining are later rehabilitated when mining is complete. Vegetation in areas of mine rehabilitation will absorb carbon, in the same way that vegetation regenerating following a bushfire absorbs carbon.

Issue 7.7. Section 9.3.5 Cretaceous Sandstone

Water bores developed for communities which do not meet drinking water guidelines is a concern. Include information on how this is communicated and managed.

Section 9.3.5 of the Draft EIS, and Section 6.3 of the Draft EIS *Groundwater Report* (Appendix F) incorrectly attribute the installation of the groundwater bores at Yedikba and Wurrumenbumanja Outstations to the proponent.

7. DEPARTMENT OF MINES AND ENERGY

The history of the installation of these bores is provided below:

Bore at Yedikba Outstation

The installation of the groundwater bore at Yedikba was carried out at the request and expense of the Anindilyakwa Land Council (ALC) and Groote Eylandt and Bickerton Island Enterprises (GEBIE) in late 2011. GEBIE is an incorporated body funded by the ALC, which funds and manages a number of Aboriginal enterprises on the island.

The proponent's involvement in the installation and commissioning of the bore was limited to making a drill rig available to install the bore. The outstation bore was drilled by an external drilling company under the direction and management of GEBIE. The proponent has no record of the borehole logs, and the bore is not located on any of the proponent's tenements.

Bore at Wurrumenbumanja Outstation

The groundwater bore at Wurrumenbumanja Outstation is a registered bore (RN27979) which was installed in 1992 by the NT Government (the then NT Power and Water Authority). Information relating to this bore is available on the Department of Land Resource Management (DLRM) website (via NR Maps). The proponent does not sample this bore as part of its monitoring program. The ALC and DLRM are responsible for the maintenance of the bore at Wurrumenbumanja Outstation.

Issue 7.8. Section 10.4.2 Runoff from Areas Disturbed by Mining Activities

Sediment dams and traps must be of sufficient size to cope with high rainfall episodes to minimise release of sediment laden water before sufficient retention time. This would expected to be addressed in the Erosion and Sediment Control Plan.

Noted.

Section 10.4.2 of the Draft EIS notes that the details of sediment dams and traps, including the location and capacity, will be addressed during the preparation of an Erosion and Sediment Control Plan.

Issue 7.9. Section 10.6 Impact Assessment

Does the creation of post-mining landform similar to the pre-mining landform mean that the drainage lines within each catchment will attempt to be replicated i.e. re-create catchment flows.

As discussed in Section 10.3 of the Draft EIS, the project layout has been designed to avoid mining of the defined watercourses within the project site.

The proposed mining area is currently drained by overland flow and this is reflected in the final landform. Figures 10-6 to 10-10 of the Draft EIS show drainage arrangements during the life of the mine. Once mining has been completed, the rehabilitated landform will be free draining, with drainage reverting to overland flow. The final landform will not result in any significant change in the

7. DEPARTMENT OF MINES AND ENERGY

natural catchment boundaries between the Emerald River and Amagula River. The post-mining landform will therefore not significantly change catchment runoff or flows within the Emerald and Amagula Rivers.

The footprint of the final landform will be further refined during detailed design to ensure that natural drainage is re-established across the post mining landform, where practical.

8. DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES

Issue 8.1. The Draft EIS has been assessed by DPIF and there is no comment.

Noted.

9. NORTHERN TERRITORY POLICE, FIRE AND EMERGENCY SERVICES

Issue 9.1. The Northern Territory Police, Fire and Emergency Services have reviewed the draft EIS for the GEMCO Eastern Leases Project and notes that the project sits outside of Northern Territory Fire and Rescue Service Emergency Response Areas. We note that Groote Eylandt Mining Company has its own Emergency Response Team in place.

Noted.

Issue 9.2. Any provided accommodation however, must comply with the Fire and Emergency Act and Regulations Part 2A – Requirements relating to smoke alarms.

This requirement is noted. Please also note that no accommodation is required to be constructed as part of the project.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.1. Section 3.5.4 Manganese

The report indicates that Oolite product is present on the leases, this material should be considered an additional environmental risk due to its fine particle size and special management considerations should be given to its handling at all stages due to dust issues, runoff water contamination and transport difficulties through to shipping.

As noted in Section 3.5.4 of the Draft EIS, the orebody comprises pisolite and mangite units, and a relatively small proportion of loose manganese ore grains up to 2 mm in diameter (i.e. oolites). This is consistent with the geology at the existing GEMCO mine.

During the project life, run of mine ore will be handled and stored within operational mining areas. The handling, processing and shipping of ore at the existing GEMCO mine will be undertaken in accordance with the current approved practices.

The Draft EIS provides a comprehensive assessment of the potential environmental impacts associated with the ore and its known composition. This includes consideration of any ore grains or particles less than 2 mm in diameter (such as oolite). Any management measures in the Draft EIS that relate to ore therefore address any potential risks associated with the presence of oolite. No further impact assessment or specific management measures to address oolite are therefore required or justified. The remainder of this response provides an overview of information contained in the Draft EIS in relation to geochemistry, water management and dust management issues related to the ore.

Ore Geochemistry

As discussed in Section 3.3 of the Draft EIS *Geochemistry Report* (Appendix A), geochemical testing of the manganese ore was undertaken on mechanically pulverised samples comprising particles less than 0.075 mm in diameter. Using this testing method creates a significantly larger surface area in the sample than is present in the oolite material or other ore units. A larger surface area means that there is greater potential for dissolution and chemical reaction of the sample and potential contaminants within the sample. This means that the results of geochemical testing undertaken on the pulverised samples presented in the Draft EIS *Geochemistry Report* (Appendix A) are likely to be more conservative than those that would be generated by testing oolites or other ore units. The Draft EIS therefore represents a 'worst case' upon which to undertake the assessment of potential environmental impacts. Nevertheless, geochemical testing shows that the ore (including any oolites present) generates low acidity, low salinity runoff with low concentrations of major ions and metals.

Ore and Water Management

The proposed mine water management system has been designed to ensure that there is sufficient capacity to contain mine affected runoff with an extremely low likelihood of release. The mine water management system is based on water balance modelling which made use of more than 100 years of historical climate data.

The potential for entrained manganese sediments to be present in surface runoff has been assessed in Table 10-4 of the Draft EIS. Section 10.8.2 of the Draft EIS describes the erosion and sediment control plan that will be prepared to control sediment generated by the project. Attachment E of the

10. ANINDILYAKWA LAND COUNCIL

Supplement also includes specific design details relating to the management of any sediments present in haul road runoff.

Ore and Dust Management

The Draft EIS *Air Quality Report* (Appendix I) also provides a comprehensive assessment of the potential impacts associated with dust generated by the project. This assessment considers a range of particulate matter from PM₁₀ (particles less than 0.01 mm in diameter) to TSP (particles less than 0.05 mm in diameter) and coarse dust deposition as well as any particles containing manganese. This assessment therefore addresses any potential dust issues related to the handling of ore containing oolite-sized particles. Section 12.9 and Section 18 of the Draft EIS provide effective management measures for dust. No additional dust assessment or management measures are required in relation to oolite.

Issue 10.2. Section 3.7.5 Infrastructure and Utilities

Due to the pristine nature of this site it is vital that quarantine risks are kept to a minimum in all aspects of the project. All service areas need to be fully contained with restricted run off to the environment. Bulk fuels, oils or other hazardous materials should not be stored on this site. It needs to be remembered that the Owners of this country will inherit any post closure legacies from this mine.

As noted in Section 18.3.3 of the Draft EIS, the only significant hazardous material required for the project is diesel fuel. Diesel for the project will be stored at the fuel storage facilities located at the existing GEMCO mine, and any on-site storage of diesel within the Eastern Leases will be limited to small, portable containers. There will be no bulk storage of fuels, oils or other hazardous materials on the project site.

The proponent has refuelling procedures in place to prevent and control any spills that may occur during refuelling. In addition, the proponent will ensure spill cleanup kits are available on site and located at strategic and easily accessible locations, and that staff are adequately trained in the use of these emergency kits, should an accidental spill occur.

Issue 10.3. Section 3.7.8 Construction Activities

The proposed overpass of the Emerald River public road needs to be installed very early in the development of this site so as to avoid the risks to other road users from increased mine traffic in this area.

As noted in Sections 3.7.8 and 3.7.9 of the Draft EIS, the initial construction phase of the project (scheduled for Project Year 1 and the first half of Project Year 2) includes the construction of the haul road linking the project site to the existing GEMCO mine, of which, the overpass of the Emerald River Road is a component. It will be necessary for the proponent to construct the haul roads (and associated overpass) early in the development of the project to ensure that construction equipment and materials are able to be transported to the project site.

10. ANINDILYAKWA LAND COUNCIL

The Commitments Register has been updated to reflect this commitment (refer to Attachment A).

As noted in Section 3.9.6 of the Draft EIS, the proponent will consult with the East Arnhem Regional Council and the ALC in relation to the final design of the overpass.

Issue 10.4. Section 3.9.1 Road Network

It needs to be clarified that under the current terms of the Main GEMCO Leases (2006) GEMCO remains responsible for the maintenance of the Emerald River road from the Angurugu Community to the Emerald River road bridge.

The section of the Emerald River Road which extends from the outskirts of Angurugu Community (at the turnoff to the Cave Paintings) to the Emerald River Bridge is owned by the East Arnhem Regional Council. However, there are sections of this road which traverse through a number of the proponent's mineral leases. In accordance with Article 10.1(2) of the current Mining Agreement, the proponent has in the past carried out general maintenance of this road at the direct request of the ALC and/or the East Arnhem Regional Council (typically annually). The general standard of maintenance that is provided retains the road's suitability for 4WD access only.

The proponent intends to formally address the issue of maintenance of the Emerald River Road through the Mining Agreement that will be developed for the Eastern Leases Project.

Issue 10.5. Figure 3.2 Local setting

During our review we noted that several maps used in this report do not accurately show the southern tributary of the Emerald River (referred to in this report as Tributary 2), this tributary provides the main perennial flow to this river system commencing as ground water springs near the western boundary of the South Eastern Lease (ELR 28162), as such it is very important environmentally and culturally and should be included in all report maps.

Introduction

Based on recent discussions that have been held with the ALC, it is understood that this submission is referring to an area to the east of Emerald River – Tributary 2. This area is shown on Figure 2.

The submission indicates that this area provides the main perennial flow to the Emerald River, with the flow originating as groundwater springs. The submission also raises concerns about the accuracy of the watercourse mapping in the Draft EIS. These two issues are addressed separately below. Please note that the ALC's Issue 10.7 raises concerns in relation to the project's potential impacts on flows in the Emerald River and the response to Issue 10.7 therefore provides a full discussion of potential impacts on flows in the Emerald River.

Perennial Extent of Emerald River – Tributary 2

The submission indicates that the area shown in Figure 2 is perennial, fed by groundwater springs. This is contrary to the findings of the Draft EIS. The watercourse mapping provided in the Draft EIS

10. ANINDILYAKWA LAND COUNCIL

(Figure 10-4) distinguishes between sections of watercourses that are ephemeral (i.e. that only flow during and shortly after periods of rainfall) and perennial (i.e. watercourses that flow all year round). The Draft EIS distinguished between perennial and ephemeral reaches of the watercourses based on:

- Aerial photography;
- A detailed surface water and watercourse geomorphology field survey, undertaken in July 2014 (documented in Appendix H of the Draft EIS);
- Observations of watercourses made during the aquatic biology surveys, undertaken in May, June and October 2014; and
- Groundwater modelling (perennial sections of watercourses flow year round because of groundwater inflows).

Further information has been gathered since the preparation of the Draft EIS, including information gathered during the following site inspections:

- Observations made during monthly visits to watercourses as part of the water quality sampling program, initiated in January 2014, with the most recent monthly visit in January 2016;
- Site inspections of the area referred to in the submission in December 2015 and January 2016; and
- Monthly photo-point monitoring of waterholes along the Emerald River – Tributary 2, undertaken from June 2015 to January 2016.

As shown on Figure 2 and stated in the Draft EIS, the Emerald River – Tributary 2 becomes perennial about 2.6 km downstream of the area referred to in the submission. The area referred to in the submission is not perennial, as evidenced by a lack of flowing water throughout the dry season, and even a lack of flowing water in January 2016 despite significant rainfall in the preceding weeks and days (refer Photographs 4 to 6). There was over 300 mm of rainfall recorded (at the Groote Eylandt Airport Bureau of Meteorology weather station) in the month preceding the photographs, including 30 mm of rain on the day before the photographs were taken. The suggestion that this area provides perennial flow to the Emerald River, as a result of inflows from groundwater springs, is not therefore supported by field observations.

It should be noted that there are a number of waterholes along the Emerald River – Tributary 2 (shown in Figure 2) that persist into the dry season. Photographs of the waterholes and the areas upstream and downstream of the waterholes are shown in Photographs 7 to 12. The waterholes are located in low points in the creek bed that intersect the shallow lateritic aquifer. The waterholes therefore receive groundwater inflows, with water persisting in ponded areas well into the dry season when the directly adjacent reaches of Emerald River – Tributary 2 have dried out. However, as the water table in the shallow lateritic aquifer drops during the dry season, the water level in the waterholes also drops until the waterholes are small, remnant pools at the end of the dry season. Although the waterholes receive groundwater inflows, they do not provide perennial flow to the downstream reaches of Emerald River – Tributary 2.

Monitoring of the waterholes, undertaken on a monthly basis from June 2016 to January 2017, provides the following evidence that the waterholes do not provide perennial flow to downstream

10. ANINDILYAKWA LAND COUNCIL

reaches of Emerald River – Tributary 2 or the Emerald River:

- During the dry season, there is no flow of water between the waterholes or immediately downstream of them (Photograph 11); and
- The Emerald River continues to flow, even when the waterholes have largely dried up. This was the case in December 2015 when the waterholes were reduced to small pools (Photograph 8), but the perennial reaches of the Emerald River continued to flow.

The proponent acknowledges that the waterholes are considered to be sacred sites (under the *Northern Territory Aboriginal Sacred Sites Act 1989*) and the proponent is in separate discussions with the ALC in relation to the management of these sites. The waterholes are beyond the project disturbance footprint and are not proposed to be mined.

Accuracy of Watercourse Mapping in Draft EIS

Figure 10-4 of the Draft EIS maps the watercourses within the project site. This mapping was based on the data referred to in the previous section, along with a review of aerial photography and topographic LiDAR data. The submission indicates that the additional area shown in Figure 2 is a watercourse and should be mapped accordingly.

Defined watercourses typically develop some distance downstream of the catchment divide at a point where there is sufficient runoff from the upstream contributing catchment to form a distinct flow channel with defined beds and banks. Standard definitions of watercourses refer to typical characteristics including the presence of a defined channel, bed and banks. The area referred to in the submission is in the headwaters of the catchment, upstream of where a defined flow channel has developed. Field observations have confirmed that the area is a drainage line that conveys overland sheet flow, and that the area lacks a defined channel with bed and banks. The area supports vegetation such as pandanus, paperbarks, sedges, grasses and rushes, given that surface water collects in low points in the topography, creating wet, marshy areas. Photographs 4 to 6 show the area referred to in the submission, and clearly demonstrate that it lacks a defined channel, bed or banks. No amendments to the watercourse mapping in the Draft EIS are therefore required.

10. ANINDILYAKWA LAND COUNCIL

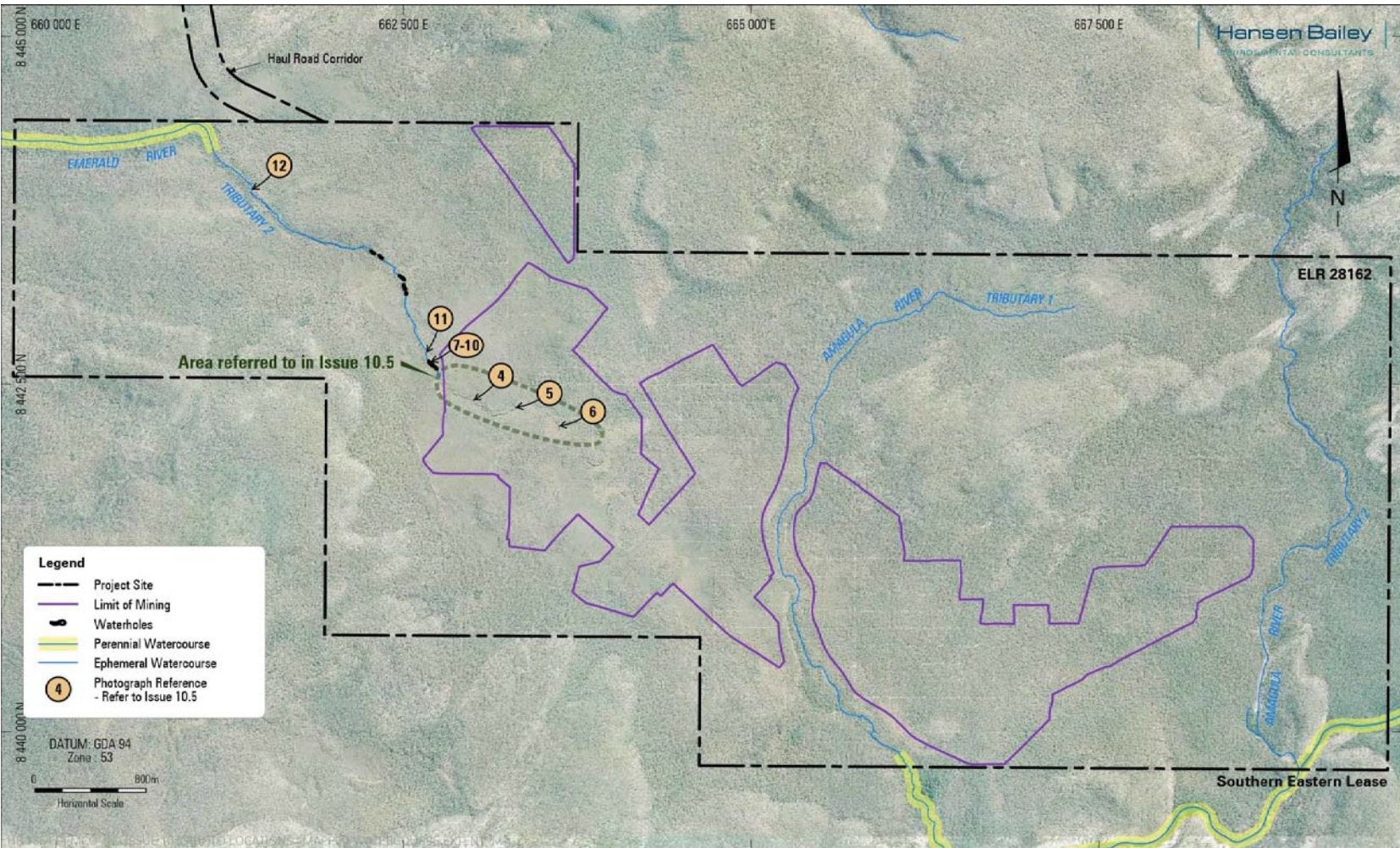


Figure 2 Location of Photographs relating to Issue 10.5

10. ANINDILYAKWA LAND COUNCIL



Photograph 4 View of Area Referred to in Issue 10.5
(Refer to Figure 2. Photograph taken 14 January 2016)



Photograph 5 View of Area Referred to in Issue 10.5
(Refer to Figure 2. Photograph taken 14 January 2016)

10. ANINDILYAKWA LAND COUNCIL



Photograph 6 View of Area Referred to in Issue 10.5
(Refer to Figure 2. Photograph taken 14 January 2016)

10. ANINDILYAKWA LAND COUNCIL



Photograph 7 View of waterhole within an ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken July 2015)



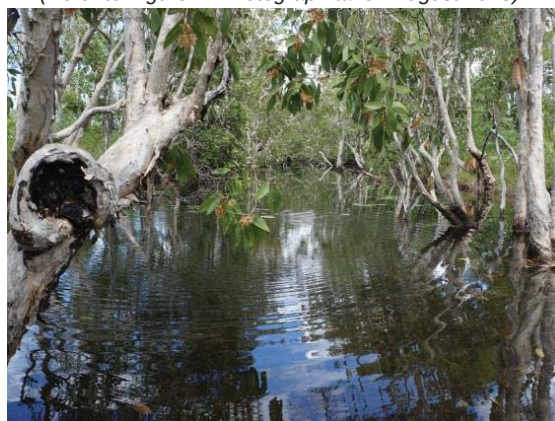
Photograph 8 View of waterhole within an ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken August 2015)



Photograph 9 View of waterhole within an ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken December 2015)



Photograph 10 View of waterhole within an ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken January 2016)



Photograph 11 View downstream of waterhole within an ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken July 2015)



Photograph 12 View of ephemeral reach of the Emerald River – Tributary 2

(Refer to Figure 2. Photograph taken June 2015)

10. ANINDILYAKWA LAND COUNCIL

Issue 10.6. Section 4.3 Environmental Risk Assessment

The ALC believes more can be done to ensure Cane Toads are kept off Groote Eylandt, current plans maintained by GEMCO lack a functional contingency plan for a toad outbreak and firm commitments around the proposed Quarantine Officer positions for Groote and Darwin and purchase of a replacement toad detection dog are yet to be made by GEMCO. As such any increase in disturbance or infrastructure expansion from this project potentially increases the risk of toads entering and establishing on Groote Eylandt.

The proponent acknowledges the serious threat that the Cane Toad poses to the unique biodiversity values of Groote Eylandt. In response to this submission, Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected. In addition, the *Revised Biodiversity Offsets Strategy*, provided in Attachment B, indicates that biodiversity offsets are proposed to be secured through providing funding toward the implementation of the Northern Territory Government's Threatened Species Management Plan. Quarantine measures for Cane Toads are proposed to be a key component of this plan.

Separate to the EIS process, and as part of its current operations on Groote Eylandt, the proponent is currently in discussions with the ALC regarding arrangements for the proposed quarantine officer positions and replacement Cane Toad detection dog.

Issue 10.7. Table 4.5 Ground Water

The ALC remains concerned that dewatering and construction of mining pits may result in decreased flows to the Emerald River. The upper aquifer hydrology maybe be severely disrupted or altered by the mining process resulting in reduced groundwater flows. The mixing of Aquifer Laterite material and Lateritic Clay Aquitard during overburden replacement may have an unpredictable outcome for the aquifer recovery and hence adversely impact on existing vegetation and ecosystem function.

Introduction

Following the receipt of this submission, the proponent met with the ALC to discuss this issue further, and to provide a full overview of the groundwater regime, groundwater recovery and predicted impacts of groundwater drawdown on watercourses and ecosystem function. A detailed PowerPoint presentation was provided, which addressed these issues. In addition, a report has been prepared by Australasian Groundwater and Environmental Consultants to provide data from the existing GEMCO mine in relation to groundwater recovery post-mining. This report is provided in Attachment C.

Issue 10.7 from the ALC's submission raises a number of separate issues, including:

- The potential impact of groundwater drawdown on flows in the Emerald River. A response to this issue has been provided below, based on the predictions contained in the Draft EIS;
- Concerns about the effect of mixing the various geological layers that comprise the overburden,

10. ANINDILYAKWA LAND COUNCIL

and the effect that this will have on groundwater recovery. The ALC raised this issue in more detail in Issue 10.20 – please refer to this issue for a response.

- Concerns about whether groundwater will recover, as predicted in the EIS. The proponent has undertaken field investigations at the existing GEMCO mine to provide data to support predictions in relation to groundwater recovery. This work is presented in Attachment C and summarised below.
- Potential impacts of groundwater drawdown on ecosystems that make use of groundwater. The ALC raised this issue in more detail in Issue 10.20 – please refer to this issue for a response.

Potential for Decreased Flows to the Emerald River

Figure 10-4 in the Draft EIS shows the watercourses within the project site and surrounding area. The figure distinguishes between watercourses that flow perennially and those that flow ephemeral. As detailed in the response to Issue 10.5, the mapped extent of perennial and ephemeral sections is based on field surveys, supported by groundwater modelling. All watercourses receive surface water flows during the wet season, but the perennial watercourses also receive groundwater flows that enable them to continue flowing during the dry season.

The Emerald River is ephemeral within the project site and becomes perennial downstream of the project site. The majority of the tributaries of the Emerald River are also ephemeral, although a section of the Emerald River – Tributary 2 is perennial within the project site.

The groundwater model prepared for the Draft EIS predicts the maximum extent of groundwater drawdown as a result of the project. Figure 3 shows the predicted drawdown in the shallow lateritic aquifer (the deeper Cretaceous sandstone aquifer is not predicted to be affected by the project) relative to the perennial and ephemeral reaches of the watercourses. It is important to note that this figure shows the total maximum extent of drawdown that will be experienced over the life of the project, and not all of this drawdown will be experienced at a single point in time. As shown in Figure 3, groundwater drawdown as a result of mining is not predicted to extend to the perennial reaches of the Emerald River. Although groundwater drawdown is predicted to extent to the ephemeral reaches of the Emerald River and its tributaries, this drawdown is not predicted to impact flows, given that flow in the ephemeral reaches of the watercourse is dependent on surface water, rather than groundwater.

In summary, the project is not predicted to give rise to any impacts on flows in the Emerald River.

Groundwater Recovery

The Draft EIS includes the results of numerical groundwater modelling, which makes use of data obtained from groundwater monitoring bores, as well as extensive geological information gathered during the proponent's ongoing exploration drilling program. As explained in Section 9 of the Draft EIS, mining in the project site is predicted to lead to drawdown of groundwater levels around active quarries, but the groundwater model predicts rapid recovery of groundwater following mining. Once mining has been completed in a quarry, active quarry dewatering will cease and groundwater table recovery will commence. The groundwater model predicts that around each quarry, 80% of the drawdown is predicted to recover within five years of mining. Almost total recovery of groundwater levels (i.e. to pre-mining levels) is expected to be achieved within 20 years of the completion of mining.

10. ANINDILYAKWA LAND COUNCIL

In response to this submission, which expresses concerns about groundwater recovery, a report has been prepared by the EIS groundwater consultant (Australasian Groundwater and Environmental Consultants) to provide data from the existing GEMCO mine to demonstrate groundwater recovery post-mining. The report is presented in Attachment C of the Supplement. Data from the existing GEMCO mine has been used because the hydrogeology at the existing mine and the project site are directly comparable. The behaviour and response of the groundwater system at the existing mine can therefore be used to inform predictions of likely changes to the groundwater regime that may result from project activities. The report addresses the following two issues:

- The post-mining effects on groundwater levels in the vicinity of mined area; and
- The re-establishment of a groundwater table in backfilled quarries.

Post-mining effects on groundwater levels in the vicinity of mined areas have been assessed using detailed groundwater monitoring data collected at the existing GEMCO mine. Monitoring data was obtained from bores located less than 1 km from mined areas, and showed no significant residual effects on groundwater levels. The re-establishment of a groundwater table in backfilled areas has been assessed through establishing a groundwater monitoring bore at the existing GEMCO mine within a quarry that has been mined, backfilled and rehabilitated. Monitoring of this bore has confirmed that, within 10 years of mining, groundwater levels in backfilled overburden have recovered to pre-mining levels.

In addition, as detailed in Section 9.5 of the Draft EIS, the proponent has established a baseline groundwater monitoring program to record groundwater levels at the Eastern Leases. Data loggers on each of the bores record the level of the groundwater every 6 hours, which is further validated during monthly field surveys of the bores. This monitoring program has been in place since January 2013. The proponent has committed to continuing to monitor groundwater levels over the life of the mine and this monitoring program will provide data on groundwater recovery post-mining.

10. ANINDILYAKWA LAND COUNCIL

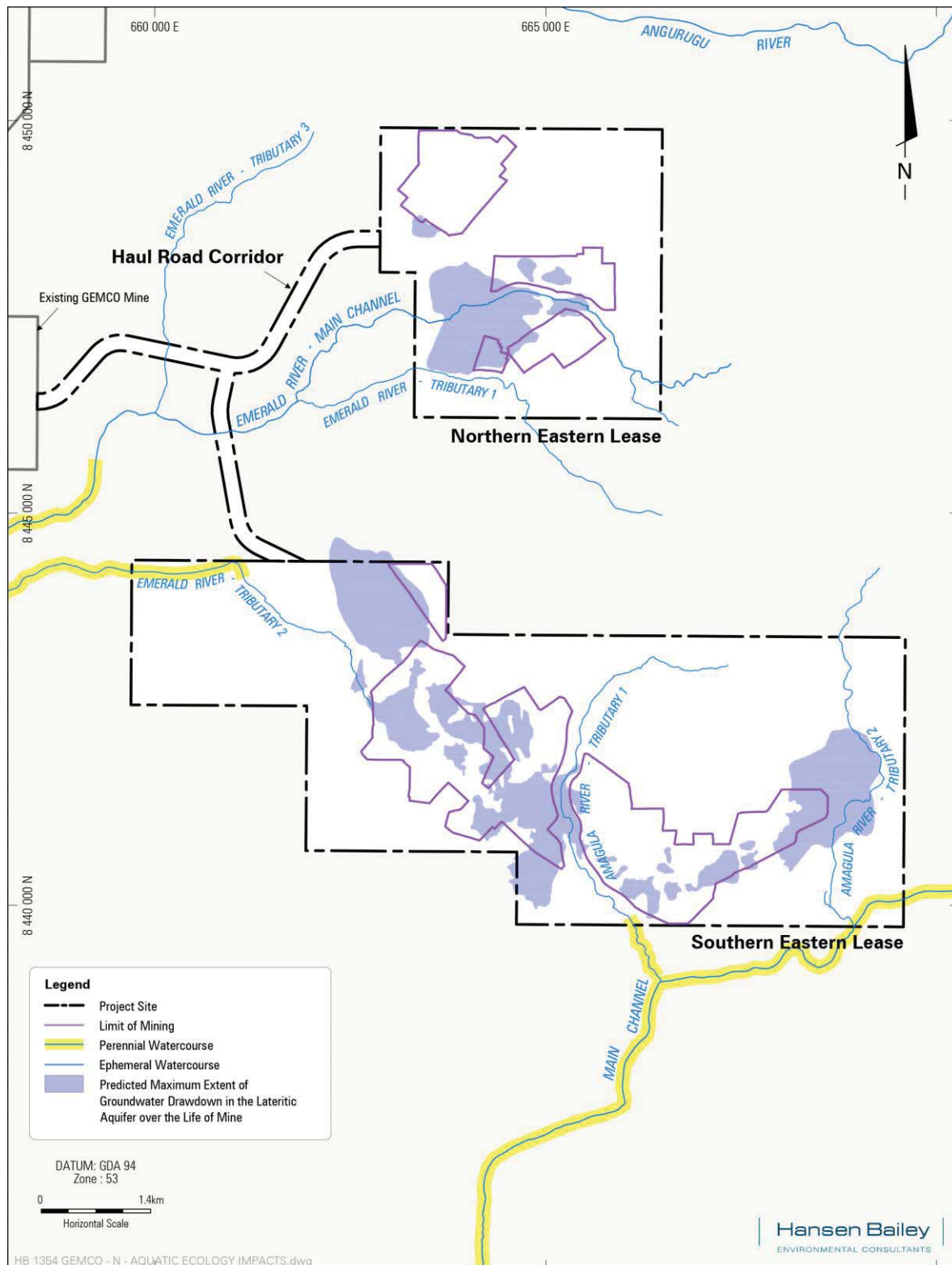


Figure 3 Predicted Maximum Extent of Groundwater Drawdown in the Lateritic Aquifer over the Life of the Mine

10. ANINDILYAKWA LAND COUNCIL

Issue 10.8. Section 5 Consultation

The level of consultation within the community was comprehensive and generally well executed by the proponent. While there will always be some community members missed for various reasons in this process we believe most people were happy with the consultation undertaken.

Noted.

Issue 10.9. Section 6.3.3 Overburden Geochemistry

It is reassuring that the proponent has found that smectite clays located within the site are non dispersive. It is requested that if this is found to be not correct for all material across the project that management systems would be put in place to prevent broader contamination of waters on the site and that this material will not be utilised for use in any drainage related works. It is also appreciated that GEMCO are putting in place procedures for the management of any PAF material found on the site.

As stated in Section 6.3.3 of the Draft EIS, dispersive clay minerals (e.g. smectite or kaolinite clay minerals) were not identified within the project site and are not expected to present significant materials handling issues. As noted in the Draft EIS, in the event that dispersive materials are encountered during earthworks, these materials will be managed by selectively handling and placing materials as backfill within the final void, thereby minimising the potential for erosion and water quality impacts.

Issue 10.10. Section 6.3.4 Rehabilitation Methods

Currently the proponents pre mining clearing requires the burning of all cleared vegetation and the ALC believes this is not best practice and requests that this material placed into Rehabilitation areas as refuges or habitat to allow the more rapid recolonisation by fauna or as wood chips to improve organic matter content of the depleted soils and hence the quality of rehabilitation outcomes. In recent times the ALC and other community groups have also requested access to valuable timber from this clearing for local milling projects. The greenhouse gases created by the current disposal of this vegetation are we believe poor practice, excessive and unacceptable in this era.

In response to this, and other submissions on the Draft EIS, the proponent will undertake a systematic trial at the existing GEMCO mine in relation to the use of salvaged timber in rehabilitation areas. The results of the trial will inform the approach adopted for the project with respect to felled timber. Further detail is provided in Section 4.3.1 of the Supplement. In addition, the proponent would be open to a proposal (and supporting business plan) from the ALC in relation to harvesting timber for a milling project. The ALC's proposed activities would need to comply with health and safety standards (both legislative requirements and the proponent's internal policies and standards), and would need to be undertaken in a manner that does not impact mining operations.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.11. It is important that the proponent balances out any shortfalls or deficiencies in overburden material requirements for post mining surfaces as any unnatural mounding or depressions will be unacceptable to the Traditional Owners at closure.

Mine planning has been undertaken with the aim of ensuring that there will not be any unnatural mounding or depressions that are unacceptable to the Traditional Owners. The mine planning process took into account the volume of ore to be removed, final void capacities, and the swell factor of the overburden.

Section 3.7.6 of the Draft EIS explains that project landform design will ensure that all quarries will be backfilled with overburden, creating a free draining landform that broadly replicates the pre-mining topography. Section 6.3.4 of the Draft EIS does, however, note that in some instances there may be a small deficit of overburden / backfill material. For example, in the Southern Eastern Lease (EL) there is predicted to be a deficit in the amount of overburden available for backfilling quarries, leading to a slight depression in the backfilled quarries relative to the pre-mining topography. In these areas the landform will be designed to be free draining, ensuring that water does not pond in the final landform. The grades in these areas will be sufficient to allow free drainage, but gentle enough to prevent erosion.

Issue 10.12. Section 7.2 Overview of Project Sites

Throughout the report there is mention of the frequency of burning in the project area by Traditional Owners inferring that it is burnt annually. Prior to extensive exploration being undertaken in this area in the past 6 years this was not the case as can be seen further to the east of the leases where very few fires occur. The increased interest in this area and the need for Traditional Owners to visit the area for mining related meetings has meant increased burning in recent years, some of these fires have been in the late dry season resulting in a more severe impacts.

This point in relation to the fire regime in recent years is noted. Section 7.7.2 of the Draft EIS indicates that during the life of the project, the proponent intends working with the Traditional Owners (via the ALC) in relation to fire management in the project site. The proponent intends to develop and implement a fire management regime that will optimise biodiversity values, whilst ensuring that risks to human safety and property are managed.

Issue 10.13. Section 7.3.1 and 7.7.3 Offset Strategy

The ALC is supportive of Offsets to conduct research on Feral Cats controls and on the ecological requirements of the Northern Hopping Mouse to enable better management through gaining a better understanding of the habitat requirements, threats and dietary needs. The ALC would also like to see further research on the Masked Owl around its population status and requirements for territory and nesting locations.

10. ANINDILYAKWA LAND COUNCIL

The Biodiversity Offsets Strategy has been further developed and revised since the Draft EIS was published. As noted in Section 3 of the Supplement, the proponent has met with the ALC and ALC Rangers on several occasions specifically to discuss biodiversity offsets. These meetings have helped to shape the *Revised Biodiversity Offsets Strategy*. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the revised strategy is provided in Attachment B.

Biodiversity offsets are proposed to be delivered through providing funding towards the implementation of the Threatened Species Management Plan, which is being developed by the Department of Land Resource Management (DLRM). The Threatened Species Management Plan will be developed collaboratively with key stakeholders including the ALC and ALC Rangers. Offsets are likely to continue to have a strong focus on feral cats, but will also address other conservation priorities for threatened species on Groote Eylandt, including the Masked Owl (northern). The *Revised Biodiversity Offsets Strategy* explains that a proportion of offsets funding may also be used for research (such as that described in this submission).

It is, however, noted that the Federal Government's EPBC Act Environmental Offsets Policy places limitations on the extent to which research programs can form part of a biodiversity offsets package.

Issue 10.14. The ALC is less supportive around mine site rehabilitation research for the return of the Northern Hopping Mouse and Rabbit Rat as we believe these funds would better placed into protecting remaining populations in other areas not impacted by mining. We believe the requirements around reinstating the substrate required for Northern Hopping Mouse return post mining are unlikely to be met under current mining practices.

As noted in the response to Issue 10.13, the Biodiversity Offsets Strategy has been revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the revised strategy is provided in Attachment B. The revised strategy focuses on direct action, with offsets to be delivered through providing funding toward the implementation of the Threatened Species Management Plan. Focus areas will likely include feral cat control, Cane Toad quarantine, weed management and maintenance of benign fire regimes.

Issue 10.15. Although little is known about the Rabbit Rat on Groote Eylandt and any research is welcome, we believe any research on the ecology of this species would be better centred on the Coburg region where this species is reported to be more abundant.

As noted in the response to Issue 10.13 and Issue 10.14, the Biodiversity Offsets Strategy has been revised since the Draft EIS was published. The revised strategy focuses on direct action, rather than research. The research into the Brush-tailed Rabbit-rat that was proposed in the Biodiversity Offsets Strategy contained in the Draft EIS is now proposed to be undertaken by the Department of Land Resource Management as part of its Groote Eylandt Biodiversity initiative. Section 4.3.4 and Attachment B of the Supplement provide further information.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.16. The Anindilyakwa Land & Sea Ranger group are also very interested in being involved in any research being conducted on Groote as part of these offsets.

Noted. As stated in the *Revised Biodiversity Offsets Strategy* (Attachment B), the proponent views the ALC and ALC Land & Sea Rangers as being key partners in the development and delivery of biodiversity offsets.

Issue 10.17. Section 7.3 Northern Hopping Mouse

Due to the selective nature of this species particularly in relation to substrates it would have been useful to identify what areas of the site are suited to this species. It would appear that no additional areas have been put aside in this project for fauna conservation in particular the critically endangered Northern Hopping Mouse.

The Draft EIS has taken the conservative approach of assuming that the entire disturbance footprint provides habitat for the Northern Hopping-mouse. Offsets will be provided for the full extent of clearing. This decision was made because of a lack of certainty in relation defining habitat, and the fact that there is no clear delineation between areas of sandy soil (which are understood to be highly suitable for the species) and those that are less suitable. Delineating specific areas as being suitable for the species (and other areas as less suitable or unsuitable) would have reduced the area of impact. This did not appear to be justified, given the level of knowledge of this species.

Please note that the conservation status of the Northern Hopping-mouse is Vulnerable (under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the NT *Territory Parks and Wildlife Conservation Act*), and not Critically Endangered.

Issue 10.18. Section 7.6.3 Edge Affects

Prior to this study being released the ALC had already identified areas of cultural and environmental importance to the owners of this country and we will be continuing to talk with the proponent to ensure the proper protection of these areas through adequate buffering. In some areas this protection extends beyond that indicated by GEMCO through this report and takes into account potential edge affects.

A separate process is currently underway to confirm the location and management measures for sacred sites and other areas of significance to the ALC and Traditional Owners. The proponent will continue discussions with the ALC in this regard. It is noted that the project cannot proceed until a Mining Agreement has been reached between the proponent and the ALC under the Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA). In addition, sacred sites are protected under the *Northern Territory Sacred Sites Act 1989*, and an Authority Certificate will be obtained under this Act. This will ensure that there is no unauthorised disturbance to sacred sites.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.19. Section 7.6.3 Erosion and Sedimentation

The ALC remains concerned at the risks of erosion and increased sediment running to the Emerald and Amagula Rivers. Such sediment would impact on water quality and aquatic habitats. Much of the stratum in these leases is vulnerable to erosion and large areas are planned to be disturbed in a high rainfall area potentially increasing the risk of unplanned releases. The proposed Erosion and Sediment Control Plan to be developed by GEMCO will be a key document to avoiding future issues in this area.

Noted. Sections 10.3, 10.4 and 10.5 of the Draft EIS discuss the mine planning and water management strategies that have been put in place to minimise risks associated with erosion and sedimentation.

The mine plan has been designed to avoid any significant disturbance of the key watercourses, and diversion drains will be installed to isolate the contained catchments of the quarries and to divert runoff from undisturbed areas through the mining areas. The project's water management system has been designed with sufficient capacity to ensure that no routine discharge of mine-affected water will be required. Additionally, key water management strategies include collecting sediment-affected water and directing it through sediment control structures to limit downstream sedimentation.

As discussed detail in Section 19.4.6 of the Draft EIS, these issues will be managed in accordance with the Water Management Plan and the Erosion and Sediment Control Plan that will be developed for the project. Further detail on the Erosion and Sediment Control Plan has been developed as part of the preparation of the Supplement and is provided in Section 4.3.8 of the Supplement.

Issue 10.20. Section 7.6.4 Impacts on Vegetation Communities - Groundwater Dependent Communities

The ALC remains concerned that the shallow groundwater aquifer will not adequately return to these areas in the short term post mining. The removal of the shallow aquifer during mining and the placement of this overburden material post mining will result in sediment realignment and this may see the aquifer reform at the new basement level (potentially the pit floor) resulting in a significant vegetation decline due to a change in available groundwater during the dry season.

Groundwater Recovery and Sediment Realignment

Please refer to the response to Issue 10.7 for further information in relation to groundwater recovery post-mining.

The submission also raises concerns about "sediment realignment". It is understood, from meetings with the ALC, that this issue relates to concerns about the fact that the various geological layers that comprise the overburden will be mixed when the quarries are backfilled, rather than being returned in distinct layers. The submitter is concerned that this mixing of material may prevent an aquifer reforming or may mean that the aquifer forms at a different level.

10. ANINDILYAKWA LAND COUNCIL

Mining will involve the excavation, handling, storage and replacement of overburden materials. The excavated overburden will comprise surface sediments including the laterite (which hosts the shallow aquifer) and underlying low permeability lateritic clay. These sediments will be fragmented and extensively mixed during the handling and replacement of overburden. As a result of the fragmenting and mixing of materials, the overburden within the backfilled pits will exhibit a higher porosity (i.e. proportion of open spaces) than the natural in-situ sediments. Post mining, groundwater inflows to this material will infiltrate these spaces resulting in recovery of groundwater. The proposed mining activities do not provide a mechanism by which groundwater recovery is likely to be suppressed at the pit floor.

In response to this, and other submissions from the ALC raising concerns about groundwater recovery, data has been obtained from the existing GEMCO mine to confirm groundwater recovery in backfilled areas. As detailed in the response to Issue 10.7, the re-establishment of a groundwater table in backfilled areas has been assessed through establishing a groundwater monitoring bore at the existing GEMCO mine within a quarry that has been mined, backfilled and rehabilitated. Monitoring of this bore has confirmed that, within 10 years of mining, groundwater levels in backfilled overburden have recovered to pre-mining levels. Further detail on this work is provided in Attachment C.

Potential Impacts on Vegetation Due to Groundwater Drawdown

The Draft EIS does not predict any significant impacts on vegetation communities due to groundwater drawdown. Vegetation communities that make use of groundwater are adapted to distinct seasonal variations in groundwater availability. Groundwater drawdown due to mining would not be dissimilar to natural variations in groundwater levels. The groundwater model predicts rapid recovery of groundwater post-mining (Section 9.4.3 of the Draft EIS notes that 80% of the drawdown is predicted to recover within five years of mining). As noted in the response to Issue 10.7, data has been collected from the existing GEMCO mine to confirm groundwater recovery post-mining. This data is provided in Attachment C.

As detailed in the response to Issue 10.7, the proponent will continue to monitor groundwater levels over the life of the project. In addition to this existing commitment contained in the Draft EIS, the proponent will develop and implement a program to monitor the condition of vegetation that may be impacted by changes in groundwater levels. The Draft EIS has not predicted any impacts on vegetation as a result of groundwater depressurisation, and the purpose of the monitoring program will be to gather data to confirm that there are no changes to the vegetation characteristics resulting from changes to groundwater levels due to the project. Section 4.3.7 of the Supplement describes the proposed monitoring program. The monitoring program will make use of aerial photograph interpretation and the establishment of permanent vegetation monitoring plots. Data from the vegetation monitoring program will be reviewed against groundwater monitoring data collected as part of the groundwater monitoring program. This will allow any changes in the extent and/or condition of vegetation to be assessed in relation to groundwater levels, and will allow any impacts to be detected. As noted in Section 4.3.7 of the Supplement, in the unlikely event of any impacts on vegetation communities being identified, suitable adaptive management measures will be developed and implemented.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.21. Section 7.6.6 Impacts to Threatened Fauna Species

There is currently little known about the populations of the Masked Owl on Groote with most surveys occurring on GEMCO leases or adjacent areas. The major impact on this species is the potential removal of roosting and nesting trees. It is expected that suitable trees with large hollows would be in excess of 100 years old and such trees are uncommon on Groote. Obviously the planting of rehabilitation is going to take some time to rectify this deficit; the ALC believes offsets should be made available for this species so more can be done to research their current status and protection requirements.

As noted in the response to Issue 10.13, the Biodiversity Offsets Strategy has been revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the revised strategy is provided in Attachment B. The *Revised Biodiversity Offsets Strategy* has been expanded to include offsets for the Masked Owl (northern).

Issue 10.22. As previously mentioned the ALC believes the edge effects in mining areas are greater than other disturbance areas due to the ongoing pattern of clearing attracting increased predator activity placing greater pressure on threatened species departing the clearing area and adjacent uncleared or buffer areas. This needs to be considered in determining the appropriate size of buffer areas and the perceived benefits of young rehabilitation areas surrounded by active mining with limited refuge sites. We believe that it is unlikely that any threatened species will move into back rehabilitated areas of the site other than for opportune foraging while active mining is occurring.

The potential for edge effects to extend beyond the direct clearing footprint is acknowledged. The disturbance footprint quoted throughout the Draft EIS is the clearing footprint associated with open cut mining operations, plus a 25 m buffer to account for edge effects, including altered predator interactions. Rehabilitating mined areas with native vegetation will be the most effective measure to ensure that impacts (including edge effects) are short-term and do not give rise to significant residual impacts.

The four threatened species listed under the EPBC Act that occur on the project site are the:

- Northern Hopping-mouse;
- Brush-tailed Rabbit-rat;
- Northern Quoll; and
- Masked Owl (northern).

The Draft EIS acknowledged that it was uncertain whether the Northern Hopping-mouse or Brush-tailed Rabbit-rat would make use of mine rehabilitation and biodiversity offsets are being provided for potential impacts on these species.

10. ANINDILYAKWA LAND COUNCIL

The proponent is confident that, in the long term, the vegetation established within mine rehabilitation will provide habitat for the Northern Quoll and Masked Owl (northern) and that there will not be a permanent loss of resources for these species or a significant impact on them. As noted in the Draft EIS, the Northern Quoll has been recorded in mine rehabilitation. The Biodiversity Offsets Strategy has, however, been revised to include offsets for the Northern Quoll and Masked Owl (northern), in addition to the Northern Hopping-mouse and Brush-tailed Rabbit-rat. This revision was made as a precautionary measure given that there is currently no long term monitoring data available to confirm that mine rehabilitation provides habitat for these species. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B. The revisions to the Biodiversity Offsets Strategy ensure that offsets are being provided for all of the EPBC Act listed threatened species that occur within the project site.

Issue 10.23. Figure 7.2 Terrestrial Fauna Survey Sites

It appears from the report map provided that the fauna survey sites were quite limited in number and most monitoring sites appear to be in areas other than where mining is proposed. It is unclear to the ALC why the survey was designed in this manner as it limits our knowledge of species living within the mining footprint that will be lost or displaced? The ALC requests that further fauna surveys are conducted within the footprint of the proposed mining area so as a full understanding of the species most affected and displaced can be made.

Fauna surveys completed for the terrestrial ecology report were conducted in accordance with the *Environmental Assessment Guidelines for the Northern Territory: Terrestrial Fauna Survey* (NT Fauna Survey Guidelines) (NRETAS, 2011), and the Terms of Reference for the EIS. The NT Fauna Survey Guidelines advise that fauna surveys should be stratified, such as to sample each of the vegetation types present in the area. The guidelines also provide an indicative sampling intensity of fauna survey based on project area (area of vegetation to be cleared or otherwise modified). These guidelines note that 16-32 sites are advised within a disturbance area of 1,000-10,000 ha. A total of 18 fauna trapping sites were surveyed within the project site in the various vegetation types. Any survey sites that did not fall directly within the project disturbance footprint are considered to be contiguous with, and analogous to, the habitats within the project disturbance footprint. It is important to assess not only the areas within the disturbance footprint, but also those outside to ensure that the impact assessment is able to fully consider both potential direct and indirect impacts to all flora and fauna within the project site.

Additional survey data was gathered from a network of infrared cameras (IR Cameras) located throughout the project site. These cameras were left recording (and baited weekly) for 15 weeks between the May 2014 and October 2014 survey periods.

In addition, as noted in Sections 3.1.2 and 3.7 of the Draft EIS *Terrestrial Ecology Report* (Appendix C), the fauna impact assessment undertaken for the project also incorporated the findings of numerous other flora and fauna surveys conducted over the years, within or nearby to the project site. The other surveys were undertaken in areas with the same or very similar habitats to the Eastern Leases, and were therefore considered to supplement the existing knowledge of fauna and habitats within the project site and surrounds. The results gained from the 2014 fauna surveys by Cumberland Ecology as part of the EIS provided fauna data that was consistent with, and very similar

10. ANINDILYAKWA LAND COUNCIL

to, data collected in the same habitats beyond the project site during the baseline surveys by URS in 2012. This indicated that the baseline data from the nearby URS (2012) study area was relevant to, and could be used for impact assessment within the project site.

The spatial design of the ecology surveys was therefore sufficient, within the timeframe of an EIS, to identify the various species that may be present within the Eastern Leases, and also to assess the habitat requirements of those species.

Issue 10.24. Section 8.6.3 and 10.4.2 Aquatic Ecology - Impact Assessment – Water Courses

The installing of low flow drainage culverts suited to a 2 year average flood flow and allowing larger flood events to flow over the culvert and earthen haul road will ultimately create issues of water quality and sedimentation of the Emerald and Amagula rivers which as per the Traditional Owners wishes needs to be avoided. The ALC requests that this proposal is reviewed and that culverts able to cater for greater flows during intense rain events should be considered. The proposed sediment traps are unlikely to be very effective in such events unless they have a large capacity to enable sediments to settle out prior to release.

The proponent notes the concerns raised in relation to the proposed haul road crossings and acknowledges that, although the Draft EIS described the proposed haul road crossings, it did not provide a detailed description of the specific design, operation and management of the haul road crossings. In response to this submission, a *Haul Road Crossing Design Overview Report* (Attachment E of the Supplement) has been prepared to provide further information on the proposed haul road crossings. This report provides additional information on the haul road crossing designs, assessment of the impacts of the haul road crossings and a description of the monitoring and management measures to be implemented for the haul road crossings.

The *Haul Road Crossing Design Overview Report* provides clarification of the design and management principles for the crossings. The principles described in the *Haul Road Crossing Design Overview Report* are intended to ensure that haul road crossings do not give rise to significant adverse erosion, sediment or water quality impacts on watercourses across a range of rainfall events up to, and greater than, the 1 in 2 year (50% AEP) flow rate of the culverts.

Issue 10.25. Section 9.3.1 Groundwater - Laterite

As stated in the report this layer contains the shallow aquifer so important for existing vegetation health and it is confined at the lower levels by the Lateritic Clay Aquitard. Both these layers are to be removed in the proposed mining areas disrupting the aquifer flow for the period of the project. More importantly is that the shallow aquifer in these mining affected areas will be disrupted for some undefined period post mining and it may reform at a different level in the soil profile due to realignment of the sediments and the former aquitard being removed.

10. ANINDILYAKWA LAND COUNCIL

Please refer to the response to Issue 10.20 which describes the mining of shallow overburden sediments (including the laterite aquifer and low permeability lateritic clay) and demonstrates the post mining recovery of groundwater levels.

The predicted timeframe of post mining groundwater level recovery is assessed in Section 8.5.1 of the Draft EIS *Groundwater Report* (Appendix F).

The groundwater information presented in Attachment C of the Supplement provides further supporting evidence for the post mining recovery of groundwater levels in the overburden and shallow sediments.

Issue 10.26. Section 9.3.4 Marine Claystone

This report indicates that the upper layer of the Marine Claystone contains most of the manganese ore for mining. This layer also acts as an aquitard for the contained lower (major) aquifer. The ALC wishes to know if disruption to this aquitard poses a significant risk to the Emerald River flows if this layer is fractured by drilling or blasting operations and the resulting aquifer flow needs to be dewatered from the mining pits? The report also states this water is unsuitable for drinking - does it pose any risk to the environment in relation to heavy metals? Will disruption to the aquifers potentially result in depressurisation of the groundwater systems in areas of the site post mining and hence base flows of the water courses?

Disruption of the Aquitard

As discussed in Section 9.3.4 of the Draft EIS, the shallow laterite aquifer and the deeper sandstone aquifer are separated by lower permeability lateritic clay and marine claystone aquitards. The marine claystone is up to 30 m thick within the project site and the upper profile hosts the manganese ore. Quarries will be excavated through the lateritic clay and ore. The marine claystone will not be excavated, given that it lies beneath the ore. Drilling and blasting below the ore (i.e. into the marine claystone) is not proposed as part of the project. Blasting will be designed to specifically target the ore body, with minimal disruption to the underlying marine claystone. The marine claystone is predicted to continue to function as an aquitard during and post-mining.

In response to the broader issue raised in the submission regarding groundwater/surface water interactions and the effect that depressurisation of the aquifer will have on surface water flows, please refer to the response to Issue 10.7.

Water Quality

As discussed in Section 9 of the Draft EIS, baseline groundwater quality is non-saline and contains low levels of metals that are leached from the natural geology. The Draft EIS *Geochemistry Report* (Appendix A) characterised overburden seepage as non-saline and typically low in metals, with the exception of naturally occurring manganese. Groundwater that accumulates in backfilled quarries will therefore be comparable to existing natural groundwater quality and is not expected to result in any significant adverse impacts to surrounding groundwater or watercourse flows that receive groundwater baseflow.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.27. Section 9.4.5 Impact on Water Courses

With the Groundwater models predicting groundwater draw downs in the South Eastern lease up to 1 kilometre from the abstraction area this raises concerns within the ALC on the possible impacts on culturally and environmentally important springs and the major recharge of perennial flows in the upper reaches of the Emerald River located on the western boundary of the lease particularly during the dry season. This risk highlights the need for appropriate buffering in this area to minimise this risk. A reduction in perennial flow within either river system as a result of this project would be seen as a significant event by the Land Council.

Please refer to the response to Issue 10.7 in relation to groundwater baseflow and surface water interactions, which explains that no impacts on perennial flows within the Emerald River are predicted.

The proponent is aware of culturally significant waterholes within the western part of the Southern Eastern Lease. The proponent is currently working with the ALC, as part of a separate process, to develop suitable management measures (including buffers) for sacred sites and other areas that are of significance to the ALC and Traditional Owners. The proponent will continue discussions with the ALC in this regard. It is noted that the project cannot proceed until a Mining Agreement has been reached between the proponent and the ALC under the Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA). In addition, sacred sites are protected under the *Northern Territory Sacred Sites Act 1989*, and an Authority Certificate will be obtained under this Act. This will ensure that there is no unauthorised disturbance to sacred sites.

Issue 10.28. Section 9.4.6 Impact on Groundwater Dependent Ecosystems

With the predicted aquifer disruption, groundwater depressurisation and some areas significant groundwater drawdown it would be expected that it may take up to 30 years from the commencement of the project for most areas to return to some state of stability. This being the case the ALC questions if significant die back of mature vegetation is likely to occur in some areas – particularly in riparian areas?

As discussed in Section 3 and Section 9 of the Draft EIS, the mining sequence and mine plan will dictate the extent of groundwater depressurisation at each stage of the mine development. The project involves the staged development of numerous quarries. The mine schedule will result in some quarries being completed (i.e. mined, backfilled and rehabilitated) while other quarries are still active or have not yet been developed. Groundwater recovery will therefore commence in the completed quarries (e.g. those quarries in the Northern Eastern Lease developed early in the mine life) while mining activities are ongoing in other areas (i.e. those quarries in the Southern Eastern Lease developed late in the mine life). This sequencing has been captured in the groundwater modelling.

The submission does not take into account the staged mine progression and misinterprets the duration of post mining recovery.

10. ANINDILYAKWA LAND COUNCIL

As discussed in Section 9 of the Draft EIS, once mining has been completed in a quarry (i.e. the time of maximum drawdown), active quarry dewatering will cease and groundwater table recovery will commence. The groundwater model predicts that around each quarry, 80% of the drawdown is predicted to recover within five years of mining. Almost total recovery of groundwater levels (i.e. to pre-mining levels) is expected to be achieved within 20 years of the completion of mining.

As detailed in the response to Issue 10.7, as part of the preparation of the Supplement, data has been gathered from the existing GEMCO mine in order to provide evidence of groundwater recovery. The data is provided in Attachment C of the Supplement. This data confirms the findings of the Draft EIS groundwater model and provides confirmation of groundwater recovery post-mining.

Please refer to the response to Issue 10.20 for further information on the potential impacts of groundwater drawdown on vegetation.

Issue 10.29. Section 10 Surface Water

This topic has been comprehensively covered in the report however the ALC remains concerned that controls on surface water flows may be inadequate and contaminated water may flow to the Emerald and Amagula Rivers. This is a high rainfall area and multiple high rainfall events may occur in a short time period resulting in an unplanned release. Much is reliant on the yet to be produced Erosion & Sediment Control Plan. The Traditional Owners have requested that no impacts occur to the rivers and the release of contaminate waters is not considered an option by the ALC.

The proponent acknowledges the concerns raised by the stakeholder in this submission and particularly the need to avoid releases of mine affected water. This concern underpins the mine water management system designs presented in the Draft EIS.

The proponent would seek to reassure the stakeholder that the proposed site drainage and water management system are suitable to address these concerns and are based upon conservative design principles intended to avoid the need to release mine affected water to the receiving environment. Further detail on the design principles is provided in Section 10 of the Draft EIS.

The proponent acknowledges that the Erosion and Sediment Control Plan will be important for managing potential surface water impacts. Additional detail on the Erosion and Sediment Control Plan has been prepared and is provided in Section 4.3.8 of the Supplement.

Issue 10.30. Section 10.5.5 Water Balance – Dam Sizing

While the data used in this model is based on 1,206mm average rainfall it is likely to be found that rainfall at this site area will in most years exceed this figure. This area to our knowledge has never had rainfall recorded and from local observations it appears to receive consistently higher rates of rainfall than Angurugu. GEMCO would be encouraged to err on the side of caution with dam sizing as the risks of uncontrolled discharge of quarry water to the river systems in this area is not seen as acceptable by the Traditional Owners of this country.

10. ANINDILYAKWA LAND COUNCIL

The submission correctly notes that an annual rainfall of 1,206 mm is an average rate. This average value is likely to be lower or higher than the actual rainfall experienced in many years. The average (along with the 90th and 10th percentile rainfall depths) are presented in Section 10 of the Draft EIS for illustration purposes only.

Local rainfall data has been provided by the Bureau of Meteorology (BoM). This data has been compiled from all relevant rainfall data recorded on Groote Eylandt and takes into account factors that may affect the local climate at the project site such as topography and distance from the coast. The dataset comprised 124 complete years of daily rainfall data.

As discussed in Section 10 of the Draft EIS, for the purpose of determining dam sizes, the proponent has selected the wettest rainfall sequence from the 124 years of BoM rainfall data. This includes years that significantly exceed the average 1,206 mm annual rainfall.

The proponent acknowledges the concerns of the Traditional Owners in respect of uncontrolled release of mine water. The proposed dams have therefore been conservatively sized to fully contain prolonged runoff generated from the worst case rainfall conditions, with no predicted need for release of water. In addition, as a further precaution against the need for a release from the dams, the proponent has provided additional capacity in the form of a 1.5 m freeboard for each of the proposed dams.

The proposed dams therefore address the concerns of the Traditional Owners in relation to the uncontrolled release of mine water.

Issue 10.31. Controlled release of Quarry Water

During consultation with Traditional Owners by the ALC it has been made clear that no mine water should go to the rivers in this project area, as such the ALC would be reluctant to agree to any discharge license for this site. The proponent is familiar with the site and needs to ensure adequate contingency for extreme rain events is built into their designs.

As discussed in Section 10 of the Draft EIS, the proposed water management system has been designed, based on the 124 years of climate data, so that there would be no requirement to discharge quarry water, including during extreme wet periods. The proposed dams have therefore been conservatively sized to fully contain prolonged runoff generated from the worst case rainfall conditions, with no predicted need for release of water. In addition, as a further precaution against the need for a release from the dams, the proponent has provided additional capacity in the dams as 1.5 m freeboard. Designing and sizing the dams in this way demonstrates the proponent's intention to operate without the need for release of mine water.

However, irrespective of how the dams are designed and sized, there is always a remote possibility that unprecedented levels of rainfall could occur which exceed the historical data and the excess freeboard. The proponent is therefore seeking approval to discharge, strictly as a contingency measure only. The proposed discharge conditions reflect the pristine nature of the watercourses, and consequently any discharges in accordance with the proposed conditions would not give rise to impacts on water quality in either the Emerald or Amagula Rivers.

10. ANINDILYAKWA LAND COUNCIL

The proponent is committed to consulting with the ALC to determine acceptable operating practices and conditions that will ensure no significant adverse effects on surface water or environmental values.

Issue 10.32. Section 13.6.7 Blasting – Cultural Heritage

The proponent needs to ensure that monitoring is routinely conducted to ensure blasting activities are not resulting in damage to cultural sites adjacent to mining areas. The ALC appreciates the geotechnical survey being undertaken to set vibration limits to protect these sites.

As stated in Section 13.7.2 of the Draft EIS, a Blast Management Plan will be developed for the project which will include the determination of ground vibration limits for the rock art sites, as well as periodic monitoring of rock shelters with art to confirm their integrity.

Issue 10.33. Section 15.6.2 Local Aboriginal Employment

The ALC would like to see new initiatives for local Aboriginal People to provide business opportunity or employment with the mine come from this project. There does not appear to be any new commitments by the proponent in this report.

As noted in Section 3.2 of the Draft EIS, the project is an additional mining area that will be operated as part of the existing GEMCO mine, rather than as an independent mine. The operations workforce required for the project will be drawn from the workforce of the existing GEMCO mine.

The proponent has in place a range of Indigenous participation strategies and plans that are implemented as part of operations at the existing GEMCO mine. These strategies and plans include the *Rehabilitation & Mine Services Aboriginal Employment Strategy* (RMS Strategy), and the Indigenous Employment Strategy. The proponent encourages the ALC to present proposals around new initiatives for local Aboriginal employment, such as that described in the response to Issue 10.10.

As stated in Section 15.6.2 of the Draft EIS, local Aboriginal employment at the existing GEMCO mine has steadily increased since the introduction of the proponent's RMS Strategy in 2011. The success of the RMS Strategy is being carried over into a new employment strategy for the existing GEMCO mine which aims to increase Aboriginal participation in roles beyond the mine rehabilitation services sector. The RMS and Indigenous Employment Strategy are directly applicable to the project.

The socio-economic benefits of the project to Groote Eylandt will include the operational expenditure of approximately \$1.9 million per year, which will include procurement from local business and contracts with local organisations, in particular from Indigenous enterprises. Socio-economic benefits are discussed in Section 15 of the Draft EIS.

10. ANINDILYAKWA LAND COUNCIL

Issue 10.34. Section 16 Archaeology

The areas of cultural significance such as art sites or shelters need to have their access restricted other than for monitoring purposes to ensure disturbance is limited. Dust may become an issue for some art sites during mining and in this instance GEMCO should be prepared to install temporary protection to prevent damage. The Land Council welcomes the development of a Cultural Heritage Management Plan by the proponent.

Noted. As mentioned in Section 16.6.3 of the Draft EIS, the Cultural Heritage Management Plan that will be developed for the project, will document access restrictions, and outline an annual monitoring program of the art for changes due to mine related dust. Section 16.5.2 of the Draft EIS notes that if dust from mining activities is found to be impacting the art, dust control measures will be implemented.

Issue 10.35. Section 19 Ecology - Mining

The proposed mining process will result in the removal of Northern Hopping Mouse and Masked Owl habitat due to their particular ecological requirements for nesting sites. It appears no additional reserve areas have been put aside for these species from this study.

Please refer to the response to Issue 10.17 in relation to the Northern Hopping-mouse.

As detailed in Section 3.10.1 of the Draft EIS, environmental considerations were a key factor in project design and the project is already highly constrained by environmental factors (e.g. a commitment to not mine the manganese resource beneath watercourses). These constraints, and the careful design of the project, have meant that the project disturbance footprint comprises only one third of the project site, and putting aside additional reserve areas would not be practical. However, as indicated in the response to Issue 10.22, the Biodiversity Offsets Strategy has been revised to include offsets for the Masked Owl (northern). This revision was made as a precautionary measure given that there is currently no long term monitoring data available to confirm that mine rehabilitation provides habitat for these species. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B.

Issue 10.36. Section 23 and 7.6.4 Introduction of Weeds

The exclusion of weeds should to be a higher priority for the proponent as current requirements for quarantine around weeds are inadequate. This site is mostly free of weeds and the ALC would like to see the introduction of strict quarantine arrangements for all equipment and vehicles entering the site. This could involve the creation of a quarantine station area on the Main Leases or on entry to the Eastern Leases where all vehicles and equipment are inspected and where necessary treated daily prior to commencing work in the area. While this process may appear onerous, the time, effort and money saved by not having to control weeds into the future in this

10. ANINDILYAKWA LAND COUNCIL

pristine area would be a saving for GEMCO and importantly not be a burden to the Owners of this country post mining.

The proponent acknowledges the importance of preventing the spread of weeds into the project site. In response to this, and other submissions in relation to weeds, additional information has been developed on the weed management practices that will be adopted for the project. This additional information is provided in Section 4.3.2 of the Supplement, and includes a requirement for vehicle inspections in order to prevent the spread of weeds.

Issue 10.37. Section 33 Social

It appears from the report that access for Traditional Owners will be restricted to the North Eastern Lease. An important cultural site is located in the north eastern corner of this lease and some form of access road/track will need to be created for Traditional Owner use.

The proponent understands that this submission relates to Pelican's Nest, a rock formation located directly to the east of the Northern Eastern Lease. Pelican's Nest is not located within the project site, and no mining will take place in the vicinity of this site.

In 2001, the ALC gave permission for the proponent to carry out exploration development in the Eastern Leases, and as a result, the proponent constructed a 4WD access track from the Emerald River Road (a public road) to the Northern Eastern Lease. This is the only vehicle track which provides access to the proposed mining area. Various exploration tracks have since been developed in the Northern Eastern Lease. The ALC has advised that the Traditional Owners currently access Pelican's Nest via the proponent's 4WD access track and exploration tracks. These tracks are the only known tracks in the vicinity of Pelican's Nest.

Continued public use of the exploration tracks will not be possible once the mine is operating due to safety considerations. It may therefore be necessary, during the life of the mine, for the Traditional Owners to access the area via foot or through less formal tracks, as would have been the case prior to the development of the exploration tracks. Developing a formal access track to Pelican's Nest would necessitate clearing of further vegetation and may require additional watercourse crossings.

Issue 10.38. The Anindilyakwa Land Council appreciates the opportunity to make comment on this Draft Environmental Impact Statement for the Eastern Leases ELR 28161 and ELR 28162 on behalf of the Anindilyakwa people that own and place cultural importance on these lands.

Noted. The proponent values the ALC's input in this process and will continue to work with the ALC on the development of this project.

11. ANINDILYAKWA LAND COUNCIL, LAND AND SEA MANAGEMENT UNIT

Issue 11.1. The LSM unit believes the Biodiversity Offset Strategy requires a number of improvements to ensure programs have applied conservation outcomes and thus benefit threatened species on Groote Eylandt.

Noted. Please refer to the responses to Issues 11.2 to 11.5 which address the submitter's concerns regarding the Biodiversity Offsets Strategy.

Issue 11.2. 1. Importance of project site for threatened species

The significance of the brush-tailed rabbit-rat (and northern hopping mouse) record from the project site is not considered or valued adequately in the EIS.

According to the Terrestrial Ecology Report (C), the brush-tailed rabbit rat has the 'potential to inhabit several habitat types' outside of the project site. However the paucity of records in recent times - despite numerous fauna surveys - suggests they do not. This is also the case for the northern hopping-mouse.

We know that the project site provides critical habitat for these species and thus its destruction may have irreversible effects on viable populations of the brush-tailed rabbit-rat and northern hopping-mouse on Groote Eylandt. As such, we believe significant offset proposals, that include substantial support for the long-term applied conservation of these species, are required.

The significance of the threatened species records from the Draft EIS *Terrestrial Ecology Report* (Appendix C) is understood and acknowledged. The records are, at least in part, due to the significant effort employed in undertaking the field surveys for the Draft EIS. The Draft EIS terrestrial ecology study entailed two programs of intensive fieldwork, involving a team of six experienced biologists. Significant effort was made to locate the Brush-tailed Rabbit-rat and Northern Hopping-mouse, particularly given that both species are cryptic and difficult to record. Multiple camera traps were left recording for 15 weeks between field surveys, and were baited weekly. Prior to undertaking the field surveys, the EIS ecology team liaised with Rebecca Diete, the PhD candidate on Groote Eylandt who is studying the Northern Hopping-mouse. Ms Diete provided advice on suitable sampling techniques for this species, and this advice was taken into account in survey design.

As part of the preparation of the Supplement, a review of other published fauna surveys on Groote Eylandt was undertaken and has confirmed that the level of survey effort in the Eastern Leases and immediately surrounding areas exceeds that on the remainder of the island. This is particularly the case when considering recent studies using techniques suitable for recording these species (e.g. infrared cameras). Many of the studies in and around the Eastern Leases are associated with the proponent's operations, but it is also likely that the relative ease of accessing this area compared to more remote areas on Groote Eylandt has contributed to the intensive survey in this area. Based on the above, the submitter's understanding that the species do not occur elsewhere on Groote Eylandt and are concentrated in the Eastern Leases is not valid.

Nevertheless, the Draft EIS acknowledges the significance of the Eastern Leases for the species, and notes that the project site supports important populations (as defined under the EPBC Act) of the

11. ANINDILYAKWA LAND COUNCIL, LAND AND SEA MANAGEMENT UNIT

Northern Hopping-mouse and the Brush-tailed Rabbit-rat. Biodiversity offsets are proposed to compensate for the loss of habitat that will arise from clearing associated with the project.

Issue 11.3. 2. Including masked owl in Biodiversity Offset Strategy

We believe there is potential for the population of masked owls on Groote Eylandt to be significantly impacted by the Eastern Lease Project and thus we believe appropriate offsets should be developed for this species.

The assessment of the habitat resources of the masked owl used in this EIS is too broad and thus it provides only a limited understanding of how important the project area is for the survival of masked owls on Groote Eylandt. While there may be 'extensive areas of potential habitat' outside of the project site, it is unclear what proportion of this habitat is useful for foraging only, and the extent of features critical to the persistence of masked owls (i.e. hollow bearing trees).

It is possible that the effects of clearing over 15,000 hectares of vegetation (together with a number of indirect impacts) may negatively impact masked owl populations given the recovery of key habitat features take decades (or even centuries) to develop.

The proponent is confident that, in the long term, the vegetation established within mine rehabilitation will provide habitat for the Masked Owl (northern) and that there will consequently not be a permanent loss of resources for the species or a significant impact on it. The Biodiversity Offsets Strategy has, however, been revised to include offsets for the Masked Owl (northern). This revision was made as a precautionary measure given that there is currently no long term monitoring data available to confirm that mine rehabilitation provides habitat for the Masked Owl (northern). The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B.

It should be noted that the area of clearing referred to in the submission is incorrect and should be 1,500 ha not 15,000 ha.

Issue 11.4. 3. Increasing direct offset strategies

The LSM unit believes there is considerable value in undertaking research to fill knowledge gaps regarding threatened species on Groote Eylandt. However, we also believe there is potential to achieve applied conservation outcomes through direct offsets not considered in the Biodiversity Offset Strategy (E).

Despite current control measures, the threat of Cane Toad incursion and establishment on Groote Eylandt persists. The extension of mining activities for four additional years (by mining the Eastern Leases) increases the long-term risk of Cane Toad establishment on Groote Eylandt through the receipt of mining / mining community supplies and equipment by barge. The introduction of this species is likely to have a devastating impact on many threatened species, including the northern-hopping mouse, brush-tailed rabbit-rat and northern quoll. The LSM unit recommends

11. ANINDILYAKWA LAND COUNCIL, LAND AND SEA MANAGEMENT UNIT

development of offset strategies that invest in collaborative arrangements that aim to improve strategies to mitigate Cane Toad incursion.

The impact of feral cats on threatened species on Groote Eylandt is unclear and thus further investigation into feral cats (and their control) is important. Nevertheless, a direct offset strategy could be developed that includes control activities and for the eradication of cats from Groote Eylandt. This strategy could partner with, and draw insights from, research that is planned for 2016 by the NT Department of Land Resource Management.

Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected.

The Biodiversity Offsets Strategy has been further revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement, and the *Revised Biodiversity Offsets Strategy* is provided in Attachment B. The revised strategy makes use of direct offsets, achieved through funding a program of conservation action. As suggested in this submission, the *Revised Biodiversity Offsets Strategy* will draw on the research being undertaken by the Department of Land Resource Management (DLRM) (i.e. the DLRM's Groote Eylandt Biodiversity Initiative). The research is being undertaken for the purpose of guiding the development of a Threatened Species Management Plan for Groote Eylandt. The proponent intends securing offsets through contributing to the funding of the implementation of this plan. The plan will focus on Cane Toad biosecurity and feral cat control, amongst other priorities.

Issue 11.5. 4. Research into improving the value of mine rehabilitation

The LSM unit does not support research into the value of mine rehabilitation as an offset strategy for threatened species on Groote Eylandt. Proposed research into the general ecological requirements of the brush-tailed rabbit-rat and northern-hopping mouse will likely provide adequate insight into the value (and potential value) of mine rehabilitation areas. We believe funds would be better invested in direct offset strategies (such as those mentioned above) or additional research outside mining areas.

As noted in the response to Issue 11.4, the Biodiversity Offsets Strategy has been revised since the Draft EIS was published. The changes to the strategy are summarised in Section 4.3.4 of the Supplement and the revised strategy is provided in Attachment B. The revised strategy focuses on direct action, with offsets to be delivered through providing funding toward the implementation of the Threatened Species Management Plan. Focus areas will likely include feral cat control, Cane Toad quarantine, weed management and maintenance of benign fire regimes.

12. ENVIRONMENT CENTRE NT

Issue 12.1. The Environment Centre NT considers that the activities outlined in the Draft EIS of the Eastern Leases Project on Groote Eylandt to be wholly incompatible with the conservation and ecologically sustainable management of an International Site of Conservation Significance.

This is due to:

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Issue 12.2. 1. The high level of environmental impact of this development in terms of hectares of native vegetation cleared and disturbance to fragile soils.

Mining will be undertaken progressively in stages, and direct clearing of habitat within the disturbance footprint will occur gradually over the 15-year life of the project. The rehabilitation of mined areas will also occur progressively over the life of the project. As discussed in Section 6.2 of the Draft EIS, the proponent has extensive experience and success with mine rehabilitation, and has an established program of monitoring the rehabilitation. Some areas of rehabilitation are over 30 years old, and the Draft EIS *Terrestrial Ecology Report* (Appendix C) observed various threatened fauna species (including the Northern Quoll) utilising the rehabilitated areas. Rehabilitation is designed to restore mined land to a self-sustaining open woodland, similar to the pre-mining environment and the surrounding undisturbed land.

The proponent's rehabilitation techniques incorporate detailed topsoil management measures (discussed in Sections 6.2.3 and 6.3.2 of the Draft EIS) which have successfully contributed to the recruitment success of native tree species observed within the rehabilitated sites. The topsoil management measures are designed to prevent excessive soil deterioration and minimise damage to soil structure, root material and seeds.

Issue 12.3. 2. High risk of introduction and spread of invasive species such as feral cattle, horse, donkey, Water Buffalo, Cane Toads and pig currently absent from the island as well as the spread of feral cats, grasses and other weeds not yet widespread on Groote Eylandt.

There is no credible method whereby the project could lead to the introduction of feral cattle, horses, donkeys, water buffalo or pigs onto Groote Eylandt. With respect to the other species mentioned in this submission:

- Section 4.3.2 of the Supplement provides additional information on methods that will be put in place to prevent the spread of weeds (including grasses).
- The proponent has existing controls regarding Cane Toads, and these are described in Section 4.3.3 of the Supplement. The Biodiversity Offsets Strategy for the project will also address Cane Toads, as detailed in Section 4.3.4 and Attachment B of the Supplement.
- The Biodiversity Offsets Strategy has a strong focus on the control of feral cats, as detailed in Section 4.3.4 and Attachment B of the Supplement.

12. ENVIRONMENT CENTRE NT

Issue 12.4. 3. Some risk of contamination of surrounding waterways, including rivers used for drinking water, swimming, fishing and cultural purposes.

The surface water impact assessment conducted for the project (refer to Section 10 of the Draft EIS) notes the environmental values relevant to the project as being:

- High conservation value aquatic ecosystems;
- Recreational use, including swimming and aesthetic values;
- Human consumption (i.e. drinking water); and
- Cultural values.

These environmental values and cultural sensitivities were specifically taken into consideration in the determination of the water management strategies that will be applied to the project.

Table 10-4 of the Draft EIS notes the activities that have the potential to give rise to surface water contamination as being refuelling activities and basic vehicle and equipment maintenance works. This table also lists management measures that will be applied by the proponent to ensure waterways are not contaminated, and that the environmental and cultural values of the waterways are protected.

Issue 12.5. 4. Vulnerability of threatened species on Groote Eylandt to disturbance, including that of the Northern Hopping Mouse, Northern Quoll and other small mammals. The well-documented rapid decline of small mammal populations is an ecological emergency deserved of national attention and there is an opportunity now to refuse approval to this development to allow Groote Eylandt to continue to be a refuge for small mammals in decades to come.

The significance of Groote Eylandt for threatened species is acknowledged in the Draft EIS and a range of avoidance and mitigation measures are proposed. In addition, offsets will be provided for potential impacts on the Northern Hopping-mouse, Brush-tailed Rabbit-rat and Northern Quoll. The biodiversity offsets will focus on landscape wide management, particularly the control of feral cats. These activities would be expected to benefit a broad range of small mammals, including the threatened species referred to in this submission. Biodiversity offsets are discussed further in Section 4.3.4 of the Supplement and in Attachment B.

Issue 12.6. 5. As outlined in the Socio-Economic study, the lack of viable alternative ecologically sustainable industries on Groote Eylandt which create a situation of economic and social dependence on increased mining activity.

As discussed in Section 15 of the Draft EIS, mining commenced on Groote Eylandt in the 1960s, and this has played a significant role in the economic development of the island. Various services and facilities were established on the island specifically to support the mining workforce.

12. ENVIRONMENT CENTRE NT

The economy of Alyangula (the residential base for the workforce of the existing GEMCO mine) is, at the present time, entirely dependent on the mine.

Angurugu and Umbakumba are the main Aboriginal communities on Groote Eylandt. These communities have similar socio-economic profiles to other remote Aboriginal communities in the NT.

During consultation for the Draft EIS, access to employment opportunities was noted to be highly valued by the residents of Angurugu and Umbakumba. Residents also expressed a desire for sustainable Aboriginal businesses on Groote Eylandt, especially as a method of ensuring the sustainability of Groote Eylandt post-mining. The *ALC Strategic Plan* (2012) which describes the governance objectives of the ALC, also articulates the vision for the Groote Eylandt Archipelago post-mining, which is for a sustainable future that is not dependent on royalty payments. The ALC Strategic Plan also focuses on the creation of a sustainable future for Groote Eylandt Archipelago and its population.

The ALC is progressing strategic planning to increase sustainable economic activity in Angurugu and Umbakumba, in order to provide a viable future for Groote Eylandt once mining is completed.

The proponent is working with the ALC in this regard and the negotiation of a new Mining Agreement for the project provides an opportunity for the proponent and the ALC to work collaboratively in relation to mine closure planning.

Issue 12.7. 6. The potential negative social impacts including impacts on social amenity, loss of land for recreation and traditional practices; anxiety and uncertainty surrounding new mining areas and impacts on spirituality and sacred places, do not offset those positive impacts in the form of royalty payments or government payments. The relatively short-term employment benefits generated from this development do not offset the high long-term cost of this significant environmental impact.

The Draft EIS fully describes the risks posed by the project, the project design elements that avoid or reduce risks, and the mitigation measures that will be put in place to reduce any residual risks. Section 4 of the Draft EIS summarises the various mitigation and management measures that have been proposed by the proponent regarding potential social or environmental risks associated with the project. The implementation of these measures will eliminate or significantly reduce the majority of risks that may be generated by the project.

It should be noted that it is the role of the regulators, i.e. the NT and Federal Governments, to ultimately assess whether the negative impacts of the project outweigh the positive. As a part of this assessment, the regulators will assess the justification and benefits of proceeding with the project (summarised in Section 3.10.2 of the Draft EIS) with the consequences of the project not proceeding (summarised in Section 3.10.3 of the Draft EIS).

Socio-economic Impacts

Section 15 of the Draft EIS discusses the potential negative and positive socio-economic impacts associated with the project, including loss of access to land, impacts on social amenity, anxiety and uncertainty surrounding new mining areas, impacts on spirituality and sacred places, and loss of connection to place. Specific management commitments have been proposed by the proponent to

12. ENVIRONMENT CENTRE NT

mitigate these socio-economic impacts, and these commitments are listed in Section 15.8 of the Draft EIS. It also should be noted that the Mining Agreement that will be negotiated between the proponent and the ALC for the project will be the primary vehicle for addressing a number of these social impacts, and the project cannot proceed until a Mining Agreement with the ALC has been agreed.

As discussed in Section 15.6.3 of the Draft EIS, the proponent contributes significant funds annually in the form of royalty payments. These royalties are apportioned based on the proponent's negotiated agreements with Groote Eylandt Aboriginal Trust (GEAT) and the ALC, or through the NT government's statutory requirements under the *Mineral Royalty Act*. Indirect royalty payments are also generated through the provisions of the *Aboriginal Land Rights (Northern Territory) Act* (ALRA) and paid into the Aboriginal Benefit Account (ABA) by the Federal Government. The royalty payments made to GEAT and the ALC are distributed to the community by these organisations, enabling them to deliver improved services to the local community. As stated in Table 15-4 of the Draft EIS, the project will extend the life of the existing GEMCO mine by around four years. This will result in an additional four years of royalty payments to the ALC under the Mining Agreement which, in turn, will provide an additional four years of economic benefits to the local community.

The existing GEMCO mine has operated on Groote Eylandt for over 50 years, and employs approximately 835 staff, including local Aboriginal persons. The project is expected to extend the life of the existing GEMCO mine by around four years, which will therefore enable the continuation of employment for 835 workers for this period.

Environmental Impacts

The management measures that will be put in place to mitigate environmental impacts are discussed in detail throughout the Draft EIS, and are summarised as a part of the Environmental Management Plan presented in Section 19 of the Draft EIS.

To counterbalance the significant residual impacts predicted on threatened species, the proponent will provide biodiversity offsets as is the requirement under the Commonwealth EPBC Act (refer to the *Revised Biodiversity Offsets Strategy* included in Attachment B of the Supplement).

Issue 12.8. 7. The risk of ore dust being spread through transport, particularly at the haul road where it crosses the Amagula River.

It should be noted that project haul roads do not cross the Amagula River. It is assumed that submitter is referring to the haul road crossing of a tributary of the Amagula River - Tributary 1.

The air quality assessment undertaken for the project (refer to Section 12 – Air Quality of the Draft EIS, and the Draft EIS *Air Quality Report*, Appendix I) assessed the various project activities that could contribute to dust generation, including the transportation of ore (refer to Section 12.7.2 of the Draft EIS). The Draft EIS details the various dust control techniques will be implemented for the project to suppress any dust generated.

Attachment E of the Supplement presents a *Haul Road Crossing Design Overview Report* and includes a description of sediment control measures that will be implemented to ensure that operation of the haul road and haul road crossings does not give rise to sedimentation of watercourses. As detailed in this report, runoff from the haul roads (which would include any dust

12. ENVIRONMENT CENTRE NT

from the transport of ore) will be managed in accordance with the Erosion and Sediment Control Plan. This will include collecting haul road runoff and directing it through sediment control structures to limit any potential downstream sedimentation or water quality impacts.

Issue 12.9. 8. The increased risk of vehicle accidents given that the haul road is accessed via a public access road.

The project's haul road will connect to haul roads within the existing GEMCO mine, and will not be accessed via a public access road. Section 3.9.6 of the Draft EIS describes access arrangements. At the intersection of the haul road and Emerald River Road, the haul road will be constructed as an overpass (i.e. it will pass over the Emerald River Road). This will negate the risk of accidents occurring between haul trucks and public vehicles as there will be no interaction between mine vehicles and public vehicles. It should be noted that mine vehicles will not travel on public access tracks, and there will be no public access to the mine haul roads.

Issue 12.10. 9. The environmental impact posed by the construction of an overpass over the Emerald River to the aquatic and riverine species dependent on the river, including alteration of the river channel, erosion, siltation and risk of contamination from ore dust.

The proponent notes the concerns raised in relation to the proposed haul road crossings and acknowledges that, although the Draft EIS described the proposed haul road crossings, it did not provide a detailed description of the specific design, operation and management of the haul road crossings.

Attachment E of the Supplement presents a *Haul Road Crossing Design Overview Report*. This report provides additional information on the haul road crossing designs, assessment of the impacts of the haul road crossings and a description of the monitoring and management measures to be implemented for the haul road crossings. It addresses the specific environmental issues outlined in this submission.

Issue 12.11. 10. The impact of increased sedimentation and erosion from the mining site upon surrounding aquatic ecosystems.

Sections 10.3, 10.4 and 10.5 of the Draft EIS discuss the mine planning and water management strategies that have been put in place to ensure the risks of erosion and sediment-affected water from project activities flowing into the rivers, are minimised. The mine plan has been designed to avoid any significant disturbance of the key watercourses, and diversion drains will be installed to isolate the contained catchments of the quarries and to divert runoff from undisturbed areas away from the mining areas.

The project is not predicted to cause increased sedimentation in the rivers or any associated impacts on aquatic ecosystems. As discussed detail in Section 19.4.6 of the Draft EIS, an Erosion and Sediment Control Plan will be implemented for the project. It will be designed to manage and control

12. ENVIRONMENT CENTRE NT

erosion and sedimentation issues that may arise due to project activities. Further detail on the Erosion and Sediment Control Plan is provided in Section 4.3.8 of the Supplement.

Issue 12.12. 11. The increased risk of spills at the port, which was originally constructed to provide for shipping of ore from the current mining lease, to the marine environment which includes internationally significant marine habitat.

As noted in Section 3.2 of the Draft EIS, the project is an additional mining area that will be operated as part of the existing GEMCO mine, rather than as an independent mine. The project will not change the production rate at this existing GEMCO mine, or require any expansion of the existing port facility. The project therefore will not increase the risks associated with the operation of the port.

Issue 12.13. 12. The lack of evidence to demonstrate that rehabilitation efforts are sufficiently effective to sustain the long-term growth of populations of small mammals, birds and other threatened species.

Section 6 of the Draft EIS describes the rehabilitation program that is currently operating at the existing GEMCO mine. The proponent has rehabilitated more than 1,000 ha within the existing GEMCO mine, with the rehabilitation varying in age from a few months to over 30 years. The success and performance of this rehabilitation is regularly assessed against completion criteria (refer to Table 6-2 of the Draft EIS), based primarily on regeneration rates and flora species diversity. This review is carried out by independent ecologists and is supported by internal surveys. In the event that monitoring indicates that rehabilitation is not on trajectory to meet the closure criteria, the rehabilitation is subject to remedial works such as supplementary plantings or extra weed control procedures. The proponent also routinely updates its Mine Management Plan (MMP) which includes details regarding rehabilitation efforts and performance of the rehabilitation.

The monitoring of fauna activity in rehabilitation areas has recently been initiated by the proponent (refer to Section 6.2.4 of the Draft EIS). Fauna usage will be included in the completion criteria that will be implemented for the rehabilitation areas of the project site. Section 4.3.5 of the Supplement provides further detail on completion criteria relevant to fauna.

Fauna Usage

The Draft EIS included a survey of the vertebrate fauna within sections of mature rehabilitation at the existing GEMCO mine. The results of this survey are presented in the Mine Rehabilitation Report which is contained within the Draft EIS *Terrestrial Ecology Report* (Appendix C). The survey results were combined with previous surveys of the mine rehabilitation. This resulted in 95 species being identified within the rehabilitation areas, including 51 birds, 14 mammals and 23 reptiles. Of these, three threatened species were observed, these being the Northern Quoll, the Yellow-spotted Monitor and Mertens' Water Monitor. As discussed in Section B.4 of the Draft EIS *Terrestrial Ecology Report* (Appendix C), the mine rehabilitation areas are considered to provide habitat suitable for a suite of fauna species. It is considered that the creation of additional mine rehabilitation areas in conjunction with ongoing management is likely to result in an increase in the faunal assemblage of mine rehabilitation areas.

12. ENVIRONMENT CENTRE NT

Issue 12.14. 13. The proponent has not critically or independently assessed rehabilitation efforts undertaken in the current mine site to apply learnings to future rehabilitation efforts, despite a long- term impact of mining over the past 50-years.

The rehabilitation areas within the existing GEMCO mine are monitored on a regular basis by independent, suitably qualified ecologists. The most recent monitoring round was undertaken by Cumberland Ecology in 2014 (the company who also undertook ecological studies for the EIS). The monitoring includes an assessment of the rehabilitation against completion criteria. If the rehabilitation does not meet the required criteria, the rehabilitation areas are then subject to remedial works. This is discussed further in the response to Issue 12.13. The proponent has taken account of learnings from its mine rehabilitation and regularly updates its internal rehabilitation procedures and standards to reflect these learnings. These procedures and standards will be applied to the project.

Further to this, Sections 4.3.1 and 4.3.6 of the Supplement explain that trials will be undertaken into the use of salvaged timber as fauna habitat in rehabilitation, and into the introduction of fire into rehabilitation.

Issue 12.15. 14. Capacity of tailings dams and sediment traps to contain contaminated waters during significant rainfall events during the wet season.

Please refer to the *Conceptual Tailings Management Report* presented in Attachment D of the Supplement which describes water management associated with the tailings dams.

Sediment control structures (i.e. sediment ponds and traps) are designed to allow the settling of entrained sediment in stormwater runoff. Water is allowed to passively overflow from these structures. The detailed design of these structures will be dependent on site specific conditions and the design life of the structure, but will typically be designed to operate effectively during significant rainfall events up to and including the 10% AEP (1 in 10 year critical storm event).

In addition, all sediment controls will be described in the Erosion and Sediment Control Plan that will be developed prior to commencement of mining activities.

Issue 12.16. 15. A lack of information to support the proponent's claims that sufficient capital will be provided for proper rehabilitation of the site, even in the event of economic hardship by the proponent once mining has started.

As stated in Section 2.3.3 of the Draft EIS, the NT *Mining Management Act* requires the payment of a security to provide for the rehabilitation of Mineral Leases or to rectify environmental harm caused by mining activities. This is a requirement for all Authorisations granted under the NT *Mining Management Act*.

The Minister will determine the level of security commensurate with protecting the community from closure liabilities and optimising the benefits to the community from the project. The calculation of securities is based on the actual cost of rehabilitation in relation to the size, environmental risk and expected project life in accordance with advisories approved by the Minister. Securities are regularly

12. ENVIRONMENT CENTRE NT

reviewed and adjusted taking into consideration progress in rehabilitation as well as new or expanded activities. The proponent has made provision to ensure that sufficient capital is provided for rehabilitation of the project site, to a standard that is acceptable to the NT Government and Traditional Owners.

Issue 12.17. 16. Insufficient detail provided in the Risk Assessment to demonstrate that the proponent has diligently assessed all best practice and low impact alternatives, including the decision not to decrease the environmental footprint of this development further beyond this proposal.

Section 3.10 of the Draft EIS discusses project alternatives, including alternative mine plans.

The mine plan put forward in the Draft EIS is highly constrained by environmental factors. In particular, all quarries will be backfilled, there will be no mining of watercourses and mine affected water will be stored on site, rather than being discharged. These aspects of the project's design were selected entirely for the purpose of reducing the project's environmental impacts.

The Draft EIS as a whole fully describes the risks posed by the project. This includes the elements that have been incorporated in the project design to avoid or lessen risks, and the mitigation measures that will be put in place to reduce any residual risks.

Issue 12.18. 17. Lack of provisions for immediate and public notification of environmental/health incidents occurring on the mine site beyond those limited requirements of the NT Environmental Assessment Act.

The mining activities that will be undertaken for the project will be conducted in accordance with the environmental approvals that will be obtained for the project (discussed in Section 2 of the Draft EIS). These approvals will condition the proponent under the NT *Mining Management Act* and the Federal *Environment Protection and Biodiversity Conservation Act 1999* to ensure that environmental protection objectives are complied with.

Section 19 of the Draft EIS discusses the environmental management measures, including the reporting of environmental incidents, that are currently in place for the existing GEMCO mine and that will be extended to cover the project. The proponent has well established procedures in place for reporting and investigating environmental non-conformances and hazards, and these are discussed in detail in Section 19.3 of the Draft EIS. Environmental incidents are reported publically on a regular basis through the Environmental Mining Report (EMR), in accordance with reporting obligations enforced by the NT Department of Mines and Energy under the NT *Mining Management Act*. (The EMR is effectively a public version of the Mining Management Plan).

Section 18.2 of the Draft EIS discusses the proponent's health and safety management system which is in place for the existing GEMCO mine and which will be extended to cover project activities. Incidents are reported internally, and corrective actions are put in place and disseminated to staff and contractors as appropriate to avoid reoccurrence of the incident.

12. ENVIRONMENT CENTRE NT

Issue 12.19. 18. Inadequate assessment of the development's greenhouse gas offsets despite ECNT's previous recommendations to the Draft Terms of Reference for this EIS.

"ECNT recommend that in this TOR and all future EIS TOR, the NTEPA must require a Climate Action Plan aimed at carbon neutral development, including reference to efforts to mitigate greenhouse gas emissions through the use of renewable energies such as solar."

The greenhouse gas assessment summarised in Section 12 of the Draft EIS, and as provided in detail in the Draft EIS *Air Quality Report* (Appendix I), has been conducted in line with the requirements of the project's Terms of Reference for the Draft EIS as issued to the proponent by the NT Environment Protection Authority. It should be noted that the project's Terms of Reference do not require a Climate Action Plan.

Issue 12.20. 19. The extremely high conservation values of the project site, which include near pristine habitat for a variety of species severely threatened on the mainland, including the Northern Quoll, Northern Hopping Mouse, Brush-Tailed Rabbit Rat, Merten's Water Monitor, Floodplain Monitor and many others.

"Many of the threatening processes operating on the Northern Territory mainland are absent from, or at low levels in, the Groote archipelago, offering a rare opportunity to maintain a virtually intact biota in this Site." (NT Government, Site of Conservation Significance)

The Draft EIS acknowledges the conservation values of the project site and Groote Eylandt.

Section 7 of the Draft EIS discusses the terrestrial ecology impact assessment undertaken for the project. This study assessed the direct and indirect impacts of the project on threatened species, including the Northern Quoll, Northern Hopping-mouse, Brush-tailed Rabbit-rat, Mertens' Water Monitor and the Yellow-spotted Monitor (also known as the Floodplain Monitor), amongst others. Section 7.6.6 of the Draft EIS discusses the potential impacts of the project on threatened species present, or likely to be present within the project site, noting that a significant residual impact is only likely on the Northern Hopping-mouse and the Brush-tailed Rabbit-rat. Biodiversity offsets will be provided for these species (refer to the *Revised Biodiversity Offsets Strategy*, Attachment B of the Supplement). In addition, and in response to several other submissions on the Draft EIS, the proponent has revised its Biodiversity Offsets Strategy to include the Northern Quoll and Masked Owl (northern).

Issue 12.21. 20. The very high cultural values of the site, including a large number of Sacred Sites.

Section 16 of the Draft EIS describes the archaeological impact assessment undertaken for the project. This study assessed direct and indirect impacts of the project and concluded that the project would not give rise to any significant impacts on archaeological sites.

12. ENVIRONMENT CENTRE NT

It should be noted that the Draft EIS was restricted to considering physical archaeological evidence, and it does not make any assessment of sacred sites, given that these are being managed as part of a separate process under the *Northern Territory Aboriginal Sacred Sites Act 1989* (discussed in Attachment 1-1 and Section 2.5.4 of the Draft EIS). The proponent is currently in discussions with the ALC in relation to the management of Sacred Sites, and an Authority Certificate will be obtained under the *Northern Territory Sacred Sites Act 1989*. This will ensure that there is no unauthorised disturbance to sacred sites.

Issue 12.22. Groote Eylandt has all the characteristics of a very high conservation site. Conservation of the threatened species and biodiversity of Groote Eylandt must be prioritised if these values are to be maintained for many generations to come, and are likely to serve as critical refuge habitat for species which are at risk of local extinction at many mainland sites due to the combined impacts of spread of invasive species, habitat loss, fire and pastoral activity.

Please refer to the response to Issue 12.20.

Issue 12.23. The extremely high conservation and cultural values of Groote Eylandt warrant proper investment by both NT and Federal Governments in supporting the expansion of cultural and eco-tourism opportunities and ecologically sustainable types of development beyond strip mining which seek to enhance rather than destroy the island's incredible natural assets.

Noted.

This comment is directed at government, rather than at the proponent.

Issue 12.24. Environment Centre NT wishes to object to the Eastern Leases Project on the grounds of the significant threat it poses to Matters of National Environmental Significance and the lack of assurance that rehabilitation and mitigation efforts by the proponent will sufficiently offset the long-term negative environmental, social and economic impacts of strip mining large sections of Groote Eylandt for the purpose of exporting manganese ore.

Noted.

The Draft EIS addresses all of the issues raised in this submission. The EIS as a whole fully describes the risks posed by the project. It describes the elements that have been incorporated in the project design to avoid or lessen risks, and the mitigation measures that will be put in place to reduce any residual risks. Attachment F of the Supplement lists the statement of commitments for the project as contained in the Draft EIS, and as amended during the preparation of the Supplement. This includes rehabilitation commitments, and mitigation and management measures designed to ensure the environmental, social and economic impacts of the project are minimised as far as practical.

12. ENVIRONMENT CENTRE NT

Matters of National Environmental Significance (MNES) relevant to the project are discussed in the:

- *Terrestrial Ecology Report* (Appendix C of the Draft EIS), and summarised in Section 7 – Terrestrial Ecology (of the Draft EIS);
- *Aquatic Ecology Report* (Appendix D of the Draft EIS), and summarised in Section 8 – Aquatic Ecology (of the Draft EIS); and
- *Revised Biodiversity Offsets Strategy* (Attachment B of the Supplement).

Section 6 of the Draft EIS provides greater detail of the rehabilitation that is currently undertaken for the existing GEMCO mine, and that will be implemented for the project.

13. JEFF ASCHMANN

Issue 13.1. The Groote Island Manganese Mine Proposal EIS summery rightly points out 50 “risks” that are associated with the proposal. The cumulative impact of these new risks (even with the proposed mitigation measures) as well as present and past mine impacts clearly indicate that the proposal should not go ahead.

Noted. The EIS fully describes the risks posed by the project, the project design elements that avoid or reduce risks, mitigation measures that will be put in place to reduce any risks and offsets that will be provided for significant, residual risks to Matters of National Environmental Significance. Cumulative impacts are discussed in the individual technical sections of the Draft EIS, where relevant. The risks were identified through a robust risk assessment process involving experienced mining, environmental and social assessment professionals. The risk assessment process is described in Section 4 of the Draft EIS.

Issue 13.2. Page 1, EIS Summary – It states that the proposal “provides significant socio-economic benefits” GEMCO has been operating for 50 years on Groote Island and has generated Economic Wealth but the Aboriginal community has gained little economic benefits in relation to overall health, life expectancy and general “well being”. Indeed statistics show Goote Island as one of the lowest. If the New Proposal goes ahead it will be more of the same. Aboriginal People will again experience lost access to land, impact on social amenity and spiritual and sacred sites undermined. Well being, will again be eroded. This is Not a good thing and is Fostered by the mine.

As discussed in Section 15.6.3 of the Draft EIS, the proponent contributes significant funds annually in the form of royalty payments and payments in accordance with the requirements of the Mining Agreement under the *Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976*. The Draft EIS describes the socio-economic benefits associated with these funds, as well as other socio-economic benefits associated with the proponent’s operations on Groote Eylandt (e.g. employment, training, provision of services on the island).

The socio-economic assessment presented in Section 15 of the Draft EIS also considered the potential negative socio-economic impacts associated with the project and provides specific management commitments to mitigate these impacts (as listed in Section 15.8 of the Draft EIS). The Mining Agreement that will be negotiated between the proponent and the ALC for the project will be the primary vehicle for addressing a number of these impacts. The project cannot proceed until a Mining Agreement with the ALC has been agreed.

Issue 13.3. Points of Concern

The New Proposal extends over water catchments. ELR28161 has crossing over Emerald Creek that is a popular swimming spot as well Even with buffer zones, It is difficult to imagine that such an intrusive operation will not detrimentally impact on the waterways. The area is located in a cyclone Area that will increase the risk.

13. JEFF ASCHMANN

Modelling undertaken to inform the development of the proposed drainage and water management infrastructure uses long term rainfall data that includes the occurrence of cyclones. All associated infrastructure required for the project has therefore been designed to accommodate the runoff generated by cyclones without significant adverse environmental impacts on watercourses. No further assessment or management measures are therefore necessary to address the risks presented by cyclones.

Issue 13.4. Threatened Species – (Page 27 EIS Summery)

The EIS points out threatened species on Groote Island. As well, NT Gov “site of conservation significance” points out more as well as areas of National and International Significance. The Cane Toad risk is also pointed out in the EIS. It will impact drastically on the Flora and Fauna and thus the ability of Aboriginal people to Hunt and Gather.

As noted by the submitter, the Draft EIS addresses biodiversity issues, and contains an assessment of potential impacts on biodiversity, as well as management measures to address the impacts.

Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected. In addition, the *Revised Biodiversity Offsets Strategy*, provided in Attachment B, indicates that biodiversity offsets are proposed to be secured through providing funding toward the implementation of the Northern Territory Government’s Threatened Species Management Plan. Quarantine measures for Cane Toads are proposed to be a key component of this plan.

Issue 13.5. Sensitive Receptors – (A Kind heading For areas that will be detrimentally impacted on by the proposal). It should be pointed out that the Aboriginal Community of Angurugu will now be surrounded by mining activities According to the map. Importantly it will be in direct line of dry SE Trade Winds (Angurugu being only 6.5 Kms Away) and blowing manganese dust. Presently it gets dust From the North and East but this is Wet Season activity. Climate and weather Data show that dust will dramatically increase. This is unacceptable and will have potential to cause severe health problems. The other areas of Yedikba (2.2 Kms) Wurramberbumanja (3.5 Kms) and Leske Pools Swimming hole (2.4 Kms), are located much too close to the impacts and their attributes will be undermined as well. They are Not a “Significant distance away” as the EIS states.

The project site is approximately 6.5 km to the south-east of Angurugu, at the closest point (refer Figure 12-1 of the Draft EIS).

As stated in Section 12.5 of the Draft EIS, “*wind is an extremely important consideration in air quality studies as dust emissions are transmitted by the prevailing winds*”. The air quality impact assessment undertaken for the project incorporates meteorological conditions, including wind and climatic conditions.

13. JEFF ASCHMANN

The results of the dispersion modelling (as presented in Section 12.8 of the Draft EIS, and shown in Figures 12-2 to 12-4 for the worse case Project Year 13) indicate that dust emissions from the project are not predicted to give rise to any exceedances of the applicable ambient air quality objectives at any of the closest sensitive receptors (i.e., Angurugu, Yedikba, Wurrumenbumanja, and Leske Pools Swimming Hole). The Draft EIS describes the mitigation measures that will be put in place to limit dust emissions from the project.

Dust will be monitored on an ongoing basis, including at Angurugu and Yedikba. If monitoring indicates any exceedances of air quality objectives, an investigation will be conducted by the proponent, and additional dust controls will be applied as necessary.

Issue 13.6. Risks – As stated before, there are 50 risks, most being significant and should be considered in a cumulative context. They will be very difficult if Not impossible to mitigate in the short and long term. They must be considered in relation to the present mine impact and associated risks.

Please refer to the response Issue 13.1.

Issue 13.7. Aquatic Impacts – Summery EIS page 29, states that they are high. Dams and other mitigation measures (eg. Chemical use for Cane Toads, etc) and infrastructure present major problems to environmental Integrity to Streams. Also the seasonal climate extremes will make mitigation attempts difficult. (wet and Dry)

The aquatic impact assessment presented in the Draft EIS *Aquatic Ecology Report* (Appendix D), and as summarised in Section 8 of the Draft EIS and on page 29 of the Draft EIS Executive Summary, states that the project is not predicted to give rise to any significant impacts to the aquatic environment. This is due to the considered mitigation measures that will be put in place for the project, combined with careful mine planning that has focused on the environmental sensitivities of the project site. Aquatic impacts are discussed in Section 8.6 of the Draft EIS, and the measures that will be put in place to mitigate impacts to the aquatic environment are provided in Section 8.7 of the Draft EIS. As discussed in the response to Issue 13.3, modelling undertaken to inform the development of the proposed drainage and water management arrangements uses long term rainfall data that includes seasonal climate extremes.

It should be noted that the Draft EIS does not propose the use of chemicals as a mitigation measure against Cane Toads.

Issue 13.8. Ground Water – Ground water and aquifers are extremely sensitive and an important source For streams and creeks. The EIS Summery states that “depresurisation will occur on the aquifer” As well it states a 20 year recovery time. This is a shameful and outrageous statement that admits to environmental damage to the aquifer Flow and thus the integrity of the streams and creeks as well. When one considers the lifespan of the Groote Island Aboriginal people, many will be dead before the aquifer recovers! This is unacceptable.

13. JEFF ASCHMANN

Groundwater Recovery

The Draft EIS includes the results of numerical groundwater modelling, which makes use of data obtained from groundwater monitoring bores, as well as extensive geological information gathered during the proponent's ongoing exploration drilling program. As explained in Section 9 of the Draft EIS, mining in the project site is predicted to lead to drawdown of groundwater levels around active quarries, but the groundwater model predicts rapid recovery of groundwater following mining. Once mining has been completed in a quarry, active quarry dewatering will cease and groundwater table recovery will commence. The groundwater model predicts that around each quarry, 80% of the drawdown is predicted to recover within five years of mining. Almost total recovery of groundwater levels (i.e. to pre-mining levels) is expected to be achieved within 20 years of the completion of mining.

In response to this submission and other submissions expressing concerns about groundwater recovery, a report has been prepared by the EIS groundwater consultant (Australasian Groundwater and Environmental Consultants) to provide data from the existing GEMCO mine to demonstrate groundwater recovery post-mining. The report is presented in Attachment C of the Supplement. Data from the existing GEMCO mine has been used because the hydrogeology at the existing mine and the project site are directly comparable. The behaviour and response of the groundwater system at the existing mine can therefore be used to inform predictions of likely changes to the groundwater regime that may result from project activities. The report addresses the following two issues:

- The post-mining effects on groundwater levels in the vicinity of mined area; and
- The re-establishment of a groundwater table in backfilled quarries.

Post-mining effects on groundwater levels in the vicinity of mined areas have been assessed using detailed groundwater monitoring data collected at the existing GEMCO mine. Monitoring data was obtained from bores located less than 1 km from mined areas, and showed no significant residual effects on groundwater levels. The re-establishment of a groundwater table in backfilled areas has been assessed through establishing a groundwater monitoring bore at the existing GEMCO mine within a quarry that has been mined, backfilled and rehabilitated. Monitoring of this bore has confirmed that, within 10 years of mining, groundwater levels in backfilled overburden have recovered to pre-mining levels.

In addition, as detailed in Section 9.5 of the Draft EIS, the proponent has established a baseline groundwater monitoring program to record groundwater levels at the Eastern Leases. Data loggers on each of the bores record the level of the groundwater every 6 hours, which is further validated during monthly field surveys of the bores. This monitoring program has been in place since January 2014. The proponent has committed to continuing to monitor groundwater levels over the life of the mine and this monitoring program will provide data on groundwater recovery post-mining.

Flows in Watercourses

Figure 10-4 in the Draft EIS shows the watercourses within the project site and surrounding area. The figure distinguishes between watercourses that flow perennially and those that flow ephemeraly. The mapped extent of perennial and ephemeral sections is based on field surveys, supported by groundwater modelling. All watercourses receive surface water flows during the wet season, but the

13. JEFF ASCHMANN

perennial watercourses also receive groundwater flows that enable them to continue flowing during the dry season.

The groundwater model prepared for the Draft EIS predicts the maximum extent of groundwater drawdown as a result of the project. Figure 3, on page 91 of the Supplement, shows the predicted drawdown in the shallow lateritic aquifer (the deeper Cretaceous sandstone aquifer is not predicted to be affected by the project) relative to the perennial and ephemeral reaches of the watercourses. It is important to note that this figure shows the total maximum extent of drawdown that will be experienced over the life of the project, and not all of this drawdown will be experienced at a single point in time. As shown in Figure 3, groundwater drawdown as a result of mining is not predicted to extend to the perennial reaches of any of the watercourses. Although groundwater drawdown is predicted to extent to the ephemeral sections of some watercourses, this drawdown is not predicted to impact flows, given that flow in the ephemeral reaches of the watercourse is dependent on surface water, rather than groundwater.

In summary, the project is not predicted to give rise to any impacts on flows in any of the watercourses.

Issue 13.9. Archeology – It is significant that there are 28 Archaeological sites, a majority of high cultural value. Most are only 1 km away, one being 400m and one will be relocated. There is little doubt that they will be detrimentally impacted on, and thus, Aboriginal culture undermined. Aboriginal people will No doubt be “payed out \$) by GEMCO for this act of environmental vandalism. The truth is that Future Aboriginal generations and all Australians will suffer in the long term From this selfish Act.

The submitter’s opinion on the potential for the project to impact archaeological sites is noted. This opinion is contrary to the findings of the Draft EIS *Archaeological Report* (Appendix L), which assessed direct and indirect impacts and concluded that the project would not give rise to any significant impacts on archaeological sites. Please refer to Section 16 of the Draft EIS for further discussion of this issue.

Issue 13.10. Blasting / Noise / Dust – The combined impacts of this especially within a quiet peaceful Area such as Groote Island Near swimming pools, outstations, sacred sites etc. makes this unacceptable.

Dust Impacts on Sensitive Receptors

Potential impacts on air quality from the project are provided in Section 12 of the Draft EIS. As discussed in the response to Issue 13.5, the Draft EIS air quality assessment determined that dust emissions from the project are not predicted to give rise to any exceedances of the applicable ambient air quality objectives at any of the closest sensitive receptors (i.e., Angurugu, Yedikba, Wurrumenbumanja, and Leske Pools Swimming Hole).

The Draft EIS describes the mitigation measures that will be put in place to limit dust emissions from the project. Dust will be monitored on an ongoing basis, including at Angurugu and Yedikba. If monitoring indicates any exceedances of air quality objectives, an investigation will be conducted by

13. JEFF ASCHMANN

the proponent, and additional dust controls will be applied as necessary.

Noise and Blasting Impacts on Sensitive Receptors

Potential impacts from noise and blasting on sensitive receptors are discussed in Section 13 of the Draft EIS. Noise criteria are designed to protect residential amenity, and are based on land use, taking into account background noises (e.g., noises generated by insects, dogs, running water, traffic, wind).

Predicted noise levels are expected to meet relevant noise criteria at all sensitive receptors, with the exception of an exceedance of the evening and night noise criteria during Project Year 9 at Wurrumenbumanja, which is an intermittently occupied outstation. The proponent will liaise with the ALC to resolve any community related issues that may arise from noise at this receptor, and will continue to operate a complaints handling procedure to respond to any noise related complaints.

Issue 13.11. Tourism – “Mine Tourism” does not complement the current NT strategy and does not Fit in with the Natural and cultural attributes of Groote Island

The Draft EIS does not contain any proposal to introduce mine tourism to Groote Eylandt.

Issue 13.12. Visual Amenity – The present mine and the proposed mining area together make up a significant area on the Island and a significant altered land-use and Visual Amenity. This detracts and does not complement environmental and cultural attributes of Groote Island. The proposal will simply be an “eyesore” and Not Acceptable

The visual impact assessment (contained in Section 14.5 of the Draft EIS) explains, using lines of sight, that the project will not be visible from any sensitive receptors, including Angurugu, Yedikba, Wurrumenbumanja, Leske Pools Swimming Hole and the Lookout at the Cave Paintings (Wurruwarrkbadenumanja). This is due to intervening topography (rocky outcrops and ridges) that will prevent views of the project elements from sensitive receptors, or dense vegetation (in the case of R4 – Leske Pools Swimming Hole) that will block views towards project elements.

It should be noted that the project site, including all infrastructure, will be decommissioned at the end of the mine life, and disturbed areas will be rehabilitated to return the area to open woodland, similar to the existing surrounding bushland.

Issue 13.13. Education – The EIS Mentions that there will be an Education Element, that will lead to employment. GEMCO in my view, has been operating for 50 Years, and still unemployment is high and school Education Statistics (reading, writing etc) are as bad or worse as in other areas without a mine. The company has a poor record and it's Future promise in regard to the proposal can Not be taken seriously. The Groote Island community is dys Functional at the moment after 50 Years of GEMCO.

The proponent has a range of Indigenous participation strategies and plans that are implemented as part of operations at the existing GEMCO mine. These strategies and plans include the *Rehabilitation*

13. JEFF ASCHMANN

& Mine Services Aboriginal Employment Strategy (RMS Strategy), and the Indigenous Employment Strategy.

As stated in Section 15.6.2 of the Draft EIS, local Aboriginal employment at the existing GEMCO mine has steadily increased since the introduction of the proponent's RMS Strategy in 2011. The success of the RMS Strategy is being carried over into a new employment strategy for the existing GEMCO mine which aims to increase Aboriginal participation in roles beyond the mine rehabilitation services sector. The RMS and Indigenous Employment Strategy are directly applicable to the project.

The proponent is working proactively to overcome low education levels and low labour force participation in the Aboriginal communities of Groote Eylandt. The proponent is working with the NT Department of Education on improving school attendance rates, and offering traineeships rather than apprenticeships, as the latter require significantly higher literacy and numeracy levels than the former.

Issue 13.14. Petrol Sniffing – There will likely be an increase in petrol Sniffing due to the increased mine infrasture. This has been a problem in the past and is likely to increase if the proposal is approved.

The only fuel supplied to Groote Eylandt is diesel and Opal fuel. Opal fuel is a direct substitute for unleaded petrol specifically created for use in communities with petrol sniffing issues.

Opal fuel was first supplied to Groote Eylandt in 2007, and since its introduction, petrol sniffing is no longer an issue for the residents of the island. The proponent was a key player in the introduction of Opal fuel to Groote Eylandt.

The Eastern Leases project will not result in an increase in petrol sniffing as there will be no alternative forms of fuel (other than diesel or Opal fuel) being used or supplied to the island. Diesel will be the only fuel source required for the project (refer to Section 3.7.5 of the Draft EIS).

Issue 13.15. Emerald Creek – I have observed pictures of people swimming in Emerald Creek (1985) One of the swimmers (White Tourist Vick Kimber 08-8941668) says "it was majical, crystal clear" The name also denotes the beauty. If the creek is used for swimming now, to put a mine in that area will be criminal

The Draft EIS acknowledges the pristine nature of the Emerald River and recognises the cultural and environmental sensitivities of the river, and indeed the other watercourses that traverse the project site (refer to Section 10.2.3 of the Draft EIS). The Draft EIS explains that mine planning has been undertaken to specifically avoid impacts on the rivers. In particular, as discussed in Section 10.3.3 of the Draft EIS, the project has been designed to ensure that mining will not encroach on the Emerald River, Amagula River, or their tributaries. Buffers were delineated around the watercourses during the mine planning process, to avoid disturbance of the main channels and to limit any interference with surface water flows. There will be no mining undertaken within the buffers.

The project has also been designed to avoid the need for any routine discharges of mine-affected water (refer to Section 10.5 of the Draft EIS). Long-term water balance modelling demonstrated that

13. JEFF ASCHMANN

there will be sufficient storage capacity to contain mine-affected water for the life of the project.

Further, to ensure runoff from areas disturbed by mining activities does not flow into waterways, collection drains will be constructed to redirect runoff to sediment traps and sediment dams (discussed in Section 10.4.2 of the Draft EIS).

The project therefore has a very limited potential to impact water quality or the environmental values of the watercourses that traverse the project site.

Issue 13.16. Cane Toad – The Cane Toad is a high risk, and chemical control will also be a risk. Groote Island (Now having a minimal problem) can be a special place For Native Flora and Fauna and a haven for cultural Hunting and Gathering Activities. If Cane Toads are restricted. Sadly this is unlikely to happen on Groote Island if the proposal goes ahead. According to Dr John Woinarski (NT News 11/7/2015) the number of Species in Kakadu National Park has declined by 54%. We can and should be combating this problem on Groote Island. This risk in regard to this proposal is unacceptable.

Section 4.3.3 of the Supplement provides further information in relation to the measures to prevent the introduction of Cane Toads. These include procedures in the event of Cane Toads being detected. In addition, the *Revised Biodiversity Offsets Strategy*, provided in Attachment B, indicates that biodiversity offsets are proposed to be secured through providing funding toward the implementation of the Northern Territory Government's Threatened Species Management Plan. Quarantine measures for Cane Toads are proposed to be a key component of this plan.

It should be noted that the Draft EIS does not propose the use of chemicals as a mitigation measure against Cane Toads.

Issue 13.17. Conclusion – The Groote Island area is of National and International Significance in relation to Environmental and cultural attributes. The cumulative risks of the proposal are many and compounded with the present mine impacts

The previous 50 Years of mining has not improved the overall environmental integrity as well as the overall "well being" of the Aboriginal Traditional owners. Statistics show that the economic royalty has led to a deterioration in cultural activities, increased drug use, violence and social dysfunction. The track record of GEMCO in successfully attacking these problems is poor.

For these reasons I object to the mine proposal going ahead

Noted. Responses to the individual environmental, cultural and socio-economic issues raised in this submission are provided in the preceding sections.

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*

*

for

HANSEN BAILEY



Laura Knowles
Principal Environmental Scientist



Peter Hansen
Director

ATTACHMENT A

Revised Commitments Register

ATTACHMENT A Revised Commitments Register

Table A1 provides a summary of the key commitments detailed throughout the EIS, and the relevant sections of the EIS in which they are found. These commitments have been updated following the submissions on the Draft EIS. New or revised text is indicated in red font, and deleted text is shown in red strikethrough font. The commitments contained in Table A1 supersede the commitments provided in Table 19-12 of the Draft EIS.

**Table A1
 Statement of Commitments for the Eastern Leases Project**

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
GENERAL				
Draft EIS: Section 3 – Project Description (Subsection 3.2)	The project will not increase GEMCO’s existing production rate of 5 Million tonnes per annum of manganese ore.		✓	
Draft EIS: Section 3 – Project Description (Subsection 3.2)	No upgrades of infrastructure at the existing mine or port will be required as a result of the project. The project workforce will be housed in existing workforce accommodation.	✓	✓	✓
Draft EIS: Section 3 – Project Description (Subsection 3.7.1)	Project landform design will ensure that all quarries will be backfilled with overburden, creating a free draining landform that broadly replicates the pre-mining topography. Backfilling the quarries in this way will ensure that there will be no elevated overburden emplacements (i.e. free standing emplacements/stockpiles that may be tens of metres high) or final voids (deep quarries that are not backfilled and consequently accumulate water over time) at the end of the mine life.		✓	✓
Draft EIS: Section 3 – Project Description (Subsection 3.7.1)	Any temporary overburden emplacements will be designed to have a maximum height of 15 m and an external batter slope of 10% (equivalent to 6°).		✓	
Draft EIS: Section 3 – Project Description (Subsection 3.7.1)	Temporary overburden emplacement areas will be located in the footprint of future mining areas.		✓	

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 3 – Project Description (Subsection 3.7.6)	Buffers have been defined around the Emerald River, Amagula River and their tributaries and there will be no mining within the defined buffers. The buffers were delineated by the 1% Annual Exceedance Probability (AEP) (1 in 100 year) flood extents. The buffers are shown in Figure 10-5 of the Draft EIS.		✓	
Draft EIS: Section 3 – Project Description (Subsection 3.7.6)	No river diversions or levees are required for the project.	✓	✓	✓
Draft EIS: Section 3 – Project Description (Subsection 3.7.8)	All borrow pits required for the project will be located within the disturbance footprint of the project.	✓	✓	
Draft EIS: Section 3 – Project Description (Subsection 3.7.4)	The current system for managing tailings and middlings will be extended to include tailings and middlings from the project.		✓	
Draft EIS: Section 3 – Project Description (Subsection 3.9.5)	The 4WD track to Dalumba Bay that traverses the project site will be relocated to avoid the mine. The proponent will consult with the East Arnhem Regional Council (EARC) and the ALC in relation to the proposed relocation.	✓		
Draft EIS: Section 3 – Project Description (Subsection 3.9.6) Supplement: Section 5 – Issue 10.3	The project haul road will be constructed as an overpass at the intersection with the Emerald River Road. The proponent will consult with the EARC and the ALC in relation to the design of the overpass, and will obtain any necessary approvals from these agencies prior to its construction. The overpass will be constructed early in the life of the project in order to minimise safety risks to road users.	✓		
Draft EIS: Section 4 – Environmental Risk Assessment	Design of haul roads will include sediment traps.	✓		
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.2)	A site traffic management plan will be developed for the project, which will include requirements for speed limits, safe driving practices and the installation of signage.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 4 – Environmental Risk Assessment	The proponent will implement procedures and driver training in relation to road safety.	✓	✓	✓
Draft EIS: Section 4 – Environmental Risk Assessment	Vehicles transporting over-dimensional loads will be escorted.	✓	✓	✓
Draft EIS: Section 4 – Environmental Risk Assessment	The proponent will circulate routine alerts and communications with the ALC in relation to the transport of heavy loads.	✓	✓	✓
Draft EIS: Section 4 – Environmental Risk Assessment	Although access to working areas of the project site will be restricted over the life of the project, Traditional Owners will be permitted continued access to the remainder of the project site to the extent that safe access can be provided.	✓	✓	✓
Draft EIS: Section 2 – Regulatory Framework	The project will comply with all applicable legislation, policies and Australian Standards as discussed in Section 2 – Regulatory Framework.	✓	✓	✓
REHABILITATION				
Draft EIS: Section 6 – Mine Rehabilitation and Closure (Subsection 6.3.4)	The project site will be progressively rehabilitated to create a self-sustaining open woodland, similar to the pre-mining environment. Rehabilitation will be in accordance with the procedures described in Section 6 – Mine Rehabilitation and Closure.	✓	✓	✓
Supplement: Section 4.3.5 – Rehabilitation Completion Criteria for Fauna	Rehabilitation criteria from the existing GEMCO mine will be reviewed for use by the project and will be updated to include completion criteria relevant to fauna.	✓	✓	✓
~~Section 6 – Mine Rehabilitation and Closure (Subsection 6.3.4)~~	~~As part of the Biodiversity Offsets Strategy (Appendix E), the proponent will fund and coordinate a research program designed to identify ways that rehabilitation could be improved in order to provide habitat for threatened fauna species, particularly the Northern Hopping mouse and the Brush-tailed Rabbit rat. The rehabilitation techniques for the project may be adjusted in the future to reflect the findings of this research.~~	~~✓~~	~~✓~~	~~✓~~

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 6 – Mine Rehabilitation and Closure (Subsection 6.3.2)	There will be specific management measures for the handling and placing of overburden from the small area in the Southern EL which has been identified as containing Potentially Acid Forming (PAF) material. This will involve monitoring for PAF material and selectively handling and burying any PAF material. In addition, samples will be collected at random from overburden emplacements and analysed on-site using net acid generation tests as a rapid screening tool.		✓	
Supplement: Section 4.3.6 – Fire in Rehabilitation	The proponent will undertake a systematic trial program of introducing controlled burning into rehabilitation areas. Procedures in relation to controlled burning of rehabilitation and completion criteria related to resilience of rehabilitation to fire will be developed for the project following the trial.	✓	✓	✓
ECOLOGY				
Draft EIS: Section 7 – Terrestrial Ecology (Subsections 7.6.3 and 7.7.2) Supplement: Section 4.3.2 – Weed Management Section 4.3.3 – Cane Toads	The proponent has existing management plans and manuals that address pests and weeds on its tenements. These will be applied to the project. Management measures will include those described in Sections 4.3.2 and 4.3.3 of the Supplement.	✓	✓	✓
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.2)	Clearing will be undertaken in accordance with the proponent's Permit to Clear process.	✓	✓	
Supplement: Section 4.3.1 – Salvage of Cleared Timber	The proponent will undertake a trial at the existing GEMCO mine in relation to the use of salvaged timber in rehabilitation areas, focussing on the habitat value of the timber for fauna. The results of the trial will inform the approach for the project with respect to felled timber.	✓	✓	
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.2)	The project site will be managed to conserve its conservation value, with management measures including weed and feral animal control and fire management (undertaken in consultation with the Traditional Owners). Land management measures will be documented in the proponent's existing Land and Biodiversity Management Plan, which will be updated to address the project.	✓	✓	✓
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.2)	The workforce will also be provided with information about threatened species, as part of their induction or through general environmental awareness programs.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.2)	Lighting will be designed to ensure that lighting is directed away from animal habitat areas, as far as possible.	✓	✓	✓
Draft EIS: Section 7 – Terrestrial Ecology (Subsection 7.7.3) Supplement: Attachment B – Revised Biodiversity Offsets Strategy	A Biodiversity Offsets Strategy will be implemented for the project.	✓	✓	✓
Supplement: Section 4.3.7 – Monitoring of Groundwater Dependent Ecosystems	A monitoring program will be implemented to monitor any impacts of groundwater drawdown on vegetation communities that are dependent on groundwater.		✓	
GROUNDWATER				
Draft EIS: Section 9 – Groundwater (Subsection 9.5)	The groundwater monitoring network established as part of EIS groundwater investigations will continue to be utilised throughout the life of the project. Section 9 – Groundwater describes monitoring frequency and parameters.	✓	✓	✓
SURFACE WATER				
Draft EIS: Section 10 – Surface Water (Subsection 10.8.2) Supplement: Section 4.3.8 – Erosion and Sediment Control Plan	An Erosion and Sediment Control Plan will be developed prior to the commencement of construction to address erosion and the control of suspended sediment. Monitoring will be undertaken to confirm the success of these measures and to identify any necessary remedial actions. The Erosion and Sediment Control Plan will be prepared in accordance with the requirements described in Section 4.3.8 of the Supplement.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsection 10.4.2)	Low flow drainage culverts will be installed at waterway crossings. Culverts will be designed to allow drainage of the 2 year average recurrence interval (ARI) flood flow. The culverts will not impede fish passage. Erosion and sediment controls will be installed at watercourse crossings and inspected to confirm their effectiveness.	✓	✓	

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Supplement: Section 4.2.3 – Haul Road Crossings of Watercourses; and Attachment E – Haul Road Crossing Design Overview Report	The haul road crossings of watercourses will be constructed, operated and maintained in accordance with the conceptual design and management principles contained in the <i>Haul Road Crossing Design Overview Report</i> (Attachment E of the Supplement).	✓	✓	
Draft EIS: Section 10 – Surface Water (Subsections 10.4.2 and 10.5.5)	The project has been designed with sufficient storage capacity for mine-affected water to ensure that no routine discharges of mine-affected water will be required.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsection 10.5.5)	The proponent will request authorisation for discharge of quarry water, as a contingency measure. The proposed contingency discharge conditions will be developed using the method described in <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (2000) (ANZECC Guidelines) for high conservation aquatic ecosystems.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsections 10.4.2 and 10.5.5)	Discharge points to natural drainage lines will be designed with energy dissipation measures, where necessary, to prevent any scouring and ensure stability.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsection 10.4.1)	Temporary and permanent diversion drains will be constructed to isolate the contained catchments of the quarries and to divert runoff from undisturbed areas through the mining areas.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsections 10.5.3 and 10.5.5)	Mine water storage dams will be constructed to have nil external catchment and will be operated with a freeboard to ensure they do not overflow. All dams will be designed and constructed in accordance with relevant engineering design standards and licence requirements.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsection 10.8.1)	A Water Management Plan will be prepared prior to commencement of the project. The plan will address water management for all stages of the project construction, operations and closure, as well as long-term post-mining water management requirements and monitoring.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 10 – Surface Water (Subsections 10.6 and 10.3.4)	Monitoring will be undertaken in accordance with a Water Management Plan. Monitoring will include: • Project water balance including water transfers, consumption and quarry water volumes; • Surface water quality monitoring and reporting; • Storage water quality monitoring and reporting; and • Discharge monitoring and reporting.	✓	✓	✓
Draft EIS: Section 10 – Surface Water (Subsection 10.7.2)	The proponent is conducting a review of regional stream gauging data with the intent of upgrading or installing additional downstream gauging.	✓		
AIR QUALITY				
Draft EIS: Section 12 – Air Quality (Subsection 12.9)	The proponent's existing Air Emissions Management Plan will be revised to include the construction and operation of the project, and the project will be operated in accordance with the requirements of the plan.	✓	✓	✓
Draft EIS: Section 12 – Air Quality (Subsection 12.9)	A number of controls have been included in the project design to limit dust emissions from the project (e.g. dust suppression watering). These are described in Section 12.9.	✓	✓	✓
Draft EIS: Section 12 – Air Quality (Subsection 12.9)	PM ₁₀ will be monitored at Angurugu and Yedikba.	✓	✓	✓
Draft EIS: Section 12 – Air Quality (Subsection 12.9)	If dust monitoring indicates any exceedances of air quality objectives, an investigation will be conducted by the proponent, and additional dust controls will be applied as necessary.	✓	✓	✓
Draft EIS: Section 12 – Air Quality (Subsection 12.9)	The proponent will continue the operation of its complaints handling procedure.	✓	✓	✓
Draft EIS: Section 12 – Air Quality (Subsection 12.10)	Greenhouse gas emissions and energy use/production associated with the project will be accounted for in ongoing annual National Greenhouse and Energy Reporting (NGER) in accordance with the <i>National Greenhouse and Energy Reporting Act 2007</i> and supporting legislation.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 12 – Air Quality (Subsection 12.10)	The project will adopt the initiatives in place at the existing mine to reduce and manage greenhouse gas emissions. These initiatives are described in Section 12.10.	✓	✓	✓
NOISE AND VIBRATION				
Draft EIS: Section 13 – Noise and Vibration (Subsection 13.6.1)	The proponent will undertake discussions with the ALC, as the representative of the Traditional Owners of Wurrumenbumanja Outstation, to resolve any issues that may arise from predicted noise levels at this outstation.	✓	✓	
Draft EIS: Section 13 – Noise and Vibration (Subsection 13.7.2)	The proponent will prepare and implement a Blast Management Plan that describes the approach that will be adopted to prevent damage from blasting to rock shelters containing archaeological sites. A description of this plan is described in Section ~~13.6.2~~ 13.7.2	✓	✓	
Draft EIS: Section 4 – Environmental Risk Assessment	The ALC will be notified of proposed blasting. Safety measures for blasting may include road closures and use of signage and sentries on roads in close proximity to blasting.	✓	✓	
SOCIO-ECONOMICS				
Draft EIS: Section 15 – Socio-economics (Subsection 15.8.1)	The proponent has an established framework for the management of socio-economic impacts and benefits relevant to the existing operations (Section 15.6.5). All existing procedures operating within this framework will be applicable to the project. These include periodically undertaking: • Human Rights Impact Assessment; • Social Baseline Study; and • Community Perception Survey.	✓	✓	✓
Draft EIS: Section 15 – Socio-economics (Subsection 15.8.1)	The Community Development Management Plan, which has been prepared for the existing mine, will be extended to include the project. It includes a register of community development projects and donations, commitments and approvals and a register of the employee matched-giving program.	✓	✓	✓
Draft EIS: Section 15 – Socio-economics (Subsection 15.8)	The proponent is updating the current Indigenous Employment Strategy for the existing mine. The updated strategy will be applicable to the project.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
ARCHAEOLOGY				
Draft EIS: Section 16 – Archaeology (Subsection 16.5.1)	The proponent will consult with the ALC in relation to a suitable management approach for the single archaeological site (i.e. the manuport), which is located within the mine disturbance footprint. A potential approach involves relocating the manuport beyond the mine disturbance footprint. Under the Northern Territory <i>Heritage Act</i> , relocation of this site would be considered to be disturbing or destroying a site. The proponent will therefore obtain approval under Section 72 of this Act prior to disturbing the site.	✓	✓	
Draft EIS: Section 16 – Archaeology (Subsection 16.5.2)	The proponent will place access restrictions on areas where archaeological sites occur, in order to prevent the mine workforce from entering these areas.	✓	✓	✓
Draft EIS: Section 16 – Archaeology (Subsection 16.5.2)	Potential impacts of dust on archaeological sites containing art will be managed in accordance with the approach described in Section 16.5.2.	✓	✓	✓
Draft EIS: Section 16 – Archaeology (Subsection 16.6.2)	Further archaeological surveys of the two clustered sites (i.e. sites ELS06 to ELS13 and ELS15 in the Southern EL, and ELN04 to ELN06 and ELN08 to ELN13 in the Northern EL) will be undertaken to ensure that all individual sites within these areas have been identified.	✓		
Draft EIS: Section 16 – Archaeology (Subsection 16.6.3)	A Cultural Heritage Management Plan will be prepared.	✓	✓	✓
Draft EIS: Section 16 – Archaeology (Subsection 16.6.4)	A procedure (as described in Section 16.6.4) will be adopted to mitigate impacts in the event that unexpected archaeological sites are located during ground disturbance activities associated with the project.	✓	✓	✓
NON-MINING WASTE				
Draft EIS: Section 17 – Non-mining Waste (Subsection 17.2.4)	Project wastes will be disposed of in accordance with current practices, and no changes to the existing waste disposal facilities are required as a result of the project.	✓	✓	✓

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
HEALTH AND SAFETY				
Draft EIS: Section 18 – Health and Safety (Subsection 18.2.1)	The proponent has extensive health, safety and risk management systems and procedures currently in place for the existing mine. Risks to human health and safety associated with the project will be managed in accordance with these systems and procedures. These include a Risk Management Plan, and a series of management plans, policies and procedures to manage specific hazards at the site.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.2.1)	Prior to the commencement of the project, a detailed risk register will be created to identify hazards and management controls to reduce risks during the construction, operation and decommissioning phases of the project.	✓		
Draft EIS: Section 18 –Health and Safety (Subsection 18.3.1)	A rigorous re-appraisal of hazards associated with the project will be undertaken as part of the RMP prior to the commencement of the construction, operations and decommissioning phases of the project, based on detailed design and operating plans.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.2.1)	All incidents that cause environmental harm will be reported to the Department of Mines and Energy as soon as practicable, in accordance with Section 29 of the <i>Mining Management Act</i> .	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	Any chemicals or proprietary substances that may be required for the project will carry a Material Safety Data Sheet (MSDS) which will clearly state whether the substance is hazardous or non-hazardous. Where an MSDS shows a substance to be hazardous, the appropriate risk and safety procedures will be adopted to ensure best practice management measures are applied.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	No permanent bulk storages for diesel are proposed to be constructed for the project, and any on-site storage of diesel will be limited to small scale portable containers.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	The proponent’s existing refuelling procedures will be adopted to prevent and control any spills that may occur during vehicle and equipment refuelling. Spill cleanup kits will be located at strategic locations and all staff will be trained in their use.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	Explosives will be transported to the project site by a licensed explosives contractor. The proponent has stringent guidelines and procedures regarding the storage, transport and handling of explosives, and all personnel are required to adhere to these procedures at all times. These procedures will be implemented for the project.	✓	✓	

EIS SECTION ¹	COMMITMENT	PROJECT PHASE ²		
		CON	OPS	DCM
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	The proponent undertakes occupational health and safety (OH&S) surveillance and monitoring of the workforce at the existing mine, which includes monitoring manganese levels. This OH&S monitoring program will continue for the life of the project.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.3)	Access to the operating mine site will be restricted and appropriate signage will be erected.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.4)	The proponent's existing emergency preparedness and response plans will be implemented for the project.	✓	✓	✓
Draft EIS: Section 18 – Health and Safety (Subsection 18.3.4)	The proponent will implement regular mosquito monitoring and management program, which will be conducted in collaboration with the Medical Entomology Group of the NT Department of Health.	✓	✓	✓
Draft EIS: Section 4 – Environmental Risk Assessment	The proponent will maintain the existing system of alerts for employees in relation to the presence of crocodiles, and will continue the general awareness program that is in place for the workforce in relation to crocodiles.	✓	✓	✓

¹ The EIS section reference refers to the primary section describing the commitment, although it is noted that in some instances a commitment is made in several EIS sections.

² Con – Construction Phase; Ops – Operations Phase; Dcm – Decommissioning Phase

ATTACHMENT B

Revised Biodiversity Offsets Strategy



EASTERN LEASES PROJECT

REVISED BIODIVERSITY OFFSETS STRATEGY

for
South32
January 2016

GROOTE EYLANDT MINING COMPANY (GEMCO)
EASTERN LEASES PROJECT

REVISED
EPBC ACT BIODIVERSITY OFFSETS
STRATEGY

Prepared by:

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14 January 2016

For:

SOUTH32 PTY LTD
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TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	PURPOSE OF THE DOCUMENT	1
1.2	OVERVIEW OF APPROVAL PROCESS	1
1.3	REQUIREMENT FOR OFFSETS	2
1.4	DOCUMENT STRUCTURE	2
2	PROJECT OVERVIEW	3
2.1	PROJECT DESCRIPTION	3
2.2	PROJECT SETTING	3
3	OVERVIEW OF THE DRAFT BOS	5
4	FEEDBACK RECEIVED ON THE DRAFT BOS	7
4.1	CONSULTATION	7
4.2	EIS SUBMISSIONS	9
4.3	ISSUES RAISED IN SUBMISSIONS AND CONSULTATION	9
5	OVERVIEW OF CURRENT CONSERVATION INITIATIVES	11
5.1	INTRODUCTION	11
5.2	THREATENED SPECIES STRATEGY	11
5.3	GROOTE EYLANDT BIODIVERSITY INITIATIVE	12
5.4	THREATENED SPECIES MANAGEMENT PLAN	12
6	REVISED BIODIVERSITY OFFSETS STRATEGY	14
6.1	INTRODUCTION	14
6.2	SPECIES FOR WHICH OFFSETS WILL BE PROVIDED	14
6.2.1	Overview	14
6.2.2	Potential Impacts on Target Species for Offsets	15
6.2.3	Profile of Target Species	16
6.3	FOCUS ON DIRECT CONSERVATION ACTIONS	18
6.4	ALIGNMENT WITH CURRENT CONSERVATION INITIATIVES	19
6.5	VALUE OF THE BIODIVERSITY OFFSETS	19
6.6	STAKEHOLDER FEEDBACK ON REVISED BOS	19
7	POTENTIAL FRAMEWORK FOR ADMINISTERING OFFSETS	21
8	REFERENCES	22

LIST OF TABLES

Table 1	Consultation Undertaken in Relation to Biodiversity Offsets
Table 2	Target Species for Offsets

LIST OF FIGURES

Figure 1	Location Plan
Figure 2	Project Setting

LIST OF APPENDICES

Appendix A	Profile of Species for which Offsets will be Provided

LIST OF ABBREVIATIONS AND TERMINOLOGY

ALC	Anindilyakwa Land Council
ALC Rangers	ALC Land and Sea Management Unit
ALRA	<i>Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)</i>
BOS	Biodiversity Offsets Strategy
DLRM	Department of Land Resource Management (NT)
DotE	Department of the Environment (Federal)
Draft BOS	Biodiversity Offsets Strategy contained in Appendix E of the Draft EIS
EA Act	<i>Environmental Assessment Act (NT)</i>
Eastern Leases	ELR28161 and ELR28162
EIS	Environmental Impact Statement
ELR	Exploration Licence in Retention
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
GEMCO	Groote Eylandt Mining Company Pty Ltd
IPA	Indigenous Protected Area
MNES	Matters of National Environmental Significance
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority (NT)
Revised BOS	Refers to this document
SPRAT	Species Profile and Threats Database
Target Species	Northern Hopping-mouse (<i>Notomys aquilo</i>) Brush-tailed Rabbit-rat (<i>Conilurus penicillatus</i>) Northern Quoll (<i>Dasyurus hallucatus</i>) Masked Owl (northern) (<i>Tyto novaehollandiae kimberli</i>)
the project	Eastern Leases Project
TOR	Terms of Reference
TPWC Act	<i>Territory Parks and Wildlife Conservation Act (NT)</i>
TSMP	Threatened Species Management Plan

EASTERN LEASES PROJECT REVISED EPBC ACT BIODIVERSITY OFFSETS STRATEGY

for
South32 Pty Ltd

1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document forms part of the Supplement to the Draft Environmental Impact Statement (EIS) for the Eastern Leases Project (the project), and replaces the Biodiversity Offsets Strategy (BOS) that was included in the Draft EIS for the project. For the purposes of this document, the BOS contained in the Draft EIS shall be referred to as the Draft BOS, and this document shall be referred to as the Revised BOS.

This Revised BOS outlines the proponent's current position in relation to biodiversity offsets, and reflects:

- The issues raised in the submissions on the Draft EIS which made specific comments on biodiversity offsets; and
- The outcomes of consultation with key stakeholders that has been undertaken by the proponent.

This document has been prepared by Hansen Bailey on behalf of South32 and the Groote Eylandt Mining Company (GEMCO).

1.2 OVERVIEW OF APPROVAL PROCESS

The project is subject to an environmental assessment process in accordance with the Northern Territory's *Environmental Assessment Act* (EA Act) and *Environmental Assessment Administrative Procedures*. The Northern Territory Environment Protection Authority (NT EPA) determined that an EIS is required for the project. The EIS process supports an application for Authorisation under the NT *Mining Management Act*.

The project was declared a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions are potential impacts on listed threatened species and communities and listed migratory species. The EIS prepared under the EA Act has been accredited to support the EPBC Act approval. A Draft EIS was prepared for the project and placed on public exhibition from 30 May to 10 July 2015. A total of 13 submissions were received on the Draft EIS and a Supplement to

the Draft EIS has been prepared to address the issues raised in the submissions. The Draft EIS, and the Supplement to the Draft EIS, together form the EIS for the project.

This document forms part of the Supplement to the Draft EIS which was lodged with the NT EPA on 14 January 2016.

1.3 REQUIREMENT FOR OFFSETS

Environmental offsets are actions taken to counterbalance the significant residual impacts of a project. Offsets are required for Matters of National Environmental Significance (MNES) protected under the EPBC Act (i.e. threatened species and communities, and migratory species) in the event that significant impacts are predicted to remain after avoidance and mitigation measures have been taken. Further detail on the requirement for offsets is provided in the EPBC Act Environmental Offsets Policy (SEWPaC, 2012a). The Revised BOS has been structured to meet the requirements of this policy.

The Revised BOS also addresses the requirements of Terms of Reference for the EIS (EIS TOR) which were prepared by the NT EPA. The EIS TOR provide a reference to the EPBC Act Environmental Offsets Policy, and the requirement to provide offsets for residual significant impacts. Northern Territory (NT) legislation does not currently contain any requirement for offsets, although the NT EPA has published a general guideline on the concept of offsets (Guidelines on Environmental Offsets and Associated Approval Conditions, NT EPA, 2013).

1.4 DOCUMENT STRUCTURE

The Revised BOS is structured as follows:

- Section 1 – Provides an introduction to the document;
- Section 2 – Provides an overview of the project and its setting;
- Section 3 – Provides an overview of the Draft BOS;
- Section 4 – Provides a summary of the feedback received on the Draft BOS;
- Section 5 – Provides an overview of current conservation initiatives being progressed by the NT and Federal governments;
- Section 6 – Provides the Revised BOS;
- Section 7 – Provides a potential framework for administering offsets; and
- Section 8 – Provides the references used in the development of this document.

2 PROJECT OVERVIEW

2.1 PROJECT DESCRIPTION

GEMCO operates a manganese mine (the existing mine) on Groote Eylandt in the Gulf of Carpentaria, approximately 650 km south-east of Darwin in the Northern Territory (Figure 1). Operations at the existing mine involve mining manganese ore by open cut mining methods, and then processing the ore in a concentrator to produce a washed ore. The concentrate is transported from the mine by road train to GEMCO's port facility at Milner Bay (Figure 2).

GEMCO is proposing to develop the Eastern Leases Project (the project) in order to access additional mining areas, located to the east of the existing mine. The additional mining areas comprise two Exploration Licences in Retention (ELRs) which are termed the Eastern Leases. ELR28161 is termed the Northern Eastern Lease (Northern EL) and ELR28162 is termed the Southern Eastern Lease (Southern EL). The project will use the same open cut mining methods used at the existing mine. Project mining areas will be connected to the existing mine via a new haul road (Figure 2). Manganese ore will be transported via this haul road to the existing mine for processing.

The project is an additional mining area that will be operated as part of the existing mine, rather than an independent mine. The project will make use of infrastructure (e.g. concentrator, stockpiles) at the existing mine. No upgrades to this infrastructure are required as a result of the project. Construction of the project is anticipated to commence in 2017, subject to the receipt of necessary approvals. Mining would take place for approximately 13 years. The project and the existing mine would operate concurrently.

2.2 PROJECT SETTING

Groote Eylandt is Australia's third largest island, with a land area of approximately 2,285 km². It is the largest island in the Gulf of Carpentaria in north-eastern Australia. It forms part of an archipelago of islands, with other nearby islands including Bickerton Island, Connexion Island and Winchelsea Island. Groote Eylandt is Aboriginal land, scheduled under the Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA). The Land Council responsible for Groote Eylandt is the Anindilyakwa Land Council (ALC).

Groote Eylandt, and the other islands in the archipelago, have significant ecological value because the terrestrial fauna species present on the island are relatively protected from key threatening processes (such as Cane Toads) that exist on the mainland. There is also very little development on Groote Eylandt. Development is limited to the existing mine and three small townships. The remainder of the island is undeveloped and is used primarily for traditional Aboriginal practices such as hunting and gathering. There are no agricultural activities on Groote Eylandt and no introduced herbivores (such as cattle).

The Groote Eylandt Archipelago is an Indigenous Protected Area (IPA). An IPA is an area of Indigenous-owned land or sea where Traditional Owners have entered into an agreement with the Federal Government to promote biodiversity and cultural resource conservation (Department of the Environment, 2013a). The Groote Eylandt Archipelago was declared the Anindilyakwa IPA in 2006, and is administered by the ALC. The ALC Land and Sea Management Unit (ALC Rangers) undertake land management activities within the IPA.

3 OVERVIEW OF THE DRAFT BOS

This section provides an overview of the Draft BOS (contained in Appendix E of the Draft EIS), for the purpose of providing context to the proposed revisions to the BOS and the submissions received on the Draft BOS. As noted in Section 1.1, this Revised BOS replaces the Draft BOS.

Four threatened species protected under the EPBC Act occur within the project site, namely the Northern Hopping-mouse (*Notomys aquilo*), Brush-tailed Rabbit-rat (*Conilurus penicillatus*), Northern Quoll (*Dasyurus hallucatus*) and Masked Owl (northern) (*Tyto novaehollandiae kimberli*). The Draft BOS proposed offsets for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat. Offsets were proposed for these species because the Draft EIS predicted that the project would have the potential to give rise to significant, residual impacts on these species. The Draft EIS did not predict significant, residual impacts on any other EPBC Act listed species, and consequently the offsets were limited to these two species. In particular, although the Northern Quoll and Masked Owl (northern) are found within the project site, the Draft EIS concluded that the project would not have a significant, residual impact on these species because habitat for these species would be created in areas of mine rehabilitation.

The Draft BOS indicated that offsets for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat would be in the form of “other compensatory measures” (i.e. non-land based offsets, also called “indirect offsets”). Indirect offsets were proposed to be provided in the form of well-planned scientific research relevant to priorities and threats identified for the target species. The Draft BOS indicated that specific research programs were still to be finalised, but proposed programs could include:

- Research into feral cat control, specifically baiting feral cats and ways to minimise impacts of baiting on non-target species (e.g. Northern Quolls).
- Research into the ecological requirements, distribution and threats to the Brush-tailed Rabbit-rat.
- Research into improving the value of mine rehabilitation as habitat for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat.

Offsets were proposed to be delivered via a partnership program that involved sponsoring research, rather than proposing to undertake direct management action. This approach was proposed for the following reasons:

- The proponent places a strong emphasis on science-led management. Feral cat control is a key conservation issue for Groote Eylandt, particularly in relation to the conservation of small mammals. However, there are a number of issues that need to

be further investigated prior to implementing a program of feral cat control on Groote Eylandt. These are the areas that the Draft BOS targeted for research, and include:

- Addressing current gaps in knowledge in relation to the density and distribution of feral cats on the island; and
- Research into the way that poison baits for feral cats are used, given the presence of native species such as Northern Quolls and Monitor Lizards, which may be inadvertently harmed by the baits.
- Groote Eylandt is Aboriginal owned land, under the management of the ALC and ALC Rangers, and it would not be appropriate for the proponent to propose direct land management activities on their behalf.

The Draft BOS indicated that further consultation with stakeholders including the ALC, ALC Rangers and government agencies in relation to the proposed offsets was planned. The Draft BOS therefore, represented a starting point to guide this consultation process.

4 FEEDBACK RECEIVED ON THE DRAFT BOS

4.1 CONSULTATION

The Draft BOS provided a starting point for initiating discussions in relation to potential biodiversity offset programs. The Draft BOS recognised that any proposed research or conservation initiatives would need to take into account any relevant existing or proposed conservation programs or research. In addition, it was recognised that biodiversity offsets would need to be developed with the support of key stakeholders including, but not limited to, the ALC, ALC Rangers, the Federal Department of the Environment (DotE) and the NT Department of Land Resource Management (DLRM). The reason for this is:

- The ALC represents the Traditional Owners of Groote Eylandt;
- The ALC Rangers are responsible for land management activities on Groote Eylandt;
- DotE is the Federal government regulator for the approval of the project under the EPBC Act and the associated biodiversity offsets required by the conditions of the approval; and
- The NT DLRM is the Northern Territory government agency with responsibility for assessment and management of biodiversity and is proposing research and conservation management programs for the island that will likely prove relevant to offsets (Section 5).

The proponent has now consulted with these stakeholders in relation to biodiversity offsets. Table 1 outlines the meetings that have been held, and Section 4.3 provides a summary of the key themes related to offsets that emerged during consultation.

Table 1
Consultation Undertaken in Relation to Biodiversity Offsets

Date	Meeting Attendees	Proponent Representatives
27 May 2015	FEDERAL DEPARTMENT OF THE ENVIRONMENT - Pablo Schopen, Acting Assistant Director, Project Approvals West Section - David Loch, Assessment Officer, Project Approvals West Section	SOUTH32 - Mike Chapman, Project Study Manager - Heath Carney, Specialist Environment Improvement GEMCO - Matt O'Hare, Superintendent Rehab & Mine Services HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist - Bronwyn Pressland, Principal Social Planner CUMBERLAND ECOLOGY - David Robertson, Director

Date	Meeting Attendees	Proponent Representatives
29 May 2015	NT DLRM (Flora & Fauna Division) - Alaric Fisher, Executive Director - Brydie Hill, Acting Director Species Conservation - Lisa Bradley, Senior Policy Officer NT EPA - Alana Mackay, Manager Environmental Assessments	SOUTH32 - Mike Chapman, Project Study Manager - Heath Carney, Specialist Environment Improvement HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist - Bronwyn Pressland, Principal Social Planner CUMBERLAND ECOLOGY - David Robertson, Director
17 June 2015	ALC RANGERS - Rick Taylor, Land & Sea Manager - Stacey Taylor, IPA Coordinator Consultant ALC - Ross McDonald, Mining & Environment Manager	SOUTH32/GEMCO - Mike Chapman, Project Study Manager - Heath Carney, Specialist Environment Improvement - John Hansen, Superintendent Indigenous Affairs - Johnathan Wurramarrba, Coordinator External Affairs HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist - Bronwyn Pressland, Principal Social Planner
28 August 2015	NT DLRM (Flora & Fauna Division) - Alaric Fisher, Executive Director - Graeme Gillespie, Director Terrestrial Ecosystems	SOUTH32 - Mike Chapman, Project Study Manager HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist - Kate Everding, Environmental Scientist CUMBERLAND ECOLOGY - David Robertson, Director
1 October 2015	OFFICE OF THE THREATENED SPECIES COMMISSIONER - Gregory Andrews, Threatened Species Commissioner - Rob Quinn, Senior Advisor to the Threatened Species Commissioner - (and other attendees from DotE)	SOUTH32 - Mike Chapman, Project Study Manager HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist
1 October 2015	FEDERAL DEPARTMENT OF THE ENVIRONMENT - Pablo Schopen, Acting Assistant Director, Project Approvals West Section - Matt Whitting, Assistant Director, Project Approvals West Section	SOUTH32 - Mike Chapman, Project Study Manager HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist

Date	Meeting Attendees	Proponent Representatives
8 December 2015	ALC RANGERS - Rick Taylor, Land & Sea Manager - Stacey Taylor, IPA Coordinator Consultant ALC - Ross McDonald, Mining & Environment Manager	SOUTH32/GEMCO - Mike Chapman, Project Study Manager - John Hansen, Superintendent Indigenous Affairs - Johnathan Wurramarrba, Coordinator External Affairs HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist
9 December 2015	NT DLRM (Flora & Fauna Division) - Alaric Fisher, Executive Director - Graeme Gillespie, Director Terrestrial Ecosystems	SOUTH32 - Mike Chapman, Project Study Manager HANSEN BAILEY - Laura Knowles, Principal Environmental Scientist

4.2 EIS SUBMISSIONS

A number of submissions on the Draft EIS also raised issues in relation to biodiversity offsets. Submissions related to offsets were received from the following stakeholders:

- NT EPA (and DotE);
- DLRM;
- ALC;
- ALC Rangers; and
- NT Environment Centre.

The main body of the Supplement to the Draft EIS includes a response to the individual issues raised, including issues related to offsets. Section 4.3 below provides a summary of key themes related to offsets that emerged from the submissions.

4.3 ISSUES RAISED IN SUBMISSIONS AND CONSULTATION

This section provides a summary of the key themes related to biodiversity offsets that emerged during the consultation phase and from the submissions received on the Draft EIS. A number of additional issues were raised by individual stakeholders (beyond these themes) and a response to these issues is provided in the main body of the Supplement to the Draft EIS. However, this section is restricted to discussing key themes that emerged from multiple submissions or consultation with multiple stakeholders, and particularly themes that have influenced the direction of the Revised BOS. It should be noted, however, that not all stakeholders raised issues directly relating to these themes, or necessarily support these

themes. The proponent has, nevertheless, taken all stakeholders' opinions into consideration in the development of this Revised BOS.

Key themes arising from the EIS submissions and consultation were as follows:

1. A request for biodiversity offsets to be extended to include both the Northern Quoll and Masked Owl (northern), unless data is available to confirm that mine rehabilitation provides the full range of habitat values for these species, and that habitat in mine rehabilitation is comparable to the habitat provided in the pre-mining environment.
2. A desire for offsets (or at least a proportion of offsets) to be in the form of direct conservation actions (i.e. on the ground management work), rather than through funding of research programs.
3. Support from a number of stakeholders for offset programs to be directed towards land management actions, particularly feral cat control programs.
4. A request for the proponent to consider the potential to align offsets with conservation initiatives that have recently been developed by the NT and Federal governments. These initiatives specifically relate to the Groote Eylandt Biodiversity Initiative, the Threatened Species Management Plan (TSMP) (that is proposed be developed as an outcome of the Groote Eylandt Biodiversity Initiative), and the Threatened Species Strategy. Section 5 provides further detail on these initiatives.

5 OVERVIEW OF CURRENT CONSERVATION INITIATIVES

5.1 INTRODUCTION

A number of submissions recommended that the proponent consider aligning offsets with recently developed conservation initiatives. These initiatives were published around the time that the Draft EIS was placed on exhibition. The key initiatives are as follows:

- The Federal Government's publication of the Threatened Species Strategy, which was launched at the Threatened Species Summit in July 2015; and
- The NT Government's Groote Eylandt Biodiversity Initiative, which will guide the development of a TSMP for Groote Eylandt.

These are discussed in the following sections. It will be necessary for the proponent's offsets to be cognisant of these initiatives. As detailed in Section 6.4, there is also the potential for offsets to be delivered by contributing funding toward the implementation of management programs identified through these initiatives.

5.2 THREATENED SPECIES STRATEGY

The Threatened Species Strategy was released by the Threatened Species Commissioner (part of DotE) in July 2015. The strategy describes the Federal Government's priorities with respect to threatened species conservation over the next five years. The strategy states that it is based on the first principles of scientific evidence, on-ground action and collaborative partnerships with territory (and state) governments, community groups, Indigenous groups, non-government organisations, business, scientific organisations and others. It includes an Action Plan for 2015-16, which outlines the following four key action areas:

- Tackling feral cats;
- Providing safe havens for species most at risk;
- Improving habitat; and
- Emergency intervention to avert extinctions.

The action area related to feral cat control is particularly relevant to the Eastern Leases Project. This action area includes "funding committed for commencement of a feral cat eradication program on at least one new island – Groote Eylandt" (Threatened Species Strategy, page 48). This funding commitment has been met by the Federal Government providing funding to the NT Government's Groote Eylandt Biodiversity Initiative, discussed in Section 5.3.

5.3 GROOTE EYLANDT BIODIVERSITY INITIATIVE

The Groote Eylandt Biodiversity Initiative was developed by the NT DLRM in order to “improve the conservation security of Groote Eylandt, improve understanding of threats, and test key aspects of the efficiency of using poison baits for feral cat control in Northern Australia”. The biodiversity initiative was announced at the Threatened Species Summit in July 2015, confirming that the Federal Government would provide \$235,000 in funding to DLRM to support the Groote Eylandt Biodiversity Initiative. The NT Government is providing additional funding to this initiative.

The funding will be used to meet the following objectives:

1. Determine the current distribution and status of threatened mammal species on Groote Eylandt.
2. Determine the distribution and estimate the density of feral cats on Groote Eylandt.
3. Evaluate the impact of feral cat baiting on Northern Quolls and other non-target species such as Northern Brown Bandicoots and Dingoes.
4. Building on the findings of Objectives 1-3, prepare a TSMP for Groote Eylandt. The TSMP is discussed in Section 5.4.

The research is scheduled to commence in 2016.

It is noteworthy that the research issues that will be addressed by the Groote Eylandt Biodiversity Initiative have significant overlap with the potential research projects identified in the Draft BOS (Section 3).

5.4 THREATENED SPECIES MANAGEMENT PLAN

A TSMP is proposed to be developed for Groote Eylandt, as an outcome of the Groote Eylandt Biodiversity Initiative. Although DLRM proposes to facilitate the development of the TSMP, it will be developed collaboratively with key stakeholders including the ALC, ALC Rangers and GEMCO (the project proponent). DLRM has indicated that it proposes to commence engagement with key stakeholders in relation to the development of TSMP in 2016. The TSMP is scheduled to be prepared in 2017. Research activities undertaken as part of the Groote Eylandt Biodiversity Initiative will help inform the development of the TSMP.

The TSMP aims to provide evidence-based prioritisation of management actions for threatened species on Groote Eylandt, and could guide future investment and on-ground management activities undertaken by, for example, the ALC Rangers. Work is still to commence on development of the TSMP, and so the management priorities are yet to be determined. However, at this stage, it is likely that management priorities would include

Cane Toad biosecurity, feral cat management, maintenance of benign fire regimes and control of environmental weeds. Depending on the outcomes of consultation with the community and incorporation of learnings from recent and proposed new research, the TSMP may outline additional management actions beyond these obvious priorities, and the TSMP is also likely to outline additional research necessary to effectively address threats to threatened species.

As noted in Section 5.3, funding has been secured to prepare the TSMP (including undertaking some additional research that will guide the TSMP). Funding has not yet been secured to implement any of the management work that will be identified in the TSMP and it is understood following discussions with NT DLRM and the Threatened Species Commissioner's Office that contribution to funding by industry would be strongly encouraged.

6 REVISED BIODIVERSITY OFFSETS STRATEGY

6.1 INTRODUCTION

The Draft BOS has been revised to reflect the issues raised in EIS submissions and during consultation, and also to reflect recent developments with respect to the conservation initiatives described in Section 5. The revisions address the following three issues:

- Inclusion of the Northern Quoll and Masked Owl (northern) in the Revised BOS;
- Shifting the primary focus of the offsets strategy away from research towards direct conservation actions; and
- Exploring the potential to secure offsets by contributing funding toward the implementation of conservation actions identified in the TSMP.

These issues are discussed in the following sections.

6.2 SPECIES FOR WHICH OFFSETS WILL BE PROVIDED

6.2.1 Overview

As noted in Section 1.3, offsets are required for EPBC Act listed species in the event that significant impacts are predicted to remain after avoidance and mitigation measures have been taken. The Draft EIS concluded that the project may give rise to significant, residual impacts on the Northern Hopping-mouse and the Brush-tailed Rabbit-rat. The Draft EIS indicated that, in keeping with the requirements of the EPBC Act Environmental Offsets Policy, offsets will be provided to counterbalance these predicted impacts.

The Northern Quoll and Masked Owl (northern) are EPBC Act listed threatened species that also occur within the project site. The Draft EIS concluded that the project would not give rise to significant, residual impacts on these two species, given that habitat for these species will ultimately be created in areas of mine rehabilitation. As noted in the Draft EIS, the Northern Quoll has been recorded in mine rehabilitation at the existing GEMCO mine. The Draft EIS concluded that the availability of mine rehabilitation will ensure that the impact on the Northern Quoll and Masked Owl (northern) will not be a permanent impact, and hence that offsets would not be required for this impact. However, submissions received on the Draft EIS requested evidence to support the conclusion that mine rehabilitation will provide a full range of habitat values (e.g. foraging, denning, or breeding habitat) for the Northern Quoll and Masked Owl (northern). The submissions indicated that offsets should be provided for these species unless data is available to confirm that mine rehabilitation provides the full range of habitat values, and that habitat in mine rehabilitation is comparable to the habitat provided in the pre-mining environment.

As noted in Section 6.2.4 of the Draft EIS, the proponent has only recently initiated fauna monitoring in mine rehabilitation. The survey work undertaken as part of the preparation of the Draft EIS confirmed the presence of Northern Quolls in mine rehabilitation, but there is currently no data in relation to the species' density within the rehabilitation or its use of rehabilitation (e.g. for foraging, denning etc.). There is no data on the Masked Owl (northern) in mine rehabilitation. Collection of this data would require an intensive, long term monitoring program, which is not feasible within the timeframe of an EIS. Consequently, although the proponent is confident that such a monitoring program would support the findings of the Draft EIS, offsets will be provided for the Northern Quoll and Masked Owl (northern) as a precautionary measure, given that long term monitoring data is not available at this point in time.

The Northern Quoll and Masked Owl (northern) make use of the same habitat as the two species for which offsets are required to be provided (i.e. the Northern Hopping-mouse and the Brush-tailed Rabbit-rat). Given this common habitat, and the fact that offsets are proposed to provide ecological benefits at a landscape scale (as discussed in Sections 6.3 and 6.4), it is reasonable to assume that the offsets for the Northern Hopping-mouse and the Brush-tailed Rabbit-rat can be designed in a manner that also benefits the Northern Quoll and Masked Owl (northern).

Table 2 summarises the species for which offsets will be provided. These species are termed the "target species" in this Revised BOS.

Table 2
Target Species for Offsets

Common Name	Scientific Name	EPBC Act Status	<i>Territory Parks and Wildlife Conservation Act (TPWC Act) Status</i>
Northern Hopping-mouse	<i>Notomys aquilo</i>	Vulnerable	Vulnerable
Brush-tailed Rabbit-rat	<i>Conilurus penicillatus</i>	Vulnerable	Endangered
Northern Quoll	<i>Dasyurus hallucatus</i>	Endangered	Critically Endangered
Masked Owl (northern)	<i>Tyto novaehollandiae kimberli</i>	Vulnerable	Vulnerable

6.2.2 Potential Impacts on Target Species for Offsets

The Draft EIS explains that impacts on the target species will largely be as a result of proposed clearing of habitat for these species. Vegetation clearing will be undertaken progressively for the project, with a total of 1,525 ha proposed to be cleared.

This will give rise to the following loss of habitat:

- Clearing of approximately 1,125 ha of open forest, and sandstone woodland and rock outcrop habitat that is potentially suitable for the Northern Hopping-mouse.
- Clearing of approximately 1,525 ha of habitat that is potentially suitable for the Brush-tailed Rabbit-rat.
- Clearing of approximately 1,525 ha of habitat that is potentially suitable for the Northern Quoll.
- Clearing of approximately 1,525 ha of habitat that is potentially suitable for the Masked Owl (northern).

Please note that the figures listed above are not cumulative, given that the area proposed to be cleared provides habitat for a number of species.

The Draft EIS also assesses indirect impacts on these species (e.g. lighting, noise, introduction of pests), but the Draft EIS concluded that these impacts were not significant and are able to be mitigated.

6.2.3 Profile of Target Species

The following management documentation has been published by the Federal Government for the target species:

- Conservation Advice under the EPBC Act for the Northern Hopping-mouse (TSSC, 2015), Brush-tailed Rabbit-rat (TSSC, 2008b), Masked Owl (Northern) (TSSC, 2015) and Northern Quoll (TSSC, 2005).
- A national recovery plan for the Northern Quoll (Hill and Ward, 2010).
- A multi-species recovery plan for the Northern Hopping-mouse (Woinarski, 2004).
- A threatened species information sheet for the Brush-tailed Rabbit-rat (NT DLRM, 2012).
- A recovery outline for the Masked Owl (Garnett et al., 2011).
- Various Threat Abatement Plans, including predation by feral cats (DotE, 2015b); biological effects caused by Cane Toads (Commonwealth of Australia, 2011); and impacts on biodiversity by listed grasses (SEWPaC, 2012b).

These documents, along with the Species Profile and Threats Database (SPRAT) profiles for the species, *The Action Plan for Australian Mammals 2012* (Woinarski et al., 2014) and other published descriptions provide information on the distribution, biology, threats to these species, and conservation and research priorities. Appendix A provides a summary of this information.

These documents indicate the following threats, in addition to threats related to habitat loss from land clearing:

- Feral cats are listed as a key threat for the Northern Hopping-mouse, Brush-tailed Rabbit-rat and Northern Quoll. Although feral cats are not listed as a threat to the Masked Owl (northern), the conservation advice for the species indicates that research is required into the decline of the main prey species of the Masked Owl (northern). These prey species include small mammals, predated upon by feral cats.
- Inappropriate fire regimes and invasive weeds (listed grasses) are listed as a key threat for all four species.
- Cane toads and predation following fire are listed as key threats for the Northern Quoll.

Based on these threats, there is opportunity to deliver conservation outcomes to improve the viability of these species by focussing on feral cats, fire regimes, invasive weeds and Cane Toads (in the case of the Northern Quoll). Conservation advice for the species acknowledges the following research priorities, which may provide benefits to the species:

Brush-tailed Rabbit-rat:

- Develop and maintain monitoring programs to assess population size, distribution, ecological requirements and the relative impacts of threatening processes.

Masked Owl:

- Assess population trends in response to control programs for threatening processes.
- Identify habitat requirements and causes for the decline in prey species.
- Examine impacts of fragmentation and develop guidelines for habitat protection.

Northern Hopping-mouse:

- Assess the effectiveness of threat mitigation options and relative impacts of these threats.
- Assess habitat and dietary requirements, and resolve taxonomic uncertainties.
- Improve sampling techniques.
- Undertake research to develop new, or enhance existing, management mechanisms.

Northern Quoll:

- Minimise the impact to the species from the colonisation of Cane Toads.
- Identify areas of critical habitat and investigate the need to establish a captive breeding program.

6.3 FOCUS ON DIRECT CONSERVATION ACTIONS

As noted in Section 3, the Draft BOS was entirely focussed on funding research programs. However, as part of the revision of the BOS, the proponent is proposing to shift the focus from research toward direct conservation action. As noted in Section 4.2, a number of submissions motivated for this change in focus. DotE, in particular, indicated that securing offsets solely through contribution to research funding would not meet the requirements of the EPBC Act Environmental Offsets Policy.

At the time of writing the Draft BOS, the proponent held concerns in relation to committing to direct conservation action, given that further research was necessary to inform and guide the conservation action. In particular, there are research questions in relation to the use of poison baits for feral cats, and research questions in relation to the distribution and density of feral cats on Groote Eylandt. However, as noted in Section 5.3, DLRM is proposing to initiate a research program on Groote Eylandt in 2016 to address these critical research questions. This work is proposed to be undertaken as part of the Groote Eylandt Biodiversity Initiative and is expected to provide a sound basis for subsequent direct conservation action in relation to threatened species. As noted in Section 5.3, the intent of undertaking this research is to guide priorities for management of threatened species on Groote Eylandt. Additionally, research to be undertaken elsewhere in northern Australia over the next 2-3 years, through the National Environmental Science Program Threatened Species Hub, will provide further insights into effective methods for managing feral cats.

Given this development, the proponent believes that it would be appropriate for the project's offsets to focus on direct conservation action for the target species, noting that this should be embedded in an adaptive management paradigm with robust monitoring and evaluation of progress and refinement of management as required.

Any conservation action on Groote Eylandt would need to be led and/or supported by the ALC and ALC Rangers, given that they represent the Traditional Owners and are responsible for conservation management of the IPA. The proponent therefore proposes to work in partnership with the ALC and ALC Rangers to develop a suitable model to enable offsets to be delivered through supporting conservation programs that benefit the target species through reducing threats to the species. The conservation programs would be guided by the research being undertaken as part of the Groote Eylandt Biodiversity Initiative. The proponent is currently in discussions with the ALC, ALC Rangers and DLRM in relation to the possibility of delivering offsets via the contribution of funding toward the implementation of the TSMP. Section 6.4 provides further detail.

Finally, although offsets are proposed to focus primarily on direct conservation action, a proportion of the offsets may still be delivered through supporting research. The EPBC Act Environmental Offsets Policy allows for indirect offsets (e.g. research) to comprise up to 10% of an offsets package.

6.4 ALIGNMENT WITH CURRENT CONSERVATION INITIATIVES

As noted above, DLRM proposes to take responsibility for the development of the TSMP for Groote Eylandt. This plan is proposed to be developed as an outcome of a consultative process with the ALC and ALC Rangers, community members and other stakeholders on the island (such as GEMCO). The TSMP would outline and attempt to prioritise potential management actions for threatened species on Groote Eylandt. This would include management actions for the species for which offsets are required to be provided.

As noted in Section 5.4, it is likely that management priorities identified by the TSMP would include Cane Toad biosecurity, feral cat management, maintenance of benign fire regimes and control of environmental weeds. These are directly relevant to the target species. As noted in Section 6.2.3, a review of conservation advice for the target species indicates that feral cats, fire regimes, invasive weeds and Cane Toads (in the case of the Northern Quoll) pose a threat to the target species. Management actions directed towards reducing these threats therefore have the potential to achieve conservation gains for the target species, as required by the EPBC Act Environmental Offsets Policy.

The TSMP is still to be developed and no funding has yet been allocated to the implementation of management actions outlined in the TSMP. Possible funding sources may include funding from the Federal and/or NT governments (e.g. as part of the Threatened Species Strategy), funding from industry or funding from other partners (e.g. non-government organisations). The proponent's offsets are another potential source of funding, given that the TSMP will be directed toward management actions for the target species, and is likely to focus on issues such as feral cat control and Cane Toad quarantine. As noted in Section 6.2.3 these are areas identified in conservation advice as being relevant for the target species.

Section 7 describes a potential framework for delivering offsets by providing funding towards to implementation of the TSMP.

6.5 VALUE OF THE BIODIVERSITY OFFSETS

Biodiversity offsets are required to compensate for the clearing of 1,525 ha of land, which provides habitat for four threatened species listed under the EPBC Act. The dollar value of the offsets will be determined during the EPBC Act approval process, and will be commensurate to the predicted impact.

6.6 STAKEHOLDER FEEDBACK ON REVISED BOS

As noted in Section 4.1, the proponent has undertaken consultation with key stakeholders in relation to proposed revisions to the Draft BOS, including the proposal to secure offsets by contributing funding to the implementation of the TSMP.

Consultation has confirmed that DLRM is broadly supportive of the concept of the proponent contributing funding towards the implementation of management actions described in the TSMP. The ALC Rangers are supportive of the Groote Eylandt Biodiversity Initiative and are working with the DLRM in relation to its implementation. The ALC and ALC Rangers have also confirmed that they are willing to explore the option of the proponent delivering its offsets by contributing funding towards the implementation of management actions described in the TSMP. The ALC and ALC Rangers have indicated, however, that they require further information on the TSMP. DLRM is proposing to undertake consultation with the ALC and ALC Rangers in relation to the TSMP in early 2016. The ALC and ALC Rangers have stressed the importance of offsets delivering benefits for all of the target species, and are keen to ensure that there is an opportunity whereby a proportion of offsets funding is able to be directed toward research. The ALC and ALC Rangers have indicated that conservation programs undertaken as part of biodiversity offsets should be undertaken on Groote Eylandt.

The Federal Threatened Species Commissioner was consulted to discuss possible synergies with the Threatened Species Strategy. The Threatened Species Commissioner confirmed that the Groote Eylandt Biodiversity Initiative was currently the key mechanism for delivering the Threatened Species Strategy on Groote Eylandt. The Threatened Species Commissioner indicated that the proposed offsets program appeared to provide a good opportunity for industry (i.e., the proponent), Traditional Owners and government (Territory and Federal level) to work collaboratively on a project that may assist with furthering the aims of the Threatened Species Strategy.

7 POTENTIAL FRAMEWORK FOR ADMINISTERING OFFSETS

The proponent has commenced discussions with the ALC, ALC Rangers and DLRM in relation to a possible framework for administering offsets. Further work will be undertaken prior to the commencement of the project to develop the framework for administering offsets.

Ideally the TSMP would provide management priorities which could then be developed into conservation programs for funding (e.g. a five year plan of conservation programs, along with annual plans). The proponent will seek to collaborate with the parties responsible for the implementation of the TSMP in relation to contributions from the project's biodiversity offsets funds towards suitable programs. A Steering Committee, including representatives from key stakeholder groups (e.g. ALC, ALC Rangers, DLRM, GEMCO and external technical specialists) is a mechanism that is being considered for the purpose of reviewing potential programs.

In order for the proponent to comply with the EPBC Act Environmental Offsets Policy, suitable programs for potential funding contributions from the project's biodiversity offsets funds would need to satisfy key principles, including:

- Ensuring that the conservation program/s deliver an overall conservation outcome that improves or maintains the viability of the target species;
- Ensuring that conservation programs are scientifically robust and reasonable. As noted in Section 5.3, it anticipated that research undertaken under the Groote Eylandt Biodiversity Initiative will assist in ensuring that the proposed conservation programs are scientifically robust. However, in instances where knowledge gaps are identified, a proportion of offsets funding may be used on further research, directed toward the target species; and
- A pre-defined monitoring and reporting program to confirm that the conservation program/s are achieving the objectives (as relevant to biodiversity offsets).

In the event of programs developed as part of the TSMP not meeting the objectives of the biodiversity offsets strategy, the proponent would consider alternative programs. The decision to consider alternative programs would be undertaken in consultation with all key stakeholder groups.

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for

HANSEN BAILEY



Laura Knowles
Principal Environmental Scientist

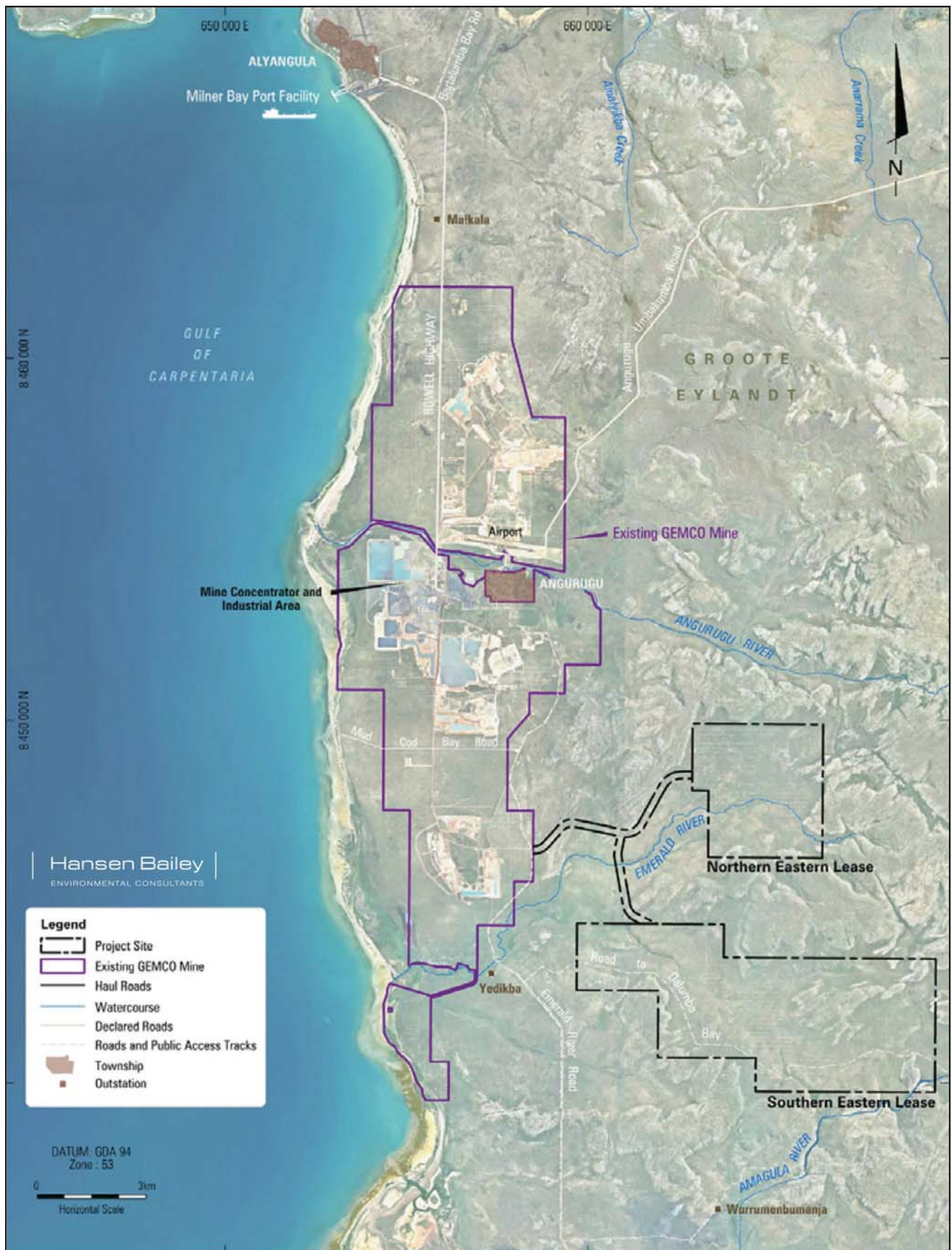


Peter Hansen
Director

FIGURES



EASTERN LEASES PROJECT



EASTERN LEASES PROJECT

APPENDIX A
Profile of Species for which Offsets will be Provided

The following management documentation has been published by the Federal Government for the target species:

- Conservation Advice under the EPBC Act for the Northern Hopping-mouse (TSSC, 2015), Brush-tailed Rabbit-rat (TSSC, 2008b), Masked Owl (Northern) (TSSC, 2015) and Northern Quoll (TSSC, 2005).
- A national recovery plan for the Northern Quoll (Hill and Ward, 2010).
- A multi-species recovery plan for the Northern Hopping-mouse (Woinarski, 2004).
- A threatened species information sheet for the Brush-tailed Rabbit-rat (NT DLRM, 2012).
- A recovery outline for the Masked Owl (Garnett et al., 2011).
- Various Threat Abatement Plans, including predation by feral cats (DotE, 2015b); biological effects caused by Cane Toads (Commonwealth of Australia, 2011); and impacts on biodiversity by listed grasses (SEWPaC, 2012b).

These documents, along with the Species Profile and Threats Database (SPRAT) profiles for the species, *The Action Plan for Australian Mammals 2012* (Woinarski et al., 2014) and other published descriptions provide information on the distribution, biology, threats to these species, and provide conservation and research priorities. Table A1 provides a summary of this information.

Table A1
Profile of Species for which Offsets will be Provided

Northern Hopping-mouse		
Description	Small rodent with a long tufted tail, and large eyes and ears (Woinarski, 2004).	 (Source: R. Diete)
Distribution	Groote Eylandt (particularly coastal dunes and sandsheets), and coastal north-eastern Arnhem Land (Woinarski, 2004).	
Habitat Preference	Grassland, shrubland and open forest habitats, mostly in sandy areas near the coast (Woinarski, 2004).	
Threats	According to Woinarski (2004), potential threats include: • Habitat change due to altered fire regimes and introduced herbivores; • Feral cats; • Disease; and • Habitat loss, specifically mining activities on Groote Eylandt and north-eastern Arnhem Land.	
Research and Conservation Priorities	According to Woinarski (2004), Woinarski et al. (2014) and TSSC (2015a), research and conservation priorities include: • Undertake research on the species to better understand total population, population trends, distribution, habitat suitability, and susceptibility to threatening processes. • Manage populations of the species, including fire management and minimising predation by feral cats. • Develop mine rehabilitation procedures that would favour this species. • Establish captive insurance populations on Groote Eylandt. • Examine options for using these captive populations for: – Reintroducing the species to areas on the mainland where it has become extinct; and – Research into mine rehabilitation options. • Maintain or enhance constraints on cat imports to Groote Eylandt. • Undertake more detailed mapping of the species' distribution on Groote Eylandt. • Establish an integrated monitoring program to describe long-term trends in abundance and responses to management actions. • Monitor the effectiveness of management measures and adapt them accordingly. • Involve Indigenous ranger groups in survey, monitoring and management. • Evaluate options for increasing the efficiency of sampling protocols at sites of known occurrence, in order to improve the reliability of detection. • Undertake a detailed autecological study to more specifically identify impacts of threatening processes. • Determine the response of the species to a range of fire regimes. • Determine the major causes of mortality (in particular impacts of cats). • Assess the effectiveness of mine rehabilitation measures for providing suitable habitat. • Assess the effectiveness of a range of possible cat control mechanisms. • Identify critical features that define suitable habitat. • Assess critical components of diet, and associated management requirements. • Identify factors influencing reproductive success. • Develop methods for broad-scale, targeted feral cat control.	

Brush-tailed Rabbit-rat		
Description	Robust rodent, notable for its long, tufted tail (DotE 2013c).	 (Source: NT DLRM)
Distribution	Limited distribution, with all records from monsoonal northern Australia, adjacent islands and southern New Guinea (DotE, 2013c).	
Habitat Preference	Restricted to mixed open eucalypt open forest and woodland, or on dunes with Casuarina. Shelters in tree hollows, logs and less frequently the crowns of pandanus or sand-palms. Appears to prefer habitats that are not burnt annually, and that have an understory of perennial grasses (DotE, 2013c).	
Threats	According to DotE (2013c), potential threats include: • Habitat change due to altered fire regimes and introduced herbivores; • Habitat loss, specifically a forestry project on the Tiwi Islands, and mining activities on Groote Eylandt and potentially the Mitchell Plateau in Western Australia; • Feral cats; and • Disease (as a possible threat).	
Research and Conservation Priorities	According to Conservation Advice for this species (TSSC, 2008b), research priorities include: • Develop and maintain a monitoring program across the species' national range; and • Assess population size, distribution, ecological requirements and the relative impacts of threatening processes (e.g. fire, introduced herbivores, feral cats). Woinarski et al. (2014) provide the following additional management measures: • Constrain further encroachments of invasive pasture grasses; • Establish captive insurance populations; • Enhance quarantine and surveillance to reduce risks of incursions of new threats to islands; • Monitor the effectiveness of management measures; and • Involve Indigenous ranger groups in survey, monitoring and management.	

Northern Quoll		
Description	Small marsupial, with a pointy snout and reddish brown fur, with a cream underside. It has white spots on its back and rump and a long, sparsely-furred, unspotted tail (DotE, 2015).	
Distribution	Discontinuous distribution across Northern Australia, with populations declining as Cane Toads spread across the Top End. Known population on several offshore islands including Groote Eylandt (Hill and Ward, 2010)	
Habitat Preference	Occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal (DotE 2015).	
Threats	According to DotE (2015a), potential threats include: • Lethal toxic ingestion caused by Cane Toads; • Removal, degradation and fragmentation of habitat; • Inappropriate fire regimes; • Weeds; • Feral predators; and • Parasitism.	
Research and Conservation Priorities	According to Woinarski (2014), research and conservation priorities include: • Through appropriate biosecurity, ensure toads do not establish on islands currently occupied by quolls. Dote (2015a) provide the following management / recovery objectives for the species: • Protect Northern Quoll populations on offshore islands from invasion and establishment of Cane Toads, cats and other potential invasive species; • Foster the recovery of Northern Quoll subpopulations in areas where the species has survived alongside cane toads; • Halt Northern Quoll declines in areas not yet colonised by Cane Toads; • Halt Northern Quoll declines in areas recently colonised by Cane Toads; • Maintain secure populations and source animals for future reintroductions/ introductions, if they become appropriate; • Reduce the risk of Northern Quoll populations being decimated by disease; • Reduce the impact of feral predators on Northern Quolls; and • Raise public awareness of the plight of Northern Quolls and the need for biosecurity of islands and Western Australia.	

Masked Owl (Northern)		
Description	Large owl with prominent heart-shaped facial disc and highly speckled plumage (TSSC, 2015b).	
Distribution	Poorly known distribution, with three suggested subpopulations in the Kimberley, Northern Territory and Cape York (TSSC, 2015b).	
Habitat Preference	Recorded from riparian forest, rainforest, open forest, <i>Melaleuca</i> swamps and the edges of mangroves, as well as along the margins of sugar cane fields (DotE (2015c).	
Threats	According to DotE (2015c), potential threats include • Altered fire regimes; • Grazing by livestock; • Feral animals • The invasion of native woodlands by exotic plants; and • A possible decline in the numbers of small and medium-sized prey.	
Research and Conservation Priorities	TSSC (2015b) provide the following conservation actions: • Implement an appropriate fire management regime for preventing the loss of large, hollow-bearing trees, and which promotes the density of prey (native mammals). • Reduce the impacts from feral animals and weeds at a landscape scale. • Assess the subspecies' population size and distribution. • Design and implement a monitoring program to assess population trends at key sites. • Identify the habitat requirements of the subspecies. • Assess population trends in response to fire management and weed and feral species control programs. • Identify the causes for the decline in the Masked Owl's main prey species. • Examine impacts of fragmentation on the subspecies and use the resulting knowledge to develop guidelines for habitat protection and corridor configuration in landscapes subject to increasingly intensive development.	

ATTACHMENT C

Groundwater Recovery at the Existing GEMCO Mine

Groundwater Recovery at the Existing GEMCO Mine

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Table of contents

	Page No.
1 Introduction	1
1.1 Purpose of the report	1
1.2 Scope and structure of this report	1
2 Groundwater setting	2
2.1 Relevant field investigations	2
2.2 Groundwater regime	2
3 Groundwater levels adjacent to quarries	4
3.1 Introduction	4
3.2 Groundwater monitoring data.....	4
3.3 Historical mining activities	4
3.4 Assessment findings	5
3.5 Conclusions.....	6
4 Groundwater recovery in backfilled quarries.....	7
4.1 Field investigation results	7
4.2 Assessment of groundwater re-establishment.....	7
5 Conclusions	8

List of figures

Figure 1	Indicative Stratigraphy
Figure 2	Historical Mining Areas (to 1999) Relative to Monitoring Bores
Figure 3	Mining Areas (to Present)

List of tables

Table 1	Groundwater monitoring bores adjacent to mined areas.....	5

List of appendices

Appendix A	Groundwater level hydrographs
Appendix B	Log for monitoring bore 8631

Groundwater Recovery at the Existing GEMCO Mine

1 Introduction

1.1 Purpose of the report

This report forms part of the Supplement to the Draft Environmental Impact Statement (EIS) for the Eastern Leases Project (the project).

The report has been prepared for the purpose of providing data from the existing GEMCO mine to demonstrate the recovery of groundwater levels within and surrounding previously mined areas. A number of submissions on the Draft EIS raised concerns in this regard, and this report provides data to assist with responding to these submissions.

The report has been prepared by Australian Groundwater and Environmental Consultants Pty Ltd (AGE) on behalf of South32 and the Groote Eylandt Mining Company (GEMCO). The groundwater drilling and monitoring data provided in this report are based on information provided by South32.

1.2 Scope and structure of this report

The Anindilyakwa Land Council (ALC), the NT Environment Protection Authority (EPA) and Mr J. Aschmann made submissions on the Draft EIS in relation to the project's potential impact on groundwater levels. Although the numerical groundwater model prepared for the project predicted relatively rapid recovery of groundwater post mining, a number of submissions requested further information on groundwater recovery or expressed doubts about whether groundwater would recover post mining. This report provides data from the existing GEMCO mine to demonstrate groundwater recovery post mining. It addresses the following issues raised in submissions on the Draft EIS:

- The post mining effects on groundwater levels in the vicinity of mined areas; and
- The re-establishment of a groundwater table within backfilled quarries.

The post mining effects on groundwater levels in the vicinity of mined areas have been assessed using detailed groundwater monitoring data collected from the existing GEMCO mine.

The re-establishment of a groundwater table in backfilled areas has been addressed through undertaking site investigations, specifically the establishment of a groundwater monitoring bore at the existing GEMCO mine within a quarry that has been mined, backfilled and rehabilitated.

Recorded groundwater levels have been assessed to determine the scale and timing of groundwater recovery within and surrounding previously mined areas.

This report is structured as follows:

- Section 1 provides a brief introduction;
- Section 2 provides an overview of the groundwater setting of the existing GEMCO mine and Eastern Leases;
- Section 3 provides an assessment of mining effects on groundwater levels in the vicinity of previously mined areas;

- Section 4 provides an assessment of the potential for re-establishment of a water table within backfilled quarries; and
- Section 5 provides a summary of the key conclusions.

2 Groundwater setting

This section describes the relative groundwater settings of the existing GEMCO mine and Eastern Leases. It confirms the relevance of groundwater monitoring data from the existing GEMCO mine to the Eastern Leases.

2.1 Relevant field investigations

Geological exploration at the existing GEMCO mine including test pitting and drilling activities commenced in 1962 and have been ongoing for over 50 years. In addition, GEMCO maintains a network of groundwater monitoring bores at the existing GEMCO mine (as discussed in Section 3.2). These information sources are further supported by geological and groundwater observations made within quarry pits during more than 50 years of operations. The geology and hydrogeology of the existing mine is therefore well understood.

Exploration drilling has been undertaken on the Eastern Leases since 2001 with over 2,070 holes drilled to date. Between 2010 and 2014 alone, a total of 1,757 drill holes were completed with more than 38,930 metres drilled and 17,222 geological samples collected. In addition to this, a further 19 monitoring bores were installed across the Eastern Leases to improve the understanding of the hydrogeology. The groundwater monitoring network comprised four monitoring locations in the Northern EL and six monitoring locations in the Southern EL. A pair of monitoring bores was typically installed at each site, targeting shallow and deep geological units. The shallow bores targeted geological units adjacent the manganese orebody whilst the deeper bores were installed within the reworked basement and marine sandstone aquifer. These investigations have provided a robust understanding of the geology and hydrogeology of the Eastern Leases.

As detailed in Section 2.2, the data that has been collected confirms that the groundwater regime at the existing GEMCO mine and Eastern Leases are consistent and comparable.

2.2 Groundwater regime

The hydrogeology of the existing GEMCO mine and Eastern Leases is described in detail in Section 9.3 of the Draft EIS. The stratigraphy is shown on Figure 1 and comprises:

- A thin veneer of Quaternary sediments;
- A shallow, highly weathered and heterogeneous Tertiary laterite aquifer;
- A highly weathered and uniform Tertiary lateritic clay aquitard;
- A Cretaceous marine claystone aquitard that includes the manganese ore in the upper profile;
- A Cretaceous sandstone aquifer comprising marine sandstone and reworked basement materials; and
- Underlying Proterozoic basement aquitard.

There is a shallow unconfined aquifer within the laterite near the surface and a deeper confined aquifer within the Cretaceous sandstone. Regional groundwater flow occurs from the elevated basement outcrops located in the centre of the island towards the ocean. A water table forms within the laterite due to focussed recharge in areas where the laterite is exposed at the surface or in the bed of ephemeral drainage lines. Diffuse recharge occurs as seepage through the superficial Quaternary

sediments. The Cretaceous sandstone receives recharge from seepage from the overlying marine claystone (where present) and upward flow from the underlying Proterozoic basement. However, the main recharge zone occurs where the Cretaceous sandstone outcrops as a thin, unsaturated unit in the vicinity of the basement outcrops. In these areas, the rate of recharge is expected to be significantly enhanced by infiltration of runoff from seasonal rainfall events. Overall, the rate of recharge to this aquifer is high.

Groundwater monitoring data for the existing mine shows a cyclic groundwater level response to seasonal rainfall recharge, which generally occurs rapidly, and immediately after and during wet season rains. Graphs presented in Appendix A provide groundwater monitoring data from the existing mine and show this seasonal response. (These graphs, and GEMCO's groundwater monitoring program, is discussed further in Section 3.) This seasonal groundwater level change is measured up to 12 m at the existing mine and is consistent with the groundwater level observations at the Eastern Leases. During the dry season, the groundwater levels decline as there is no recharge to the aquifers and excess water within the groundwater system naturally flows to discharge zones.

In the Eastern Leases, the water table within the Tertiary laterite is also highly seasonal, fluctuating between the wet and dry seasons. This seasonal fluctuation is comparable to the trends observed at the GEMCO mine (Appendix A).

In summary, the hydrogeology at the GEMCO mine and Eastern Leases Project are directly comparable. Given this similarity, the behaviour and response of the groundwater system at the GEMCO mine can be used to inform potential changes in groundwater levels at the Eastern Leases.

3 Groundwater levels adjacent to quarries

3.1 Introduction

As discussed in Section 1, stakeholders have raised concerns relating to the effects of mining on groundwater levels in the vicinity of quarries and the ability of the groundwater regime to recover following the cessation of mining. This section provides an assessment of additional data that demonstrates post mining recovery of groundwater levels in the vicinity of mined areas. This assessment draws upon groundwater monitoring data, mine plans and mine scheduling information from the existing mine.

3.2 Groundwater monitoring data

GEMCO undertakes regular monitoring of the groundwater level across a network of monitoring bores surrounding the main operations. Monitoring frequency is typically quarterly in response to seasonal climate variations and mining activities. However, GEMCO undertook a particularly intense groundwater monitoring program during the period 1998 to 2002. During this period, groundwater monitoring was undertaken at least monthly and therefore provides an excellent groundwater dataset and a clear understanding of the seasonal response of groundwater level to climate conditions (i.e. how groundwater levels respond to the wet and dry climatic cycles) and the effects of mining activities.

Figure 2 shows the available monitoring bore network at the existing mine. Water level measurements from all available groundwater monitoring bores were examined to determine the frequency of monitoring and the proximity to mining. The purpose of the assessment was to investigate recovery in groundwater levels post mining, and therefore bores that were influenced by active mining including water storage and quarry dewatering were removed. The data review process produced a sub-set of two suitable monitoring bores that could be used to assess post mining groundwater recovery. Figure 2 highlights the location of these two groundwater monitoring bores in relation to the historical mined areas.

The groundwater level hydrographs from the groundwater monitoring bores is provided in Appendix A. This information was used to establish post mining trends in groundwater level.

3.3 Historical mining activities

As noted in Section 3.2, the monitoring data used in the assessment is from 1998 to 2002. It was necessary to understand the extent of mining during the years preceding monitoring. Historical mine plans were reviewed to determine the mining sequence at this time. It is important to note that a range of ore quality and grades are present across the existing GEMCO mine, and these ore types are blended to meet customer specifications for product manganese. Mining is therefore targeted to ore types that can be blended to achieve the required product manganese specification. As a result, several quarries may be mined concurrently and mining at each quarry may be discontinuous.

Figure 2 shows the extent of mined areas within the central and southern parts of the existing GEMCO mine over the following time periods:

- Pre-1986;
- 1987 to 1991; and
- 1992 to 1999.

Figure 2 shows that prior to 1986, there was a single mining area within the southern part of the existing mine (i.e. the area currently known as D Quarry). Between 1987 and 1991, there was an

increased level of mining activity occurring in the D Quarry mining area; specifically in the north, south and east of the mining area. During the subsequent period between 1992 and 1999, mining occurred within localised areas in the north and east of D Quarry. Mining at D Quarry did not occur between 1999 and 2002.

As shown in Figure 2, prior to 1986, there were four discrete mining areas within the central part of the existing mine (i.e. the area comprising A, E, G and B Quarries).

Between 1986 and 1991, there was an increase in the footprint of these mined areas. By 1999, further expansions had resulted in these mining areas coalescing and/or abutting each other.

3.4 Assessment findings

Table 1 shows the location of each bore relative to mined areas and the range in groundwater levels during the 1998-2002 intensive groundwater monitoring period. Mining occurred within approximately 10 years prior to the commencement of groundwater monitoring.

Table 1 Groundwater monitoring bores adjacent to mined areas

Monitoring Bore ID	Distance to Historical Mined Area (m)	Nearest Mined Area (m)	Approx. Groundwater Level Range (m bgl*)	Peak Wet Season Groundwater Level Range (m bgl*)
MW8578	655	D Quarry	1.0 – 5.5	1.0 – 2.0
MW7658	810	Central Quarries	1.0 – 12.5	1.0 – 1.5

* metres below ground level

The key features of this data include:

- Groundwater levels following seasonal rainfall range from 1.0 to 2.0 m below ground level (m bgl) in bores that are located within 1 km of mined areas.
- The bores show stable seasonal groundwater level fluctuations over the monitoring period, with no significant increasing or decreasing trends.
- By the end of the monitoring period (i.e. within 0 to 15 years post mining), groundwater levels during the wet season are uniformly shallow compared to ground level. The post wet season groundwater level peaks at 1.0 m below ground level. While pre-mining groundwater levels are not available due to the age of the existing mine, the shallow depth of the groundwater (i.e. 1-2 m bgl) suggests that there is limited scope for further increases in groundwater level. This indicates that there is no significant mining impact on groundwater level at these locations. It is therefore inferred that these levels are representative of pre-mining groundwater levels at these locations.
- Groundwater levels during the wet season are significantly higher than the base of quarry pits in mined areas (which are typically in the order of 10 m bgl).

The historical groundwater level monitoring data demonstrates that rainfall rapidly recharges groundwater following the onset of the wet season and naturally recedes during the dry season.

The rapid wet season groundwater recharge promotes groundwater level recovery from the effects of the dry season and any potential mining induced drawdown effects.

3.5 Conclusions

The Draft EIS Groundwater Report predicted localised groundwater drawdown in the laterite aquifer around the proposed quarries. Drawdown is predicted to be greatest where proposed quarries are deepest. Groundwater drawdown (of up to 1 m) is predicted to extend less than 1 km from any quarry. This is consistent with the groundwater data from the existing mine which show no significant groundwater level effects attributable to mine drawdown at distances greater than 655 m and 810 m from mined areas.

Post mining groundwater levels in the laterite aquifer are predicted to rebound rapidly following completion of mining, recovering 35 % of the maximum drawdown within 1 year and 80 % within 5 years. Groundwater levels are predicted to recover 99% compared to pre-mining levels within approximately 20 years of mine closure. Full groundwater recovery (i.e. 100%) will ultimately be achieved, re-establishing the pre-mining groundwater levels in the vicinity of the rehabilitated final landform. This is consistent with the groundwater data from the existing mine which show no significant residual effects on groundwater levels attributable to mining within 15 years post mining.

The results presented in the assessment are, if anything, conservative. The nearest quarries to the monitoring bores discussed in Section 3.4 had not been backfilled at the time that monitoring data was collected. Evaporative losses from quarries creates a hydraulic groundwater gradient, inducing groundwater flow towards the dewatered quarry and resulting in groundwater drawdown around the quarry. However, even with the influence of open quarries and the associated evaporative losses, the bores discussed in Section 3.4, shows recovery of groundwater levels. The quarries in the Eastern Leases will be backfilled soon after mining, allowing pre-mining groundwater levels to re-establish.

4 Groundwater recovery in backfilled quarries

The proponent has undertaken additional field investigations at the existing GEMCO mine to address stakeholder concerns raised in relation to the re-establishment of a groundwater table within backfilled quarries.

This section provides the results of the field investigations and presents an assessment of the timing of re-establishment of a groundwater table relative to completion of backfilling activities.

Pre-mining groundwater levels at this location are not available. However, based upon the monitoring data presented in Appendix A, the pre-mining groundwater levels is inferred to be in the range 1.0 m bgl (post wet season) to 12.5 m bgl (dry season).

4.1 Field investigation results

The presence and depth of the groundwater table was investigated by the installation of a groundwater monitoring bore within overburden backfill at B Quarry (Figure 3). B Quarry was selected due to its backfilled and rehabilitated status and ready access for drilling and future monitoring.

Monitoring bore MW 8631 was drilled at B Quarry in September 2015 (i.e. in the dry season). Drilling was targeted to intersect backfilled overburden and any associated groundwater table above the pre-backfilling quarry floor.

Drilling reached a total depth of 10.5 m bgl. Backfilled overburden materials were encountered from the ground surface to 10 m bgl (i.e. the pre-backfilling quarry floor). The backfill materials comprised fine to medium grained clayey sands, consistent with laterite and lateritic clay units that typically comprise the overburden geology. Natural ground was encountered below 10 m bgl.

The location of this bore is shown on Figure 3. The bore log is presented in Appendix B.

4.2 Assessment of groundwater re-establishment

B Quarry was backfilled and rehabilitated in 2005 (i.e. 10 years prior to drilling of bore MW8631 within the backfilled overburden).

The drilling investigation program confirms that backfilled overburden material at B Quarry is saturated with a standing water level located approximately 5 m bgl (i.e. over 5 m above the base of the backfilled quarry). The bore was drilled and monitored during the dry season when groundwater levels naturally decline due to lack of recharge. A groundwater level of 5 m bgl is therefore well within the natural groundwater level range (i.e. 1.0 to 12.5 m bgl) monitored in bores not impacted by mining.

The results from the bore drilled in backfilled overburden are therefore consistent with the conceptual groundwater assessment for the Eastern Leases presented in the Draft EIS, which predicts recovery of groundwater levels in backfilled quarries.

5 Conclusions

The geology and hydrogeology at the existing GEMCO mine is very comparable to the Eastern Leases and groundwater inflow to mining operations occurs predominantly from the shallow laterite aquifer. The behaviour and response of the groundwater system in the Eastern Leases project site is therefore highly likely to be similar to that observed at the existing GEMCO mine.

This reports presents data from monitoring bores located within the existing GEMCO mine, near quarries that were actively mined prior to the monitoring period presented this report. The monitoring data shows that a cyclic groundwater level response to rainfall recharge, which generally occurs rapidly, and immediately after and during summer wet season rains. Groundwater levels during the wet season are within 1 to 2 m of the ground surface. This monitoring data indicates that mining activities have not resulted in long term adverse effects on groundwater levels around mined areas and that groundwater levels are within the inferred natural pre-mining range.

The recovery of groundwater has also been observed within backfilled overburden materials in mined areas. A monitoring bore was drilled and completed within an area of B Quarry mine rehabilitation confirming that saturation has occurred and that a water table has developed within the backfill material within 10 years post mining and recovered to pre-mining levels.

Any residual drawdown that has propagated from the quarries during mining will further diminish as the groundwater levels within and surrounding the quarries continue to recover over time.

Figures



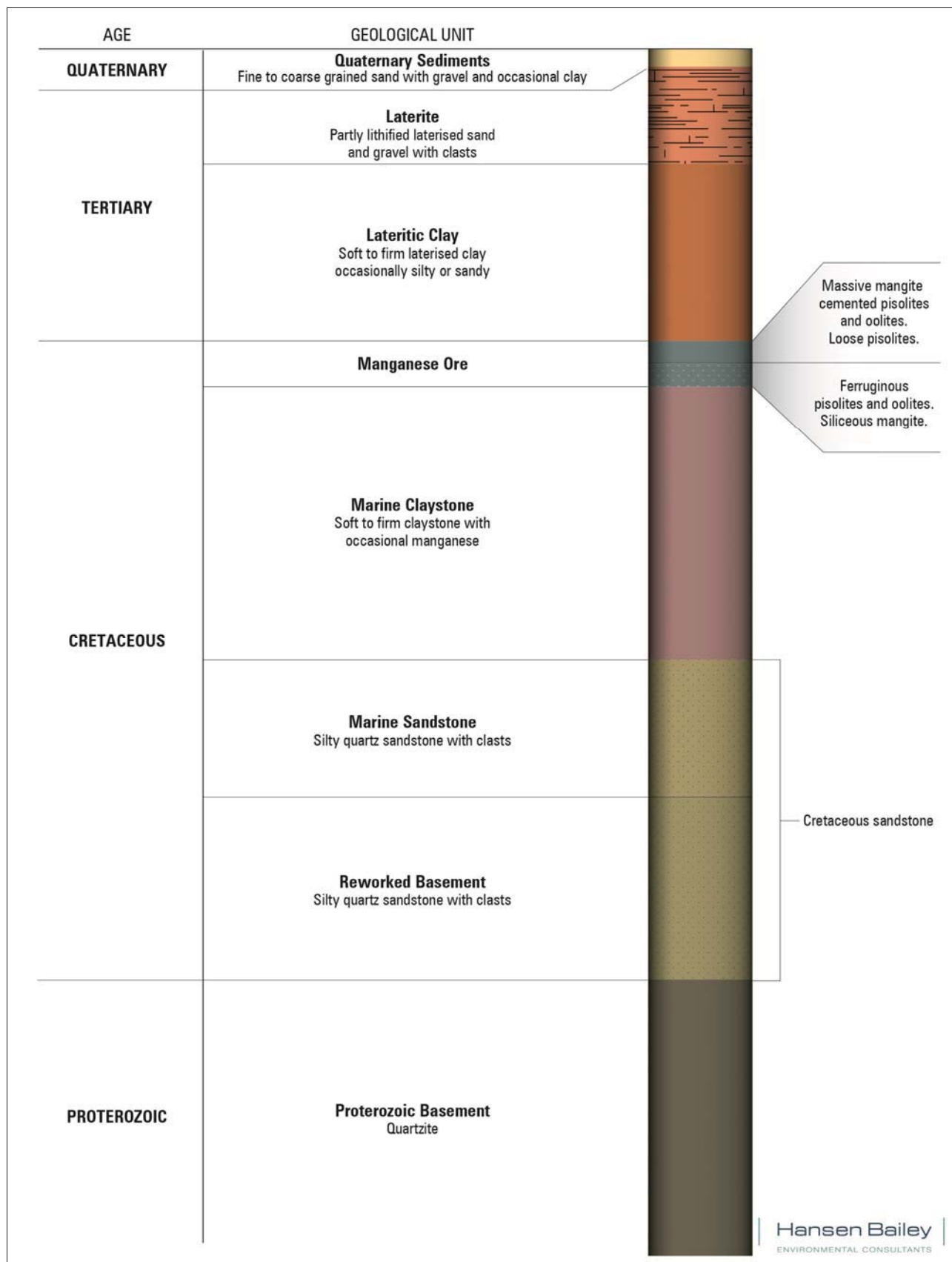


Figure 1 Indicative Stratigraphy

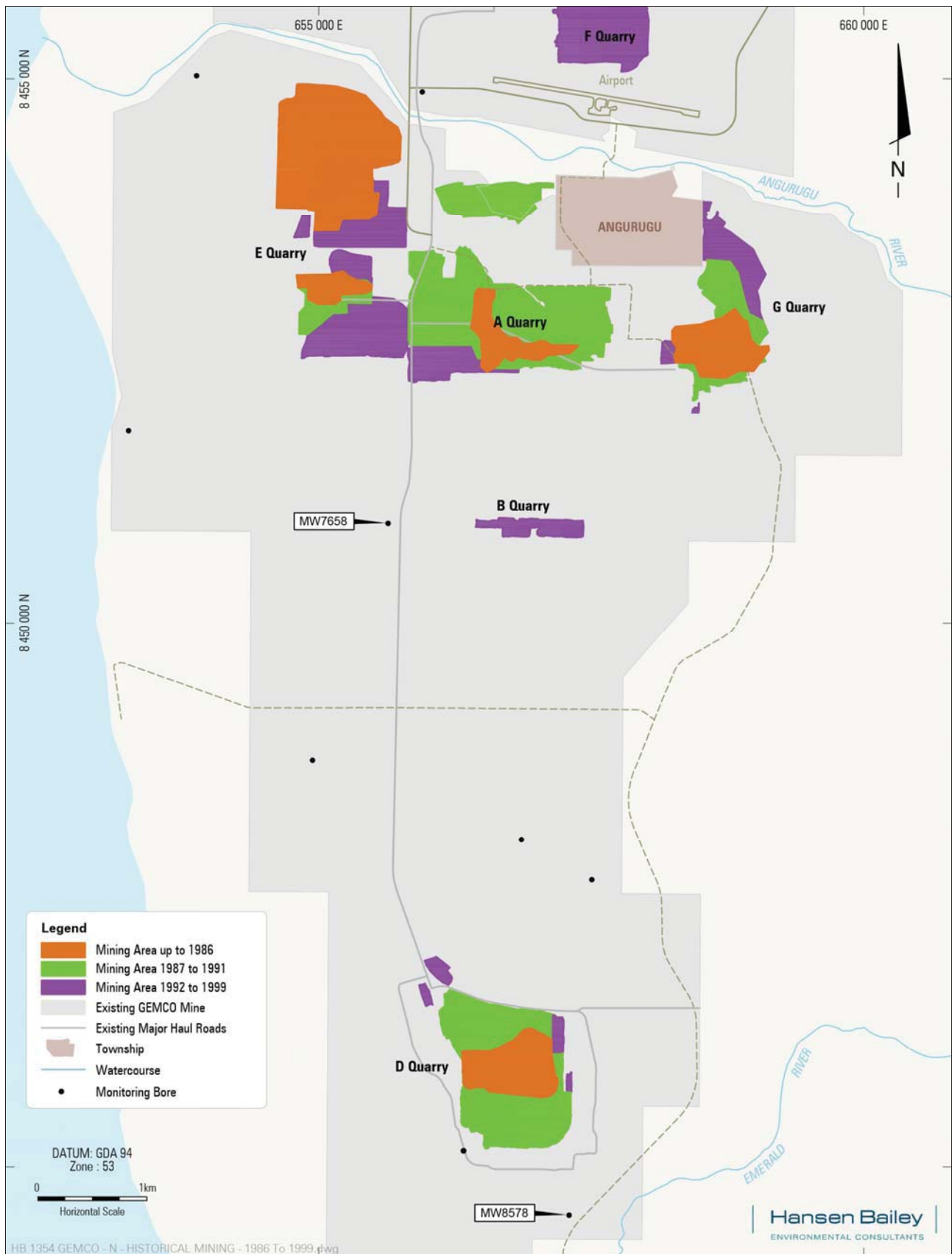


Figure 2 Historical Mining Areas (to 1999) Relative to Monitoring Bores

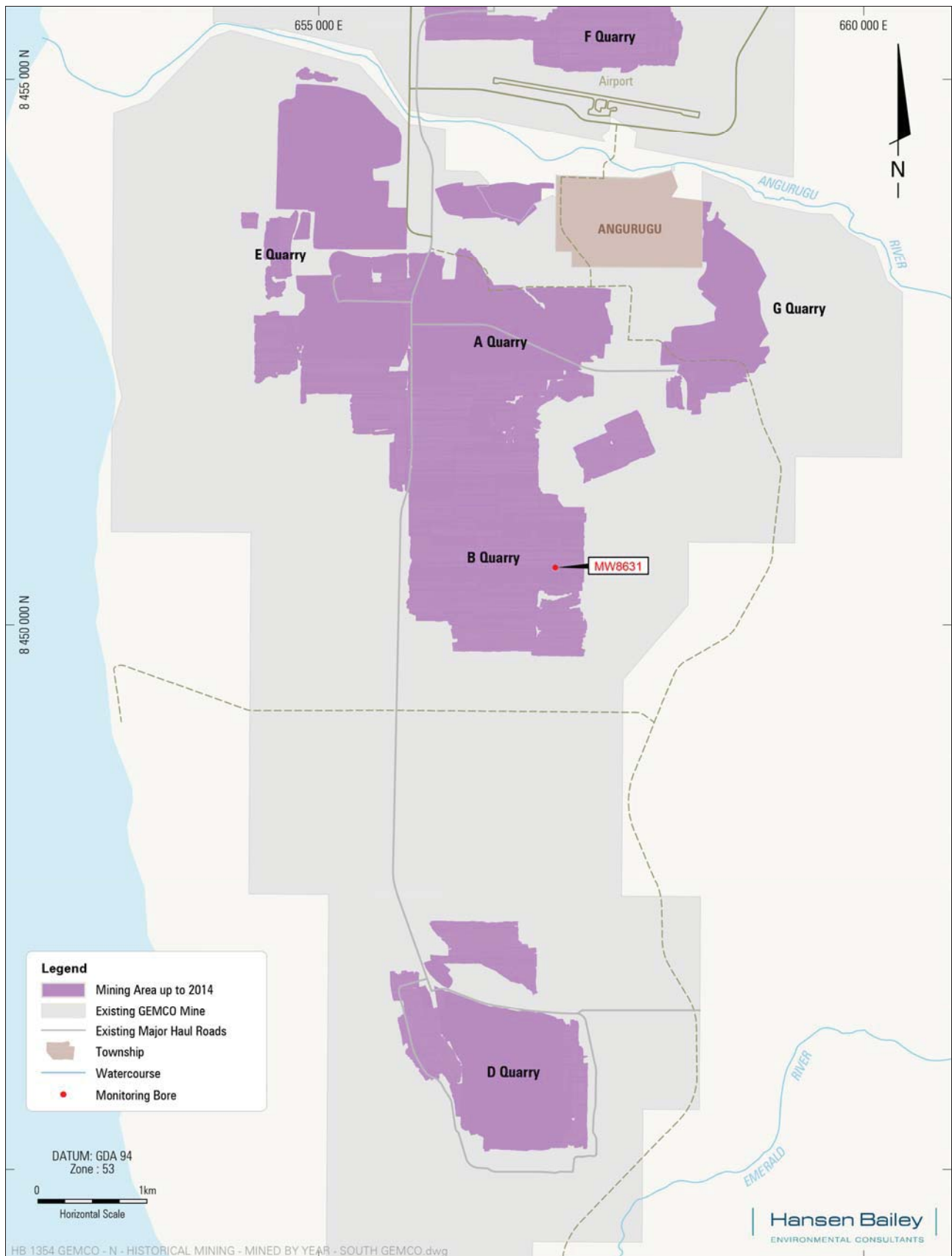


Figure 3 Mining Areas (to Present)

Appendix A **Groundwater level hydrographs**

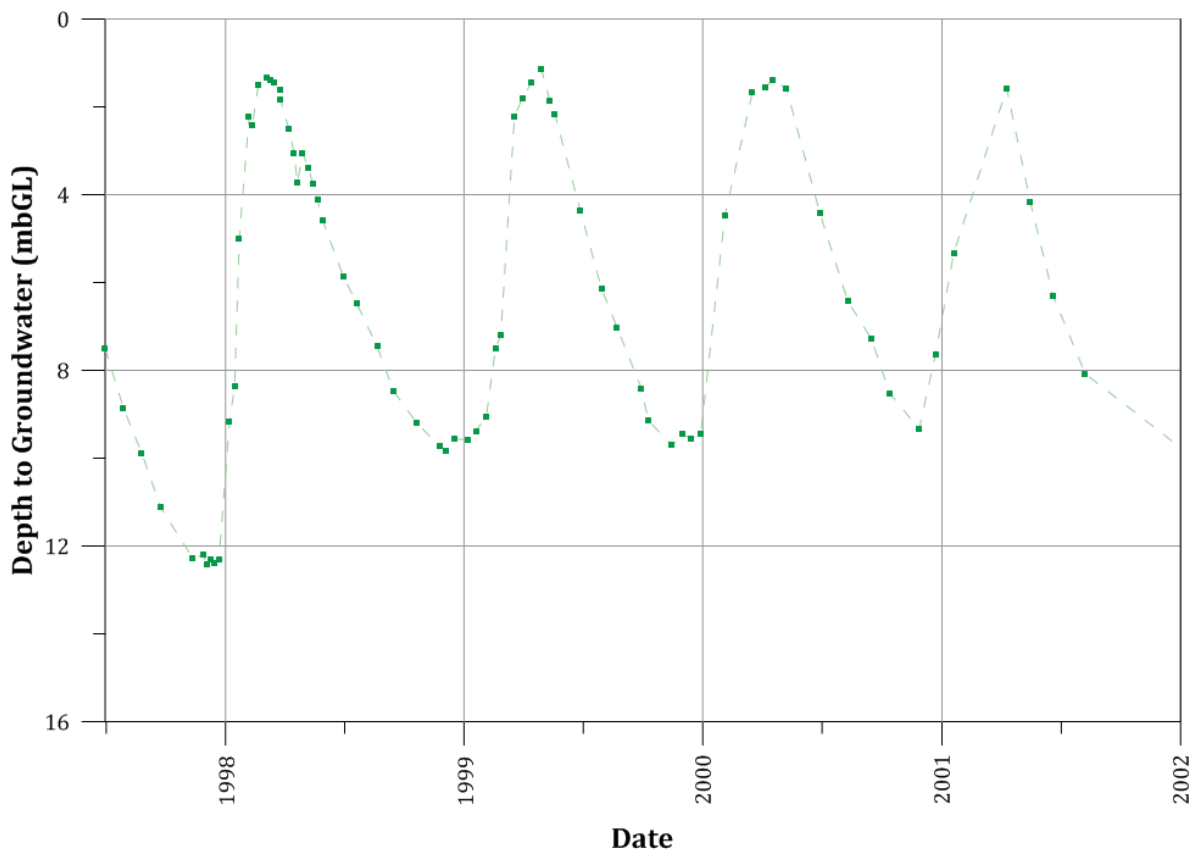


Figure A 1 MW7658 groundwater level hydrograph

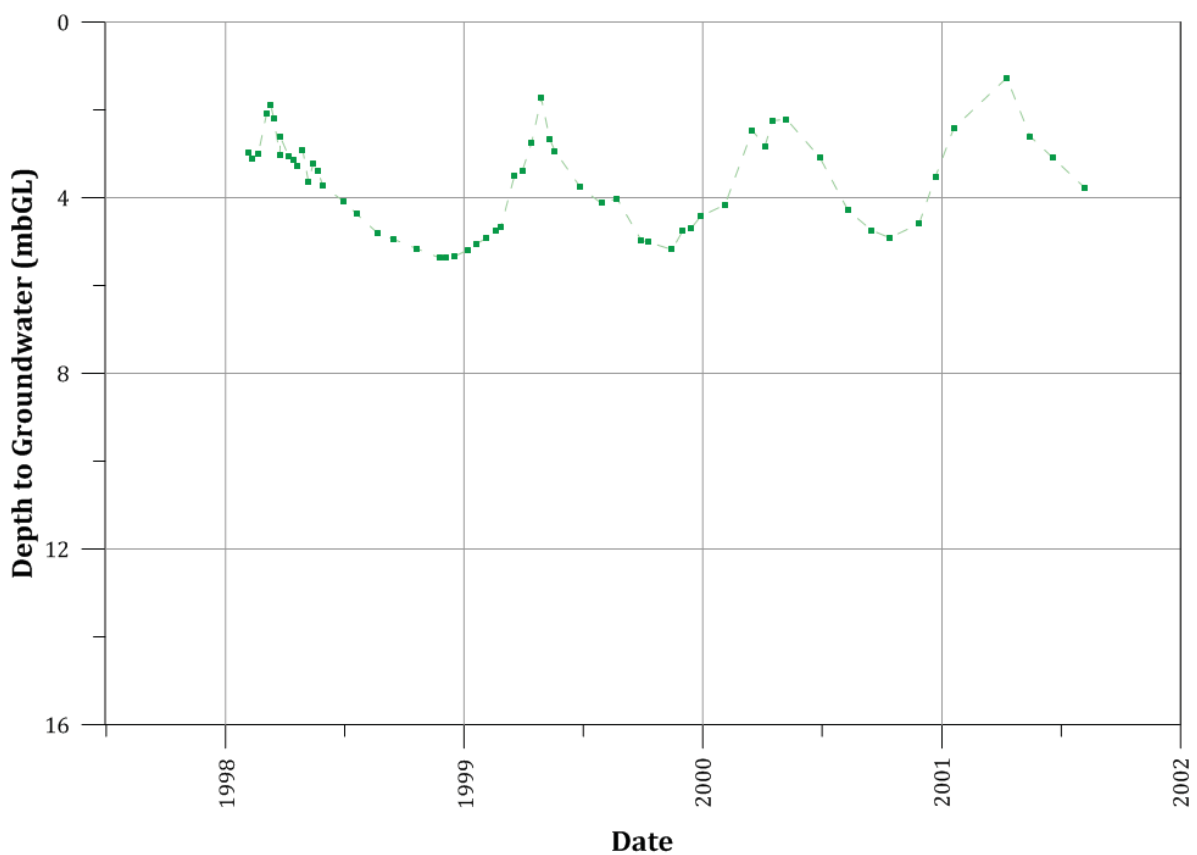


Figure A 2 MW8578 groundwater level hydrograph

Appendix B **Log for monitoring bore MW8631**



**Australasian Groundwater & Environmental
Consultants Pty Ltd**

Level 2, 15 Mallon Street, Bowen Hills, Queensland 4006

BOREHOLE LOG

page: 1 of 1

MW8631

PROJECT No: **G1663B**

PROJECT NAME: **Groote Eylandt**

DATE DRILLED: **20-Sep 2015**

LOGGED BY: **HM (AGE)**

DRILLING COMPANY: **Swick Drilling**

DRILLER: **M. Wilson / E. Thomassen**

DRILLING METHOD: **RC**

DRILL RIG: **RC3003**

EASTING: **657170 mE**

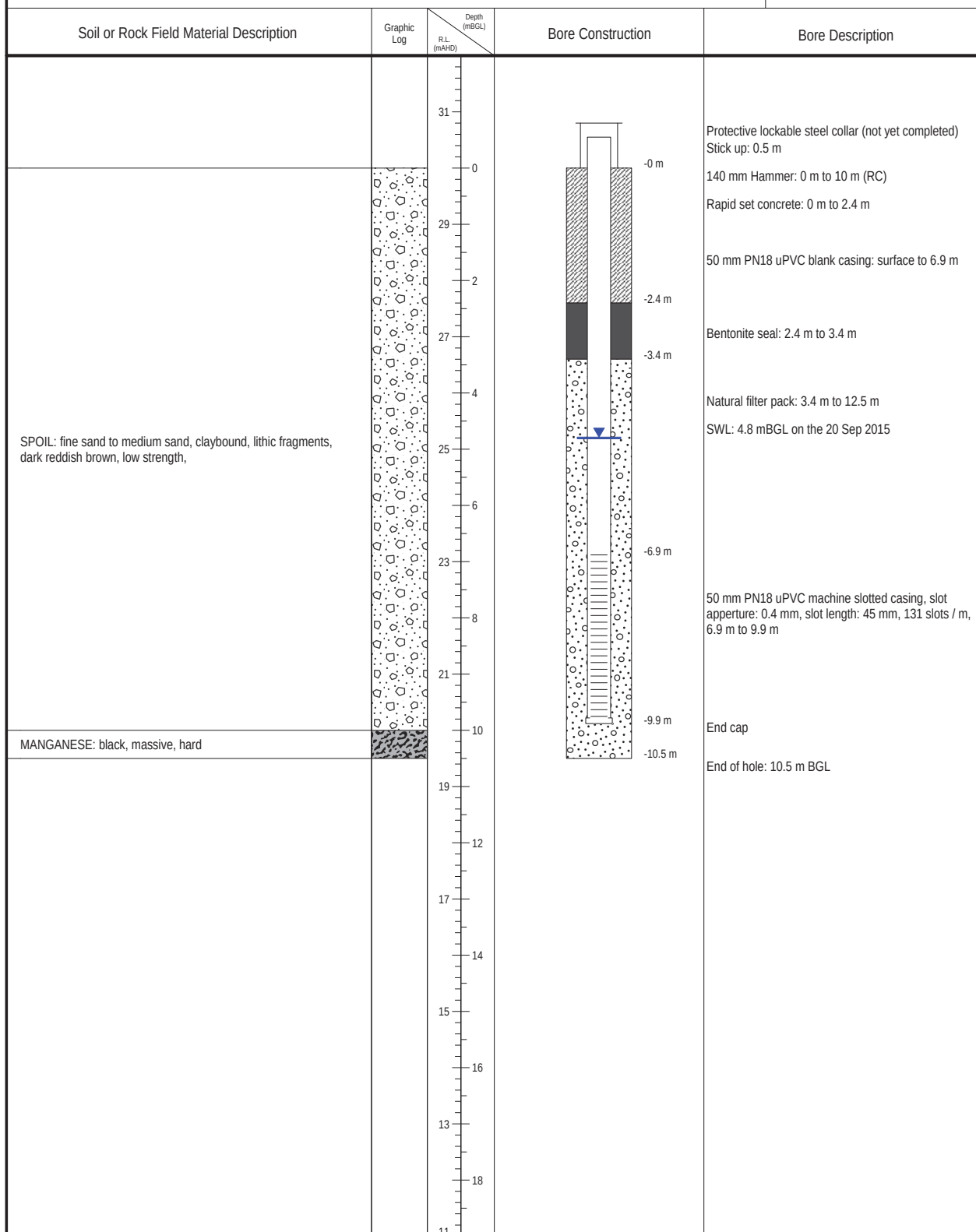
NORTHING: **8450524 mN**

DATUM: **MGA94 (z53)**

RL: **30 mAHD**

TD: **10 mBGL**

COMMENTS: **Bore not surveyed**



ATTACHMENT D

Conceptual Tailings Management Report

EASTERN LEASES PROJECT: CONCEPTUAL TAILINGS MANAGEMENT REPORT

November 2015

CONTENTS

1.	Introduction	1
1.1	Purpose of the Report.....	1
1.2	Overview of Submissions	1
1.3	Structure of the Report	2
2.	Overview of the Tailings Management System	3
2.1	Tailings Production	3
2.2	Tailings Characteristics.....	3
2.3	Tailings Management	3
2.4	Tailings From The Project.....	3
3	Life of Mine Tailings Quantities	4
3.1	Life of Mine Planning	4
3.2	Life of Mine Tailings Production	4
4	Life of Mine Tailings Storage Strategy.....	6
4.1	Overview	6
4.2	Staging of Tailings Storage Facilities	6
4.3	Life of Mine Tailings Balance.....	7
5	TSF Design.....	10
5.1	TSF Design Process.....	10
5.2	Conceptual TSF Design.....	10
5.3	TSF Construction.....	11
5.4	TSF Operation	11
5.5	TSF Monitoring	13
5.6	TSF Rehabilitation and Decommissioning.....	13
6	References	15
	Figures.....	16
	Appendix A	17
	Remaining Life of Mine TSF Staging	17

LIST OF TABLES

Table 1	Overview of EIS Submissions Related to Tailings Management
Table 2	Remaining Life of Mine Tailings Production (in dry tonnes)
Table 3	Cumulative Remaining Life of Mine Slimes and Sands Tailings Volumes (Tailings from Existing Mine and the Project)
Table 4	Remaining Life of Mine Tailings Storage Facilities
Table 5	Remaining Life of Mine TSF Staging
Table 6	Remaining Life of Mine Sands Tailings Balance
Table 7	Remaining Life of Mine Slimes Tailings Balance
Table 8	Life of Mine TSF Conceptual Landform Design

LIST OF FIGURES

Figure 1	Location of Existing GEMCO Mine and Project Site
Figure 2	Conceptual Life of Mine Tailings Storage Facilities Layout

1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report forms part of the Supplement to the Draft Environmental Impact Statement (EIS) for the Eastern Leases Project (the project). This report addresses issues related to the remaining life of mine storage of tailings at the existing GEMCO mine including the additional tailings which are forecast to be generated by the project. The report has been prepared for the purpose of providing additional information in response to EIS submissions that related to tailings management for the project. The estimates of life of mine tailings quantities and the capacity of conceptual tailings storage facilities discussed in this report are based on mine planning information provided by Minserve Pty Ltd.

1.2 OVERVIEW OF SUBMISSIONS

The EIS submissions that relate specifically to tailings management for the project are presented in Table 1. This table presents the stakeholders, their respective issues and a cross reference to the section of the report where each issue is addressed.

Table 1: Overview of EIS Submissions Related to Tailings Management

Submission Issue	Cross Reference to Relevant Report Section
Stakeholder: NT Environment Protection Authority	
The draft EIS states that the “current system for managing tailings and middlings will be extended to include tailings and middlings from the project [GEMCO Eastern Leases Project]” and the “life of asset planning process...ensures that sufficient capacity is available to meet tailings storage requirements associated with ongoing and future mine production whilst ensuring that tailings are stored and managed with no significant adverse environmental impacts”.	
The life of asset planning process for tailings and middlings management or details regarding the capacity of the existing tailings storage facilities are not detailed in the draft EIS and as such, the draft EIS has not demonstrated that	
there will be sufficient capacity and the appropriate conditions, at the existing GEMCO mine to meet future tailings storage requirements	Section 4
tailings and middlings generated from the GEMCO Eastern Leases Project can be handled and stored in a manner that will ensure there are no environmental impacts	Section 2.4 and Section 5
It is also unclear whether new tailing storage facilities may be required in the event that life of asset planning identifies that the current facilities cannot accommodate additional tailings and middlings generated from the GEMCO Eastern Leases Project.	Section 4
Facilities may need to be considered outside of this assessment and/or the existing environmental approvals if additional tailing storage facilities are required.	Section 2.4 and Section 5
Specific details regarding the life of asset planning process.	Section 3.1
The capacity and integrity of the proposed tailings storage facilities including details of the location, layout, factor of safety rating, expected design life and permeability, to enable an assessment of the acceptability of the proposed management of the tailings and middlings should be included in the Supplement.	Section 5
Stakeholder: Environment Centre NT	
Capacity of tailings dams and sediment traps to contain contaminated waters during significant rainfall events during the wet season.	Section 5.3.1

1.3 STRUCTURE OF THE REPORT

This report is structured as follows:

- Section 1 provides an introduction;
- Section 2 provides background information on tailings management at the existing mine and the extension of these management measures to include the project;
- Section 3 outlines the life of mine planning process for tailings management and the volume of tailings that are forecast to be generated over the life of the mine (including additional tailings from the project);
- Section 4 provides a description of the life of mine tailings storage strategy; and
- Section 5 provides a description of design, construction, operation and closure principles for the remaining life of mine tailings storage facilities.

2. OVERVIEW OF THE TAILINGS MANAGEMENT SYSTEM

2.1 TAILINGS PRODUCTION

Manganese ore is fed into the concentrator at the existing GEMCO mine where it is crushed, sized and washed. The location of the concentrator is shown on Figure 1. The processing of manganese ore results in the production of concentrate products (i.e. manganese lump and fines) and waste products including tailings. Tailings comprise approximately 45 to 50% of the total manganese ore feed to the concentrator.

The tailings are separated into a fine fraction (slimes tailings) and a coarse fraction (sands tailings) at the concentrator. The slimes tailings comprise tailings with a particle size less than 0.1 mm, while the sands tailings comprise tailings with a particle size of 0.5 mm to 0.1 mm.

2.2 TAILINGS CHARACTERISTICS

Geochemical testing has been undertaken on tailings. It has confirmed that tailings typically contain low concentrations of metals (except manganese) and have negligible capacity to generate acid. Leachate from these materials is typically pH neutral and low in salinity and trace metals. A detailed assessment of the geochemistry of the tailings is provided in the EIS Geochemistry Report contained in Appendix A of the Draft EIS.

Stored sands and slimes tailings typically settle to a density of 1.15 and 1.65 tonnes per bank cubic metre (t/bcm), respectively.

2.3 TAILINGS MANAGEMENT

Tailings are pumped from the concentrator via overland pipes and discharged into separate purpose-built sands and slimes tailings storage facilities (TSFs) located adjacent to the mine industrial area (Figure 1).

The TSFs are conventional wet storage facilities constructed within mined quarry pits. At each TSF, additional storage capacity has been created above natural ground level by the construction of raised embankments. Tailings slurry is deposited within the active TSFs in order to progressively develop a tailings beach and maintain a tailings water decant pond. Tailings water (i.e. supernatant water and rainfall runoff) that collects within the decant pond is dewatered to dedicated water storages for reuse.

The current active slimes and sands TSFs are TSF 11 and TSF 14, respectively (Figure 2). The Northern Territory Department of Mines and Energy (DME) does not have specific regulatory guidelines for the design of TSFs. These TSFs have therefore been designed in accordance with the Australian National Committee on Large Dams *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure* (2012) (ANCOLD Guidelines). In accordance with these guidelines, these TSFs have been designed and certified by a suitably qualified engineer following appropriate risk assessment and consequence analysis of dam failure.

The TSFs are operated and monitored in accordance with the requirements of the existing approved 2014-15 Mining Management Plan. GEMCO maintains an extensive groundwater and surface water monitoring network to ensure that any unexpected adverse environmental impacts that arise from the storage of tailings are detected.

2.4 TAILINGS FROM THE PROJECT

Ore mined as part of the project will be transported to the existing mine and processed at the concentrator. Tailings generated by processing this ore will be managed in accordance with GEMCO's existing tailings management strategy. Tailings will be emplaced in storage facilities within the existing mine and there will be no tailings storage facilities within the project site. A mid to long term mine planning review process has been undertaken (discussed in Section 3.1) to ensure that the remaining life of mine tailings generated by the existing mine and the project can be accommodated.

3 LIFE OF MINE TAILINGS QUANTITIES

3.1 LIFE OF MINE PLANNING

As discussed in Section 3 of the Draft EIS, the proponent operates a life of mine planning process. The planning process is designed to provide an integrated business plan which spans the economic life of the mine through operations and closure. The life of mine plan is informed by a detailed Opportunity Assessment which brings together key disciplines including geology, mine planning, sustainable development and finance.

This planning process also ensures that sufficient capacity is available to meet tailings storage requirements associated with ongoing and future mine production.

As part of this planning process, an evaluation of future tailings management options has been undertaken to ensure that the available tailings storage capacity at the existing mine will be adequate for the life of project tailings storage requirements. The planning process assumed a continuation of the tailings management strategy at the existing mine i.e. the storage of wet tailings within mined quarry pits, with additional above ground and out-of-pit storage capacity created through the progressive construction (raising) of engineered embankments. These facilities will be operated as conventional wet tailings storage facilities, as this is a proven and economically viable option.

Design, construction and operating principles for the proposed remaining life of mine TSFs are based on the existing sands and slimes TSFs. These principals are discussed in Section 5. The designs will be subject to further refinement based upon detailed production scheduling, mine planning and scheduling, as well as detailed geotechnical investigations. The design and management of these facilities will be documented in the Mining Management Plans submitted to the DME under the *Mining Management Act*.

3.2 LIFE OF MINE TAILINGS PRODUCTION

Table 2 provides a breakdown of the total annual remaining life of mine tailings production including tailings from the existing mine and from the project. The tailings quantities generated by the project are also shown.

The current life of mine plan was completed following lodgement of the Draft EIS and includes several minor refinements of the previous version presented in the Draft EIS. These refinements result in minor reductions in life of mine tailings volumes and ratios compared to those presented in the Draft EIS. The tailings volumes presented in this section reflect the current life of mine plan as this represents the most recent data.

Table 2: Remaining Life of Mine Tailings Production (in dry tonnes)

Project Year	Calendar Year	Project Tailings	Total Life of Asset Tailings (Tailings from Existing Mine & Project)
-1	2015	0	3,674,074
0	2016	0	3,439,937
1	2017	0	3,285,361
2	2018	435,266	3,219,123
3	2019	1,057,702	3,728,027
4	2020	974,765	3,400,343
5	2021	607,944	3,700,821
6	2022	691,820	3,540,591
7	2023	1,087,938	3,329,045
8	2024	1,140,696	3,638,363
9	2025	1,658,257	3,947,646
10	2026	2,000,063	3,787,687
11	2027	881,906	3,557,539

Table 2: Remaining Life of Mine Tailings Production (in dry tonnes)

Project Year	Calendar Year	Project Tailings	Total Life of Asset Tailings (Tailings from Existing Mine & Project)
12	2028	1,497,823	3,785,271
13	2029	2,087,767	3,225,114
14	2030	1,695,844	2,2550,447
Total		15,817,791	55,809,388

Note: figures have been rounded and this may result in minor discrepancies in total tonnages report

The total remaining life of mine tailings production (i.e. the total tailings generated from the existing mine and the project) is approximately 55.8 Mt (dry weight). The project will generate approximately 15.9 Mt (dry weight) of tailings, which equates to approximately one quarter of the total tailings over the remaining life of the mine.

The dry tonnes of tailings listed in Table 2 equate to an estimated settled volume of approximately 42.6 Mm³, comprising approximately 29.1 Mm³ slimes tailings and approximately 13.5 Mm³ sands tailings.

Table 3 shows the annual and cumulative volumes of sands and slimes tailings generated over the life of the mine.

**Table 3: Cumulative Remaining Life of Mine Slimes and Sands Tailings Volumes
(Tailings from Existing Mine and the Project)**

Project Year	Calendar Year	Annual		Cumulative	
		Slimes (m ³)	Sands (m ³)	Slimes (m ³)	Sands (m ³)
-1	2015	1.9	0.9	1.9	0.9
0	2016	1.8	0.8	3.7	1.7
1	2017	1.7	0.8	5.4	2.5
2	2018	1.7	0.8	7.1	3.3
3	2019	2.0	0.9	9.1	4.2
4	2020	1.8	0.8	10.8	5.0
5	2021	1.9	0.9	12.8	5.9
6	2022	1.9	0.9	14.6	6.8
7	2023	1.7	0.8	16.3	7.6
8	2024	1.9	0.9	18.2	8.5
9	2025	2.1	1.0	20.3	9.4
10	2026	2.0	0.9	22.3	10.4
11	2027	1.9	0.9	24.1	11.2
12	2028	2.0	0.9	26.1	12.1
13	2029	1.7	0.8	27.8	12.9
14	2030	1.3	0.6	29.1	13.5
Decommissioning/Closure		0.0	0.0	29.1	13.5

Note: Annual figures presented in this table has been rounded to one decimal place for clarity. Rounding for annual volumes results in a minor discrepancies when these values are summed. Rounded annual figures should not be summed to determine life of mine volumes. The totals and cumulative volumes presented in this report are accurate and the minor discrepancies do not materially affect the assessment and conclusions presented in this report.

4 LIFE OF MINE TAILINGS STORAGE STRATEGY

4.1 OVERVIEW

The tailings storage strategy for the remaining life of mine involves the use of six TSFs. The TSFs are each dedicated sands or slimes storages. Co-disposal of sands and slimes tailings is not proposed for the remaining life of mine tailings storage. Slimes TSFs will be capped with sands tailings where appropriate. This strategy is consistent with the current slimes TSF capping practices at the existing mine and provides additional sands tailings storage capacity at the slimes TSFs (as shown in Table 4)

Table 4 provides an overview of each TSF including the type of tailings to be stored and the total sands and slimes storage capacities.

The TSFs have a total storage capacity of approximately 43 Mm³, comprising 29.4 Mm³ and 13.7 Mm³ of slimes and sands tailings storage capacity, respectively. As shown in Table 4, this storage capacity is greater than the required life of mine tailings storage requirements. A detailed assessment of the annual tailings balance has been undertaken and is presented in Section 4.3. It confirms that the current life of mine planning provides sufficient tailing storage capacity at all times during the remaining life of the mine.

Table 4: Remaining Life of Mine Tailings Storage Facilities

TSF	Type of Tailings Stored	Total Slimes Storage Capacity (Mm³)	Total Sands Storage Capacity (Mm³)
TSF 11	Slimes TSF Capped with Sand	7.1	4.3
TSF 14	Sands TSF	0.0	2.5
TSF 15	Slimes TSF Capped with Sand	7.1	1.8
TSF 16	Slimes TSF Capped with Sand	6.7	2.9
TSF 17	Slimes TSF	8.5	0.0
TSF 20	Sands TSF	0.0	2.2
TSF Design Total		29.4	13.7
Remaining Life of Mine Tailings Volume		29.1	13.5
Surplus Storage Capacity		0.3	0.2

The location of each TSF is shown on Figure 2. All TSFs will be located in close proximity to the concentrator at the existing mine, and at least 1 km from the nearest watercourse (i.e. the Angurugu River). All TSFs are located within/above existing mined quarry pits or areas proposed to be mined (i.e. future quarries).

The TSFs will be developed progressively over the life of the mine. The staged development of the TSFs is discussed in Section 4.2.

Section 5 describes the design, construction and operation of the TSFs. As discussed in Section 3.1, the detailed design and operating plans for these facilities will be documented in the Mining Management Plans and as part of separate, standalone feasibility study reports, developed for each TSF. GEMCO also has internal corporate guidelines, management plans and procedures that govern the operation of tailings storage facilities. GEMCO will amend these documents as required, as the tailings storage strategy develops and is implemented over the life of the mine.

4.2 STAGING OF TAILINGS STORAGE FACILITIES

The TSFs will be constructed sequentially over an 11 year period and the embankments of the TSFs will be progressively raised in stages. The progressive development of the TSFs is shown in Table 5 and illustrated in Appendix A.

Table 5: Remaining Life of Mine TSF Staging

TSF	Initial Construction Year	Deposition Activities	Commencement of Active Deposition	Completion of Active Deposition
Slimes Tailings				
TSF 11	2014	Slimes Storage	2015 (PY -1)	2018 (PY 2)
TSF 16	2015	Slimes Storage	2019 (PY 3)	2022 (PY 6)
TSF 15	2020	Slimes Storage	2022 (PY 6)	2026 (PY 10)
TSF 17	2025	Slimes Storage	2026 (PY 10)	2030 (PY 14)
Sands Tailings				
TSF 14	2014	Sands Storage	2015 (PY -1)	2016 (PY 0)
TSF 16	2015	Sands Storage	2016 (PY 0)	2018 (PY 2)
TSF 14	N/A	Slimes Storage	2018 (PY 2)	2019 (PY 3)
TSF 11	N/A	TSF Capping	2019 (PY 3)	2024 (PY 8)
TSF 16	N/A	TSF Capping	2024 (PY 8)	2026 (PY 10)
TSF 20	2025	Sands Storage	2026 (PY 10)	2028 (PY 12)
TSF 15	N/A	TSF Capping	2028 (PY 12)	2030 (PY 14)

PY – Project Year N/A Not applicable

4.3 LIFE OF MINE TAILINGS BALANCE

A tailings balance assessment has been undertaken for the remaining life of mine. This assessment compared the tailings volumes generated during each year of the remaining mine life to the corresponding storage capacity available in the active TSF to ensure that sufficient capacity will be available at all times during the life of the mine. The tailings balance is presented in Table 6 and Table 7 for sands and slimes tailings, respectively.

The tailings balance shows that there is significant excess sands and slimes storage capacity available during all years of the mine life.

Table 6: Remaining Life of Mine Sands Tailings Balance

Project Year	Calendar Year	Starting Storage (Mm³)	Additional Storage Created (Mm³)	Annual Tailings (Mm³)	Total Excess Storage ¹ (Mm³)	Active TSF
-1	2015	0.9	1.7	0.9	1.7	TSF 14
0	2016	1.7	0	0.8	0.9	TSF 16
1	2017	0.9	1.6	0.8	1.6	TSF 16
2	2018	1.6	4.3	0.8	5.1	TSF 14
3	2019	5.1	0	0.9	4.2	TSF 14
4	2020	4.2	0	0.8	3.4	TSF 11
5	2021	3.4	0	0.9	2.5	TSF 11
6	2022	2.5	0	0.9	1.6	TSF 11
7	2023	1.6	1.2	0.8	2.0	TSF 11
8	2024	2.0	0	0.9	1.2	TSF 11
9	2025	1.2	2.2	1.0	2.4	TSF 11
10	2026	2.4	0	0.9	1.4	TSF 20
11	2027	1.4	1.8	0.9	2.4	TSF 20
12	2028	2.4	0	0.9	1.5	TSF 20
13	2029	1.5	0	0.8	0.7	TSF 15
14	2030	0.7	0	0.6	0.1	TSF 15
Closure		0.1	0	0	0.1	NA

NA – not applicable as no tailings is produced in this year.

Note: Annual figures presented in this table has been rounded to one decimal place for clarity. Rounding for annual volumes results in a minor discrepancies when these values are summed. Rounded annual figures should not be summed to determine life of mine volumes. The totals and cumulative volumes presented in this report are accurate and the minor discrepancies do not materially affect the assessment and conclusions presented in this report.

1 Total excess storage volume represents the TSF storage volume remaining following the deposition of annual tailings (i.e. excess storage volume remaining at the end of each year). This volume also reflects any increases in TSF storage capacity arising from the staged development of TSFs (as presented in Table 5)

Table 7: Remaining Life of Mine Slimes Tailings Balance

Project Year	Calendar Year	Starting Storage (Mm³)	Additional Storage Created (Mm³)	Annual Tailings (Mm³)	Total Excess Storage ¹ (Mm³)	Active TSF
-1	2015	7.1	0	1.9	5.2	TSF 11
0	2016	5.2	0	1.8	3.4	TSF 11
1	2017	3.4	0	1.7	1.7	TSF 11
2	2018	1.7	6.7	1.7	6.7	TSF 11
3	2019	6.7	0	2.0	4.7	TSF 16
4	2020	4.7	7.1	1.8	10.1	TSF 16
5	2021	10.1	0	1.9	8.2	TSF 16
6	2022	8.2	0	1.9	6.3	TSF 15
7	2023	6.3	0	1.7	4.6	TSF 15
8	2024	4.6	0	1.9	2.7	TSF 15
9	2025	2.7	8.5	2.1	9.1	TSF 15
10	2026	9.1	0	2.0	7.1	TSF 17
11	2027	7.1	0	1.9	5.3	TSF 17
12	2028	5.3	0	2.0	3.3	TSF 17
13	2029	3.3	0	1.7	1.6	TSF 17
14	2030	1.6	0	1.3	0.3	TSF 17
Closure		0.3	0	0	0.3	NA

NA – not applicable as no tailings is produced in this year.

Note: Annual figures presented in this table has been rounded to one decimal place for clarity. Rounding for annual volumes results in a minor discrepancies when these values are summed. Rounded annual figures should not be summed to determine life of mine volumes. The totals and cumulative volumes presented in this report are accurate and the minor discrepancies do not materially affect the assessment and conclusions presented in this report.

1 Total excess storage volume represents the TSF storage volume remaining following the deposition of annual tailings (i.e. excess storage volume remaining at the end of each year). This volume also reflects any increases in TSF storage capacity arising from the staged development of TSFs (as presented in Table 5)

5 TSF DESIGN

This section describes the design process and conceptual designs for the future TSFs. The design principles are based on the design of TSF 11, which is the most recently commissioned TSF at the existing GEMCO mine. The design principles presented are in accordance with the ANCOLD Guidelines. This section also provides an overview of the construction, operation, closure and monitoring of future TSFs.

5.1 TSF DESIGN PROCESS

GEMCO will develop a detailed design for each future TSF that describes the design, operation, monitoring and rehabilitation criteria of each TSF. The detailed design will include:

- A functional design;
- Results from hydrologic, hydraulic and geotechnical modelling used in the design of the TSF;
- A revegetation and vegetation management plan for the TSF;
- Engineering drawings depicting the physical attributes and dimensions of the TSF;
- The staged development of the final landform including the proposed temporary and permanent water management arrangements; and
- All investigation and other reports required to support the detailed design.

The protection of human life and the environment is a key driver in the development of the TSFs. The standards used to inform the design, construction, operation, modification and decommissioning of the TSFs will therefore reflect the consequences arising from any potential failure or collapse of the TSFs. The TSFs will therefore be designed, constructed, operated and maintained to an appropriate engineering standard that reflects the characteristics of stored tailings and the TSF setting.

As part of the detailed design process, GEMCO will undertake an assessment of the consequences of a range of scenarios (e.g. dam break or containment failure). The consequence category assessment will be undertaken by a suitably qualified and experienced engineer and will determine the design performance criteria for each TSF. This assessment will be undertaken in accordance with the ANCOLD Guidelines.

Conceptual TSF designs and criteria have been developed as part of the life of mine planning process. An overview of these conceptual designs and design principles is provided in Section 5.2. These conceptual designs will be refined as part of the detailed design process.

5.2 CONCEPTUAL TSF DESIGN

The TSF embankments will be raised in stages. The TSFs will have an estimated maximum embankment height of approximately 19 m. The final total footprint area of the TSFs will be approximately 637 ha (Figure 2). Table 8 presents the TSF embankment elevation, maximum embankment height and maximum footprint required for each TSF.

Table 8 Life of Mine TSF Conceptual Landform Design

TSF	Embankment Elevation (m RL)	Maximum Embankment Height (m)	Maximum Footprint (ha)
TSF 11	29	13	229
TSF 14	19	14	59
TSF 15	20	13	97
TSF 16	29	19	66
TSF 17	37	10	94
TSF 20	13	3	92

The total final external embankment slopes will nominally be between 1V:3H to 1V:5H depending on site-specific conditions. The final top surface of the TSFs will have a cross fall of up to 5% to promote runoff. The TSF embankments will be rehabilitated progressively over the life of the mine.

All designs will be subject to detailed geotechnical field investigations of the proposed TSF foundation areas.

Detailed stability analyses will be undertaken for each TSF landform with the intent of estimating the factor of safety (FOS) of the proposed closure and temporary operational slopes under a variety of load conditions. The FOS is a measure of the resistance of the TSF embankment to failure and is determined by geotechnical analysis considering foundation conditions, embankment construction and phreatic surface levels within the embankment. The analysis will be undertaken by a suitably qualified engineer. All TSFs will be constructed with closure and temporary operational slopes that exceed the minimum FOS requirements under the ANCOLD guidelines (typically FOS 1.5).

5.3 TSF CONSTRUCTION

5.3.1 IN-PIT STORAGE PREPARATION

Mined quarry pits containing quarry water will be dewatered at the commencement of construction of each in-pit TSF, and prior to deposition of tailings. Initial pit dewatering will be pumped to other existing pits or dedicated mine water storages for reuse as water supply.

Pit water levels will be maintained at low levels by decant pumping to ensure that the tailings deposition strategy can be undertaken effectively.

5.3.2 OUT-OF-PIT FOUNDATION PREPARATION

At the commencement of construction of each out-of-pit storage area, the TSF foundation area (i.e. the embankment footprint and out-of-pit storage area footprint) will be cleared and grubbed. Grubbing will be followed by the removal and stockpiling of available soil resources from the foundation areas, including materials suitable for use as topsoil and/or capping material in rehabilitation.

After the topsoil and capping material have been removed, the foundation area will be inspected and suitable preparation measures implemented to provide a low permeability foundation. It is anticipated that this will involve:

- Further stripping to remove any loose, cracked, softened, weak or wet soil or highly permeable sand and gravel within the foundation area to expose clay foundation materials;
- Moisture conditioning (i.e. watering) of the clay foundation materials to achieve close to optimum moisture condition so that a low permeability layer is formed during compaction; and
- Proof rolling and compaction of the clay foundation using a pad-foot roller to achieve suitable compaction.

Should the inspection show that insufficient clay soils are present to achieve design requirements an alternative design solution would be developed.

All foundation preparation works will be undertaken in accordance with the Erosion and Sediment Control Plan (ESCP). Temporary erosion and sediment controls will be implemented as necessary to manage surface water runoff in the foundation area.

5.4 TSF OPERATION

The proposed slimes and sands tailings deposition strategies are described below. These deposition strategies, which apply to both mined quarry pits and above ground tailings storage, are well-established at the existing mine and commonly used in conventional wet tailings storage facilities in the mining industry.

These strategies will also allow for the progressive drying and consolidation of successive layers of deposited tailings which will increase the shear strength of the final tailings beach and the stability of the final landform.

5.4.1 SLIMES TAILINGS

The slimes tailings consist of very fine clays, soils and manganese washed out in the concentration process (particle size of less than 0.1 mm). The slimes tailings deposition strategy involves sequencing of active tailings discharge spigots in order to progressively develop a beach around the perimeter embankment towards the centre of the TSF.

These methods will maintain a tailings decant water pond in the central low point of the active TSF area and prevent ponding of water against quarry pit walls or TSF embankments.

Tailings water will collect in the decant pond following deposition of solids from the tailings slurry on the beach areas. Rainfall runoff from within the active TSF area will also collect in the decant pond. For each TSF development stage the slimes tailings spigot off-take system will be set around the inner crest of the quarry pit walls or TSF embankments to ensure the tailings beach can be maintained, ensuring the efficient placement of tailings solids within the TSF and maintenance of the central decant pond.

5.4.2 SANDS TAILINGS

Sands tailings are material that have been washed out through the concentration process (particle size of 0.5 mm to 0.1 mm). The sands tailings will be deposited in cones from a single slurry outlet pipe. The deposition point will be relocated as necessary to ensure the development of a uniform elevated tailings beach is achieved.

Tailings water and rainfall runoff will collect in the designated decant basin area following deposition of solids from the tailings slurry on the beach areas.

5.4.3 WATER MANAGEMENT

The drainage and water management strategy for the TSFs is summarised as follows:

- Mined quarry pits will be dewatered at the commencement of construction of each in-pit TSF, and prior to deposition of tailings. Initial pit dewatering will be pumped to existing pits or to water storages for reuse as water supply.
- Prior to the construction of each TSF embankment around the full perimeter of the TSF, diversion drains will be constructed around the TSF to isolate the active TSF catchment.
- Once the full embankment is constructed around the perimeter of the TSF it will isolate the TSF catchment.
- Runoff from the external slopes of the TSF embankment will drain to a series of collection drains and will be directed to sediment traps for control of suspended sediment prior to draining from site. Geotextile or scour protection material will be placed in drains to limit in-channel erosion, as necessary. Erosion of the dam embankments will be limited by suitable control measures including the establishment of vegetation to assist long-term surface stability. Clean drainage from established rehabilitation on the external TSF embankment slopes will be allowed to drain from site.
- A pontoon mounted return water pump will be moored in the TSF decant pond. The pump will operate automatically to maintain a low water level within the decant pond. The pump will transfer water from the decant pond to the Process Water Dam (Dam 1), which provides priority water supply for the concentrator.
- As part of GEMCO's operating procedures and generic design of its TSFs, water is never allowed to build up on the storage such that a pond extends closer than 100 m from the perimeter embankment for an extended period of time.

The TSFs will be designed to contain ponded water including rainfall runoff during extreme rainfall events up to the 1 in 100 annual exceedance probability. This will ensure that there is an extremely low potential for uncontrolled release of pond water during a range of operating and climate conditions.

5.5 TSF MONITORING

There is an existing program to monitor key environmental and design performance indicators for the TSFs.

Monitoring for the TSFs includes:

- Regular inspections and annual survey of the deposited tailings beach and decant pond;
- Regular inspection of the tailings lines, decant system, return water lines and embankments (including spillways);
- Regular inspection of the spigot off-take system pond levels and operation of the decant pumping system and valves;
- Regular inspection of the surface drainage around the perimeter of each TSF;
- Annual geotechnical review of the TSFs including documentation of the total and remaining storage volume, the deposition rates, the condition of embankments and quarry pit walls and any signs of seepage;
- Surface water monitoring including freeboard, TSF decant pond water quality and return water volumes pumped to the Process Water Dam (Dam 1);
- Monitoring of pore water pressures in the TSF embankments; and
- Monitoring of groundwater levels and water quality in the vicinity of the TSFs.

This program will be continued over the life of the mine.

5.6 TSF REHABILITATION AND DECOMMISSIONING

ANCOLD (2012) requires that all TSFs are designed for sustainable closure and rehabilitation. Consistent with ANCOLD guidelines, it is GEMCO's intention that all closed and decommissioned TSFs will ultimately be rehabilitated in order to meet its obligations under:

- The Mining Agreement under the *Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976*;
- The mineral lease;
- The *Mining Act*; and
- The *Mining Management Act*.

Rehabilitation of available areas of the TSF will be undertaken throughout the mine life and will be an integral part of the development and operation of the facilities. Rehabilitation will involve shaping of the landform and provision of capping, topsoil layers and seeding, as described in Section 6 – Mine Rehabilitation and Closure of the Draft EIS.

In general, the main objectives for closure of the TSFs include:

- Long term stability of containment embankments;
- Physical stability of the tailings beach and pond shoreline area; and
- Creation of a post mining landform that meets the expectations of the Traditional Owners and the Northern Territory Government.

As discussed in Section 6.3.5 of the Draft EIS, detailed closure objectives will be developed in consultation with key stakeholders, particularly the Anindilyakwa Land Council (ALC).

Closure objectives for the TSFs will be achieved by decommissioning and rehabilitation of the TSFs. This will be undertaken in accordance with the proponent's closure plan for the existing mine and will address the following key requirements:

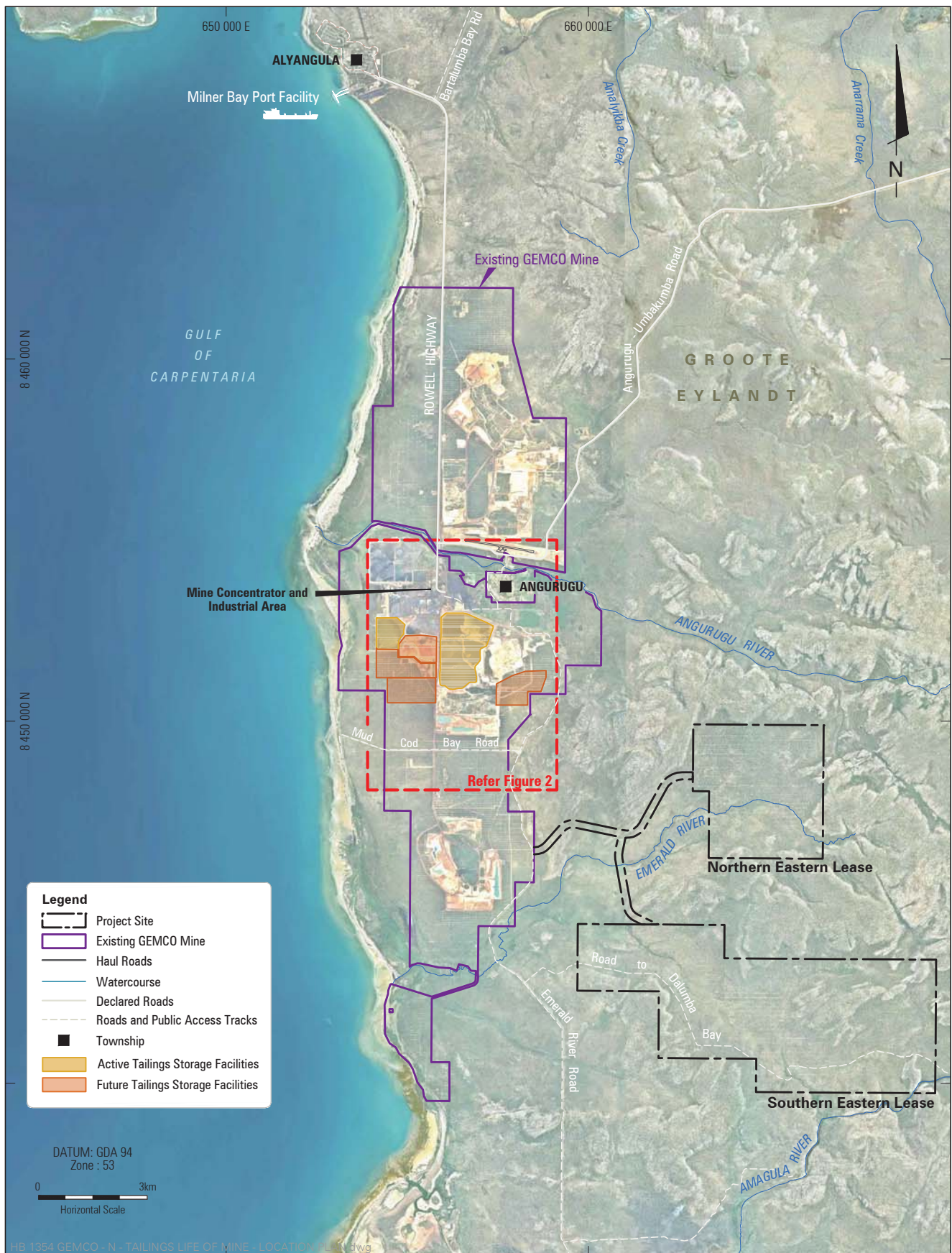
- Removing the tailings distribution system (i.e. associated network of pipes and pumps);

- Contouring the tailings beach surface to achieve a final closure surface by spigotting from select sides of the embankments in order to achieve the desired surface profile;
- Covering the exposed tailings beach with a free draining cover. The design of an engineered cover system will take into consideration climate-soil interactions which influence infiltration and runoff. External slope protection measures will be implemented as required in order to control erosion;
- Re-contouring access roads and pipeline bedding areas; and
- Monitoring the final landform for the establishment (and verification of the success) of the post mining vegetation cover.

6 REFERENCES

Australian National Committee on Large Dams (ANCOLD) (2012) *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure*.

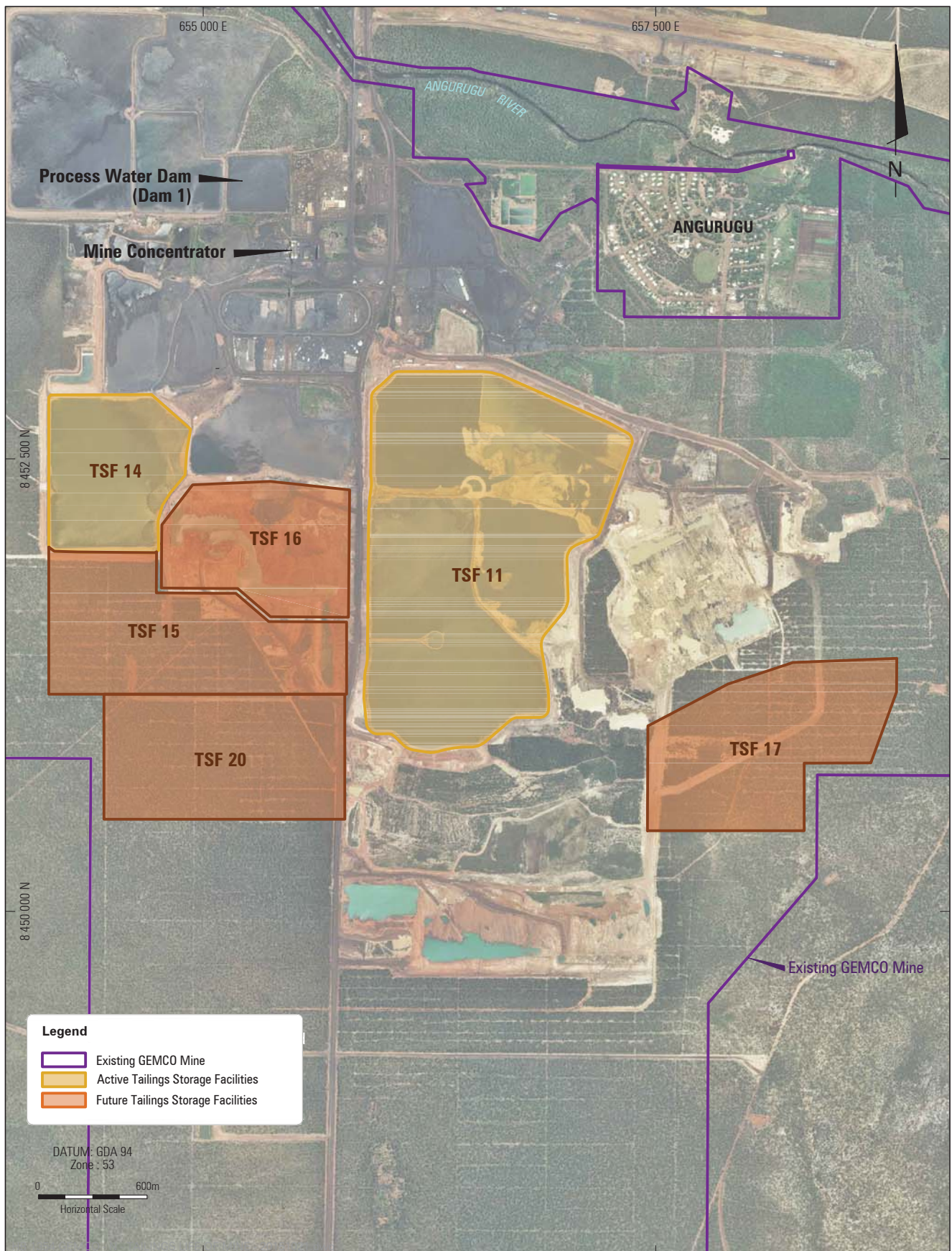
FIGURES



EASTERN LEASES PROJECT

Location of Existing GEMCO Mine and Project Site

FIGURE 1



EASTERN LEASES PROJECT

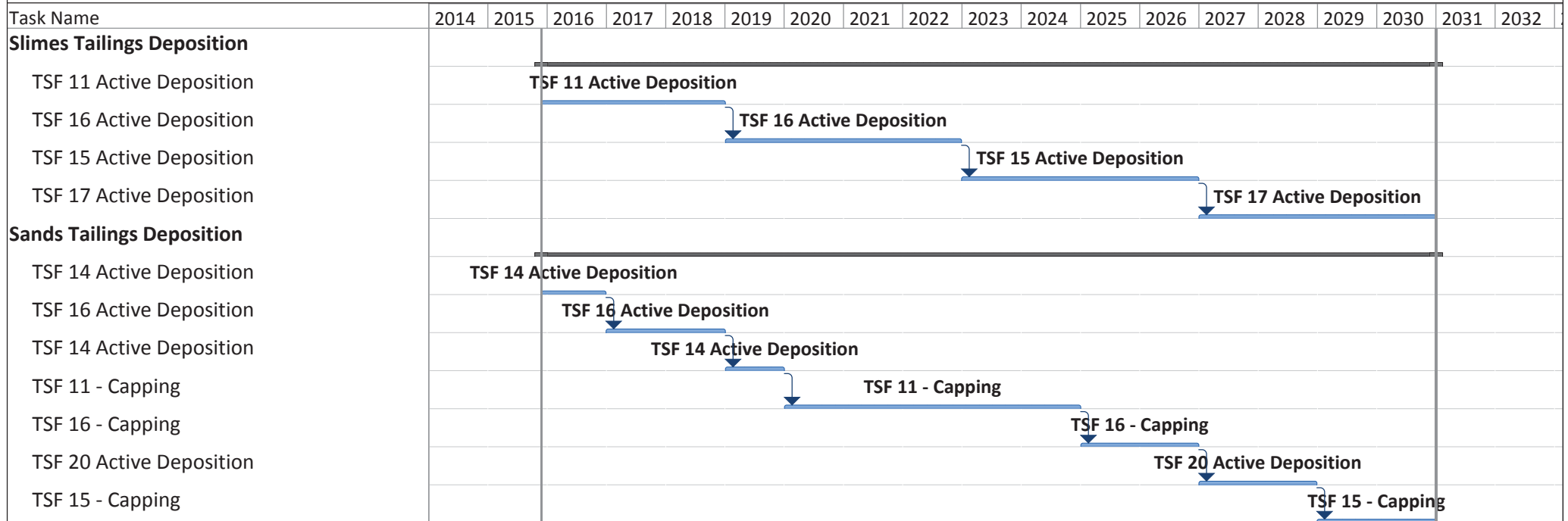
Conceptual Remaining Life of Mine Tailings Storage Facilities Layout

FIGURE 2

APPENDIX A

REMAINING LIFE OF MINE TSF STAGING

APPENDIX A: Remaining Life of Mine TSF Staging



ATTACHMENT E

Haul Road Crossing Design Overview Report



EASTERN LEASES PROJECT

HAUL ROAD CROSSING DESIGN OVERVIEW REPORT

for

South32

December 2015

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

GROOTE EYLANDT MINING COMPANY (GEMCO)
EASTERN LEASES PROJECT

HAUL ROAD CROSSING
DESIGN OVERVIEW REPORT

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TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	PURPOSE OF THE REPORT	1
1.2	OVERVIEW OF SUBMISSIONS	1
1.3	STRUCTURE OF THE REPORT	2
2	PLANNING PROCESS AND DESIGN PRINCIPLES	3
2.1	INTRODUCTION	3
2.2	HAUL ROAD ALIGNMENT	3
2.3	HAUL ROAD CROSSING LOCATIONS	3
2.4	HAUL ROAD CROSSING DESIGN OBJECTIVES AND PRINCIPLES	3
2.5	CONCEPTUAL HAUL ROAD CROSSING DESIGNS	4
2.6	CONCEPTUAL HAUL ROAD CROSSING OPERATION	5
2.6.1	Circular Pipe Culvert Crossings	5
2.6.2	Emerald River Arch Culvert Crossing	5
3	HAUL ROAD CROSSING IMPACT ASSESSMENT	7
4	MONITORING PROGRAM	11
5	HAUL ROAD DRAINAGE	13
6	REFERENCES	15

LIST OF TABLES

Table 1	Summary of Potential Haul Road Crossing Impacts and Management Measures

LIST OF FIGURES

Figure 1	Haul Road Crossing Locations
Figure 2	Conceptual Illustration of Circular Pipe Culvert
Figure 3	Conceptual Illustration of Arch Culvert
Figure 4	Conceptual Montage of Arch Culvert
Figure 5	Operation of Circular Pipe Culvert
Figure 6	Operation of Arch Culvert
Figure 7	Design of Sedimentation Basins Adjacent to Haul Roads

LIST OF APPENDICES

Appendix A	Conceptual Haul Road Crossing Design

EASTERN LEASES PROJECT HAUL ROAD CROSSING DESIGN OVERVIEW

for
South32

1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report forms part of the Supplement to the Draft Environmental Impact Statement (EIS) for the Eastern Leases Project (the project). The project requires the construction of several haul road crossings of watercourses. A number of submissions on the Draft EIS requested further information in relation to the proposed haul road crossings or raised issues in relation to the proposed crossings. This report has been prepared for the purpose of addressing these submissions on the Draft EIS. Although the Draft EIS described the proposed haul road crossings, it did not provide a detailed description of the specific design, operation and management of the haul road crossings. This report provides this information.

The report has been prepared by Hansen Bailey on behalf of South32 and the Groote Eylandt Mining Company (GEMCO). The haul road crossing design parameters provided in this report are based on engineering designs undertaken for the Eastern Leases Project Selection Phase Study by Jacobs Pty Ltd, on behalf of South32.

1.2 OVERVIEW OF SUBMISSIONS

A number of submissions on the Draft EIS raised issues in relation to the potential impact of haul road crossings on watercourses. Submissions relating to haul road crossings were received from the following stakeholders:

- The Anindilyakwa Land Council (ALC) requested that the proponent provide additional details on the potential water quality and sedimentation impacts arising from the haul road crossings.
- The NT Environment Protection Authority provided a submission requesting information on the proposed monitoring and remedial measures that will be implemented for the haul road crossings.
- The Environment Centre NT raised concerns regarding the environmental impact posed by the construction of an overpass over the Emerald River to aquatic species, including alteration of the river channel, erosion, siltation and manganese contamination.

1.3 STRUCTURE OF THE REPORT

This report is structured as follows:

- Section 1 provides a brief introduction;
- Section 2 describes the planning process that was adopted for siting and designing the haul road crossings, provides design objectives and principles for the crossings and describes the operation of the crossings;
- Section 3 provides an assessment of potential impacts due to the haul road crossings;
- Section 4 provides a description of management and monitoring measures to be implemented during the haul road crossing construction and operation; and
- Section 5 provides a description of the drainage arrangement for the remainder of the haul road alignment.

2 PLANNING PROCESS AND DESIGN PRINCIPLES

2.1 INTRODUCTION

This section provides an overview of the design and operation of the haul road crossings. The information provided in this section is a high level overview of the crossings, and a more detailed description of the design of the crossings is provided in Appendix A.

2.2 HAUL ROAD ALIGNMENT

The proposed haul road alignment was selected following a rigorous selection study, which involved an evaluation of various alternative alignments for the haul road corridor and watercourse crossings. The proponent assessed potential haul road corridor options to select the preferred haul road alignment. The selected alignment was influenced by economics, productivity, water management, health, safety, environment, cultural sensitivities and community issues. The potential impacts of each potential haul road corridor option on the Emerald and Amagula Rivers were specifically assessed as part of the preferred haul road alignment selection process.

2.3 HAUL ROAD CROSSING LOCATIONS

A total of five haul road crossings are proposed on the ephemeral reaches of the Emerald River, its tributary and a tributary of the Amagula River, as shown on Figure 1. The haul road crossings are proposed at the following locations:

- In the haul road corridor at one location on the Emerald River – Main Channel, and at one location on the Emerald River – Tributary 3;
- In the Northern EL at two locations on the Emerald River – Main Channel; and
- In the Southern EL at one location on the Amagula River Tributary 1.

The watercourses at each of these locations are narrow and highly ephemeral with small contributing catchments and the watercourses therefore experience no flow for the majority of each year.

2.4 HAUL ROAD CROSSING DESIGN OBJECTIVES AND PRINCIPLES

A key design objective for the proposed haul road crossings is to minimise the potential for water quality impacts arising from erosion and sedimentation through robust management measures.

As per the International Erosion Control Association *Best Practice Erosion and Sediment Control* (IECA guidelines), the following design principles were adopted to achieve the design objective:

- Consider erosion and sediment control issues in the haul road crossing planning process;
- Minimise the area of soil disturbance associated with haul road crossing construction;
- Conserve topsoil for later reuse in rehabilitation of haul road crossings;
- Avoid concentration of flows at the haul road crossings that could result in erosive forces and mobilisation of sediment;
- Rehabilitate haul road crossings in a timely manner; and
- Monitor and maintenance of haul road crossings and associated erosion and sediment control measures.

Based upon these principles, the following conceptual design specifications were developed for the proposed haul road crossings:

- Avoiding construction of crossings within watercourse channels, where practical;
- Designing crossing geometry to minimise disruption of watercourse flows;
- Designing crossing geometry to avoid concentration of flows against the bed and banks of watercourses;
- Incorporation of energy dissipation measures to further reduce the potential for crossings to generate erosive forces at the bed and banks of watercourses; and
- Application of erosion resistant materials to haul road crossings areas susceptible to erosion, as necessary.

2.5 CONCEPTUAL HAUL ROAD CROSSING DESIGNS

Hydrological modelling was undertaken to characterise the rate and duration of watercourse flows at each of the proposed haul road crossings. The design of each specific haul road crossing considered the watercourse characteristics and flows at each of the proposed crossing locations.

All five haul road crossings will be installed with low flow drainage culverts in the road formation. A culvert is a structure that allows water to flow through an object such as a road or road embankment (i.e. from one side to the other side).

Hydraulic modelling was undertaken using the modelled watercourse flows to determine the conceptual design of each proposed haul road crossing and the dimensions of drainage culverts.

The following road crossing and culvert designs have been selected:

- Four of the haul road crossings will use a combination of low flow circular pipe culverts and high flow causeways. The pipe culverts will be approximately 1.5 m to 2 m in diameter. Figure 1 shows the crossings that will make use of circular pipe culverts; and
- A single haul road crossing on the Emerald River main channel (Figure 1) will comprise a low flow steel arch culvert and high flow drainage pathway. This crossing, being downstream of the other crossings on the Emerald River, has a larger contributing catchment and will experience larger flows during seasonal flow events. The river also has a relatively wide and deep cross section at this location.

Figure 2 and Figure 3 show conceptual illustrations of the circular pipe culvert and steel arch culvert crossing designs. Figure 4 is a conceptual montage of the steel arch culvert crossing.

The designs of the haul road crossings and culverts are planned to be further refined as part of a feasibility assessment prior to commencement of construction activities. Detailed design will be undertaken and certified by a suitably qualified and registered engineer.

A detailed description of each proposed conceptual haul road crossing design, including dimensions of the crossings, is provided in Appendix A.

2.6 CONCEPTUAL HAUL ROAD CROSSING OPERATION

2.6.1 Circular Pipe Culvert Crossings

Figure 1 shows the proposed location of the circular pipe culvert crossings. The operation of these crossings under no flow, low flow and high flow conditions is illustrated on Figure 5. Each crossing has been designed to allow unimpeded stream flows through the embankment culverts under normal rainfall and low flow conditions up to the 50% Annual Exceedance Probability (AEP) (1 in 2 year) flow event. During higher flow conditions (i.e. those greater than the 50% AEP [1 in 2 year] flow event), excess stormwater will flow over the scour resistant haul road causeway and back into the natural watercourse channel on the downstream slope.

2.6.2 Emerald River Arch Culvert Crossing

Figure 1 shows the proposed location of the steel arch culvert on the Emerald River. The culvert span is proposed to be wider than the river channel and the culvert foundations are therefore located outside the high-bank of the river channel. No culvert structures are therefore proposed to be constructed in the river channel at this haul road crossing location.

The haul road crossing has been designed to allow unimpeded stream flows through the arch culvert under normal rainfall and low flow conditions up to the 50% AEP (1 in 2 year) flow event (Figure 6).

During higher flow conditions (i.e. those greater than the 50% AEP [1 in 2 year] flow event), stormwater may back up on the upstream side of the haul road crossing (Figure 6). In these circumstances, high flows will continue to flow through the arch culvert. Excess water will be directed to a high flow drainage pathway that will redirect flows of excess water around the steel arch culvert. The high flow drainage pathway will be engaged via a low point on the upstream river bank. The high flow drainage pathway will flow back into to the watercourse approximately 30 m downstream of the haul road crossing. The haul road will cross the high flow drainage pathway. This crossing has been designed as causeway that allows high flows to pass over the haul road (Figure 6).

3 HAUL ROAD CROSSING IMPACT ASSESSMENT

The project planning process identified the Emerald and Amagula Rivers, and their tributaries as being culturally and environmentally sensitive. For this reason, extensive design features have been incorporated into the project planning process to manage and mitigate potential impacts of the haul road crossings on the cultural and environmental values of the watercourses.

Table 1 describes of the potential haul road crossing impacts and the design features and management measures proposed to mitigate these potential impacts.

A key component of the proposed management measures is the development of a detailed Erosion and Sediment Control Plan to address the construction and operation of the haul road crossings. The Erosion and Sediment Control Plan will be developed prior to the commencement of haul road crossing construction in accordance with the IECA guidelines and the New South Wales Office of Environment and Heritage publication *Managing Urban Stormwater: Soils and Construction, Volume 2E – Mines and Quarries*. These are considered best-practice for the design of erosion and sediment control works.

The proposed design features and management measures will ensure that the construction and operation of the haul road crossings will not result in any significant impacts to the receiving environment.

A proactive monitoring and maintenance program will be implemented for the haul road crossings throughout construction and operations phases, as discussed in Section 4.

Table 1
Summary of Potential Haul Road Crossing Impacts and Management Measures

Impacts	Description	Management Measures
Surface water quality impacts	• The project may generate sediment-affected runoff from areas disturbed during construction of the haul road crossings. • The project may also generate sediment-affected runoff from erosion of haul road crossing surfaces. • If sediment-affected waters were released to the environment, this would have the potential to affect surface water quality in the receiving watercourses. Specifically, increased levels of suspended sediment has the potential to increase turbidity in watercourses, thereby: - Reducing photosynthesis, resulting in impacts to aquatic ecology; - Reducing levels of visual amenity; and - Rendering water less suitable for human consumption.	• Where practical, construction of haul road crossings will be timed to coincide with the dry season when the ephemeral watercourses are not flowing or have significantly reduced flows. This will minimise the potential for construction to give rise to erosion and downstream water quality impacts. • A detailed Erosion and Sediment Control Plan will be developed to ensure that the environmental impacts of the haul road crossing construction phase are appropriately managed. • Runoff and erosion controls will be installed before vegetation is cleared. • Suitable construction erosion and sediment controls will be installed to mitigate potential impacts from the construction phase. Construction erosion and sediment controls will include minimising the extent and duration of land clearance, diverting clean runoff around the construction areas and installing temporary sediment traps to manage construction site runoff in the event of an unseasonal rainfall event. Sediment traps are temporary devices that allow for settlement of suspended sediments in construction site runoff. All drainage will be appropriately managed in accordance with the Erosion and Sediment Control Plan. • Construction equipment and vehicles will at all times be confined to designated areas in order to minimise any potential for disturbance and erosion of adjacent areas. • Erosion resistant materials will be used for the finished surfaces of any proposed haul road crossings that could be subject to stream flows. Erosion resistant materials may include stabilised pavement treatments, rock lining, concrete, terramat, geobinders, geotextiles, grouted rock or other scour resistant materials, with specifications for the materials being confirmed during detailed design. These measures will mitigate the potential for erosion of these surfaces and ensure that the proposed haul road crossings remain stable and do not adversely impact water quality. • Culverts will be set in low permeability material to minimise the potential for entrainment of sediment.

Impacts	Description	Management Measures
		- Preliminary geotechnical investigations within the haul road corridor indicate the presence of 'low erodibility and non-dispersive' laterite that may be used as a suitable construction material. - Workforce training will be provided as part of the induction process to ensure that employees and contractors are aware of the significance of the watercourses and the need for the proposed controls.
Geomorphic impacts due to erosion of watercourses	Changes to surface water flows can induce channel erosion resulting in changes to watercourse geomorphology that can impact environmental values of watercourses.	- Haul road crossings have been designed to minimise the potential for erosion of watercourses and any induced river bed and bank stability impacts. - The haul road crossings will be located on straight, stable sections of watercourses, downstream of any abrupt channel bends and upstream of riffles to minimise erosion. - The haul road disturbance footprint will be kept to a safe minimum in order to reduce the disturbance to soils and vegetation in watercourses. - The design ensures that culverts have been aligned with the watercourse channel to minimise changes to stream flows through the haul road crossing and reduce the potential for erosion downstream of the culverts (and sedimentation upstream of the culverts). - Engineered stabilisation, scour controls and energy dissipation measures have been included in the haul road crossing designs to reduce erosion of the watercourses.

Impacts	Description	Management Measures
Geomorphic impacts due to sedimentation of watercourses	- Changes to surface water flows and flood behaviour can cause sedimentation resulting in changes to watercourse geomorphology that can impact environmental values of watercourses. - Sedimentation of watercourses can occur where reduced stream flows allow for settlement of suspended sediments from the water body. Sedimentation is therefore typically associated with watercourses that exhibit high sediment loads (e.g. estuarine areas and watercourses draining catchments prone to erosion).	- All of the proposed haul road crossings have been located in an upper catchment setting and the watercourses are characterised by extremely low sediment loads. - Periodic accumulation of floodwaters upstream of haul road crossings is therefore unlikely to result in significant sedimentation impacts to the watercourses due to the extremely low sediment loads and associated low potential for settlement of sediments from these waters. - Culverts have also been aligned with the watercourse channel to minimise changes to stream flows through the haul road crossing and reduce the potential for sedimentation upstream of the culverts. - A range of measures to address surface water quality impacts have been proposed and are detailed in the preceding sections of the table. These measures will also minimise the generation and release of suspended sediment into watercourses. These measures will also minimise potential for the haul road crossings to result in sedimentation and geomorphic impacts in downstream watercourses.
Flooding impacts	Construction of structures within watercourses and watercourse floodplains can alter the natural extents and duration of flood inundation resulting in a range of impacts on vegetation and downstream land uses.	- The proposed haul road crossings have been designed to minimise any change in upstream water levels by allowing unimpeded stream flows under normal rainfall and flow conditions. Under these conditions, the culverts will not increase flooding or significantly change the natural flooding regime. - The steel arch culvert crossing will be constructed outside the watercourse channel. - The proposed haul road crossings may experience infrequent periods of high flow which exceeds the design capacity of the proposed culverts. The proposed haul road crossings have been designed to allow higher flood flows to overflow the crossing causeway (or bypass the crossing entirely in the case of the arch culvert crossing) during periods of high flow when the culvert capacity is exceeded. - This design will allow for continued flow of natural watercourses during high flow events and minimise the potential for adverse flooding impacts upstream of the haul road crossings.
Ecological impacts	Disruption to fish passage	The proposed haul road crossings will allow for continued flow of natural watercourses and passage of aquatic fauna during both low and high flow events.

4 MONITORING PROGRAM

A monitoring program will be implemented during the construction and operation of the haul road crossings. The monitoring program will comprise regular inspections and maintenance of erosion and sediment control structures to ensure they continue to function effectively. The program will include:

- Inspection of all construction works to ensure effective operation of erosion and sediment control measures (such as temporary sediment traps);
- Inspection of external batter slopes on haul road crossing embankments, road surfaces, causeways (and associated high flow drainage pathway) to confirm that they remain stable with no visible signs of erosion;
- Inspection of culverts to identify any significant debris blockage or sedimentation;
- Inspection of the watercourse bed and banks to ensure that they remain stable with no visible signs of erosion (such as scouring) or sedimentation; and
- Water quality (as turbidity) will be monitored at locations upstream and downstream of the crossings. The upstream and downstream monitoring results will be compared to identify any increase in background turbidity levels. Where monitoring indicates an increase in turbidity caused as a direct result of construction or operation of the haul road crossings, additional sediment controls will be installed, as necessary.

The frequency of monitoring will vary over the life of the mine depending on the season and mining activities. As a minimum, monitoring will be conducted at least bi-monthly during the wet season and following significant high intensity storm events. Additional inspections of haul road crossing culverts will be undertaken following any high flow event that exceeds the design capacity of the culverts (i.e. 50% AEP).

A detailed inspection will also be undertaken upon completion of the haul road crossing construction phase to confirm that the road crossings have been constructed in accordance with engineering design plans/criteria, and are stable and revegetated prior to commencement of operations.

If the monitoring program indicates significant erosion or water quality impacts associated with the construction or operation of the haul road crossings, additional management measures will be implemented, as necessary. These additional measures may include:

- Installing sediment fences and/or sediment traps to ensure that there is no increase in background turbidity levels due to the proposed haul road crossings;
- Undertaking channel stabilisation works and sediment removal to ensure no impacts to the stability of the watercourse or water quality;

- Remediating any signs of crossing embankment erosion to maintain the integrity of the embankment and minimise the potential for significant erosion and sediment generation;
- Removing any accumulated sediment within sediment traps at regular intervals to ensure the effective operation of these control measures;
- Removing significant culvert blockages;
- De-silting culverts to re-establish the effective operation of the culvert; and
- Installing additional remedial measures on the culvert inlet to prevent recurring sedimentation of the culvert.

5 HAUL ROAD DRAINAGE

The previous sections provide a detailed description of the specific design, operation and management of the haul road crossings.

A conceptual drainage strategy has also been developed for the remainder of the haul road alignment (i.e. those areas where the haul road does not crossing watercourses).

The haul road will be surfaced with middlings. The water quality of runoff from the haul roads is therefore likely to exhibit similar characteristics to middlings. The *Geochemistry Report* presented in Appendix A of the Draft EIS characterised middlings as typically pH neutral and low in salinity and trace metals. These results show that the water quality of runoff from middlings would be similar to natural background surface water quality and would therefore be suitable for passive drainage from the haul road. Runoff from haul roads may however contain elevated levels of suspended sediment. The following controls are proposed to prevent the release of suspended sediment:

- Clean runoff from undisturbed areas will be diverted around the haul road.
- Runoff from the haul roads will be managed in accordance with the Erosion and Sediment Control Plan. This will include collecting haul road runoff and directing it through sediment control structures to limit any potential downstream sedimentation or water quality impacts.

Figure 7 provides a schematic diagram showing the proposed drainage arrangement.

The haul road will be constructed with a raised centreline that is designed to shed water to either side of the road. Haul road runoff will drain through regular breaks in the haul road safety bund to collection drains and will be directed through sedimentation basins prior to discharge from the haul road corridor.

Collection drains will typically have sufficient capacity to convey runoff from the 10% AEP critical storm event. The collection drains will be trapezoidal or parabolic roadside drains. Longitudinal grades will be typically 1% and cross-section batters will be constructed to stable slopes and revegetated to minimise erosion. Any steeper sections will be constructed with velocity control structures or scour protection. Discharge points to natural drainage lines will be designed with energy dissipation measures, where necessary, to prevent any scouring and ensure stability.

Collected runoff will generally be directed to one or more sedimentation basins prior to draining from the haul road corridor. Sedimentation basins will be nominally located at 500 m intervals along the haul road alignment. The precise number and location of

sediment traps will be determined during preparation of the detailed Erosion and Sediment Control Plan. Sedimentation basins will be designed and constructed generally in accordance with relevant engineering guidelines including the IECA guidelines. The detailed design of each basin will be dependent on specific site conditions and the design life of the basin, but will typically be designed to manage inputs from the 10% AEP (1 in 10 year) critical storm event. All sedimentation basins will be regularly desilted to ensure their continued effective operation. The Erosion and Sediment Control Plan is discussed in more detail in Section 4.3.8 of the Supplement to the EIS.

6 REFERENCES

International Erosion Control Association (IECA) *Best Practice Erosion and Sediment Control*. Prepared by Catchment & Creeks Pty Ltd.

New South Wales Office of Environment and Heritage (NSW OEH) *Managing Urban Stormwater: Soils and Construction, Volume 2E – Mines and Quarries*. 4th Edition.

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for
HANSEN BAILEY

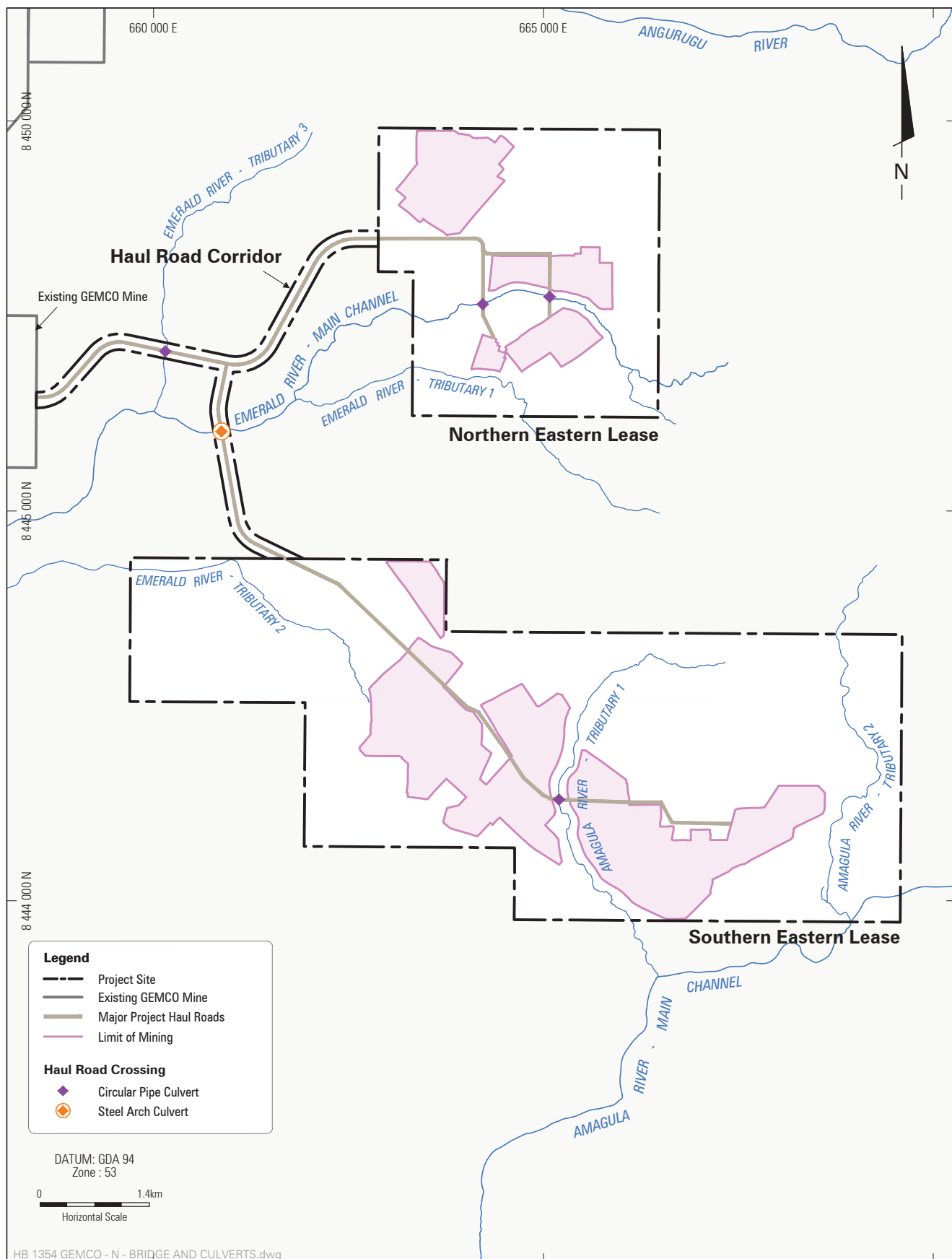


Ross Edwards
Senior Environmental Scientist



Peter Hansen
Director

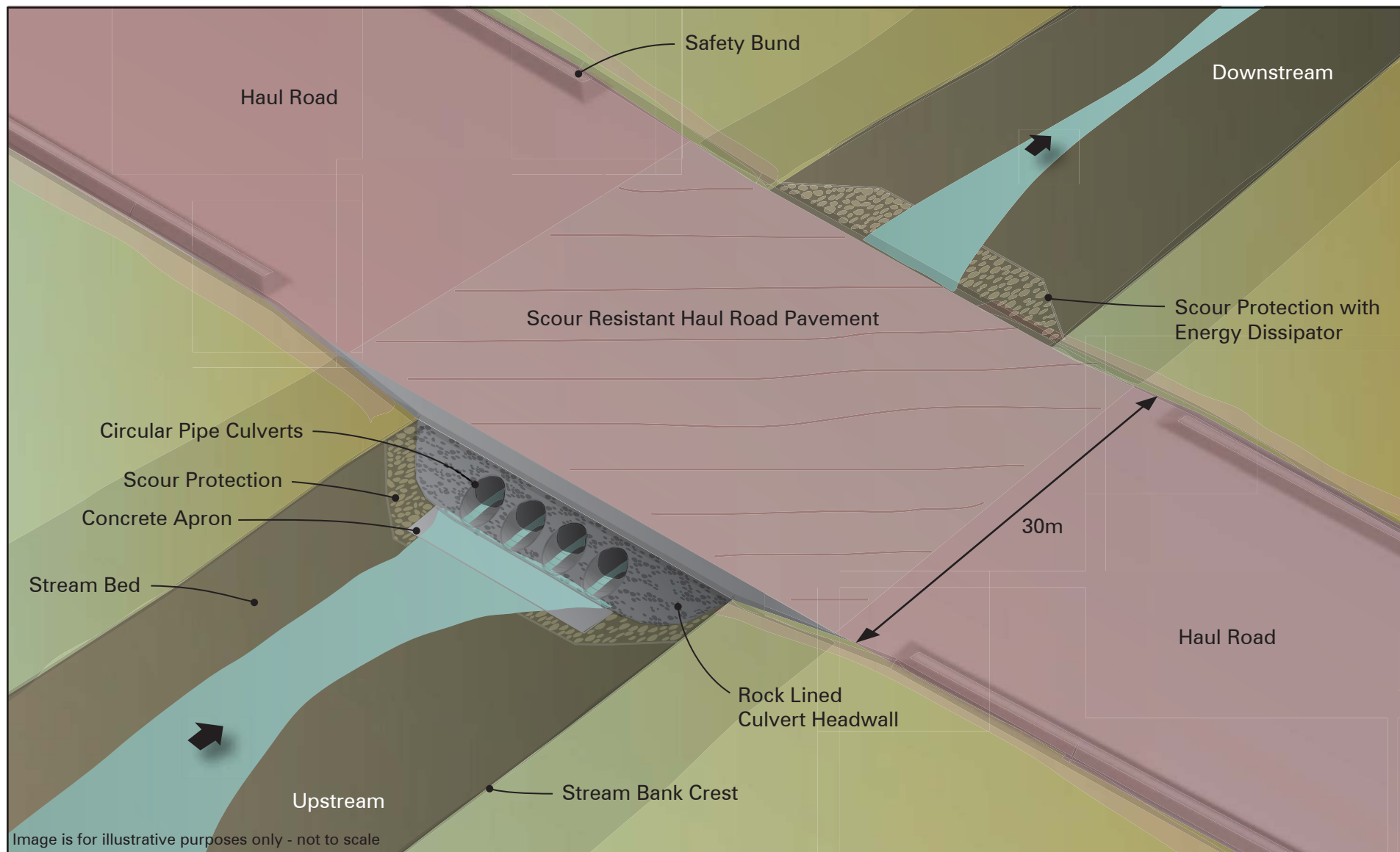
FIGURES



EASTERN LEASES PROJECT

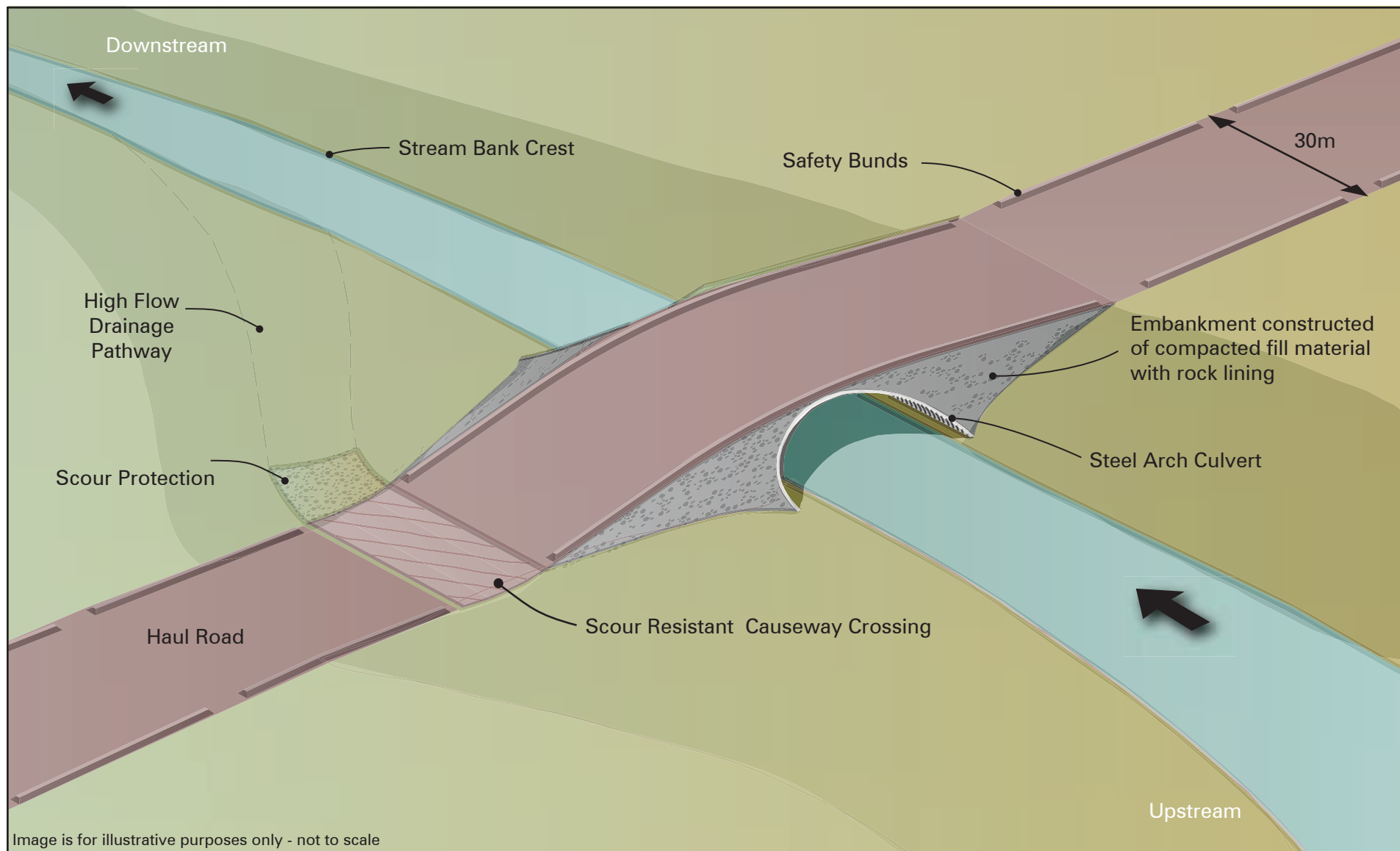
Haul Road Crossing Locations

FIGURE 1



HB 1354 GEMCO - N - SCHEMATIC CULVERTS.ai

EASTERN LEASES PROJECT



EASTERN LEASES PROJECT

Conceptual Illustration of Arch Culvert

FIGURE 3



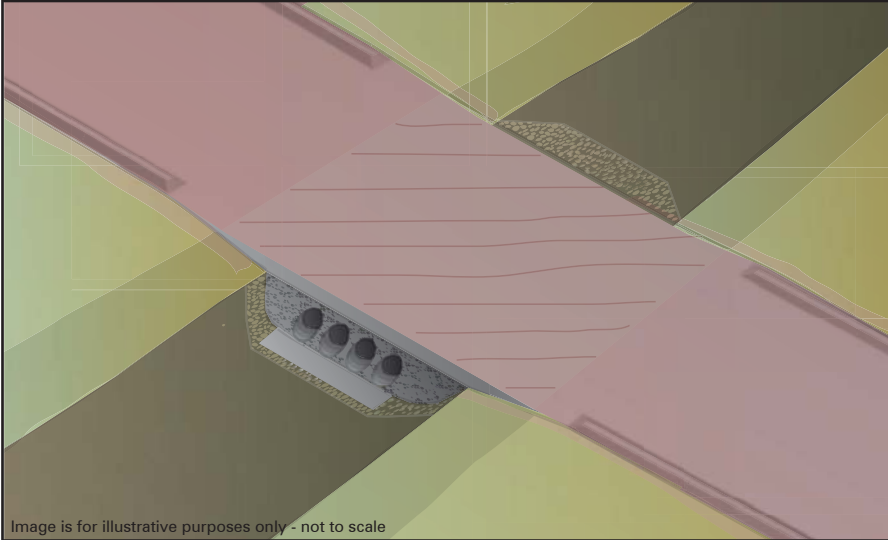
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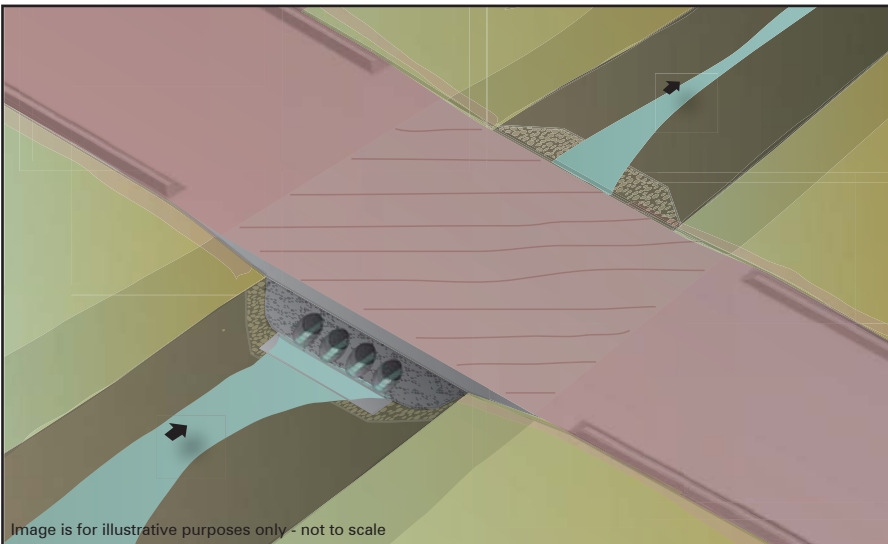
EASTERN LEASES PROJECT

Conceptual Montage of Arch Culvert

FIGURE 4



No Flow Conditions



Low Flow Conditions



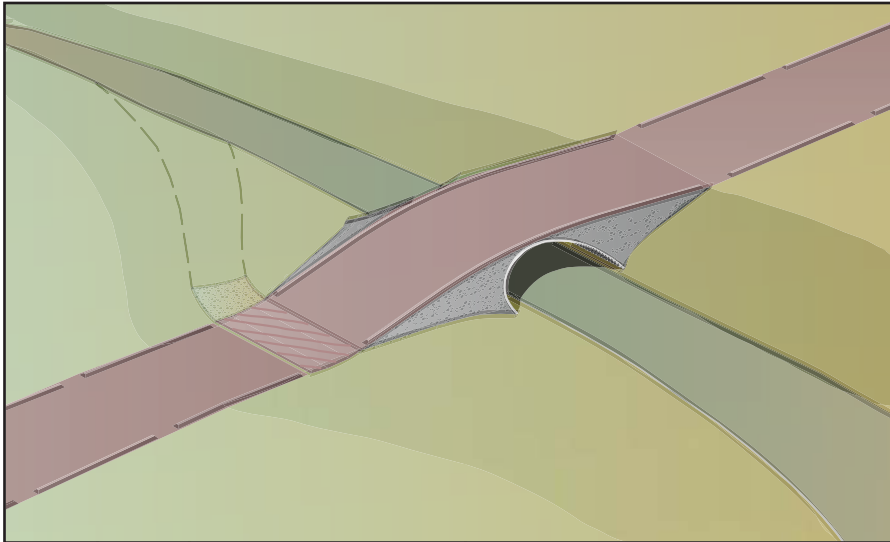
High Flow Conditions

HB 1354 GEMCO - N - SCHEMATIC CULVERTS - FLOW CONDITIONS.ai

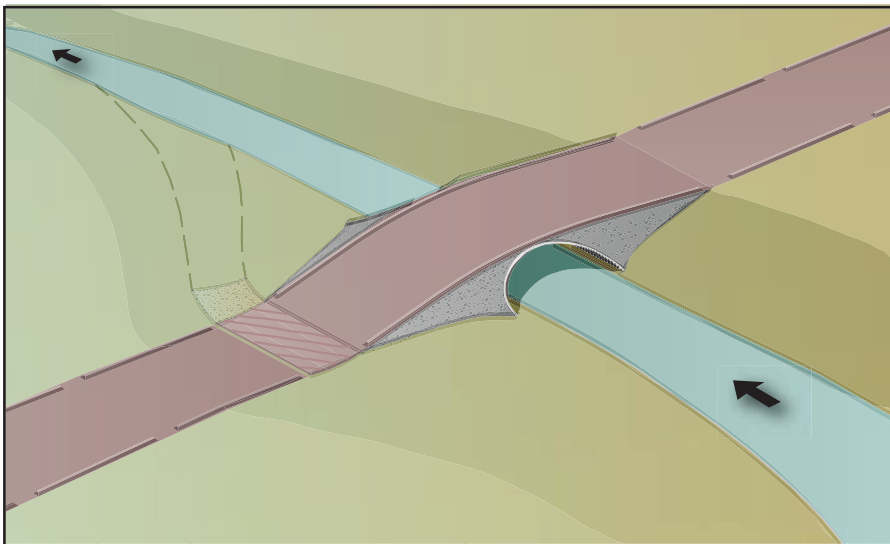
EASTERN LEASES PROJECT

Operation of Circular Pipe Culvert

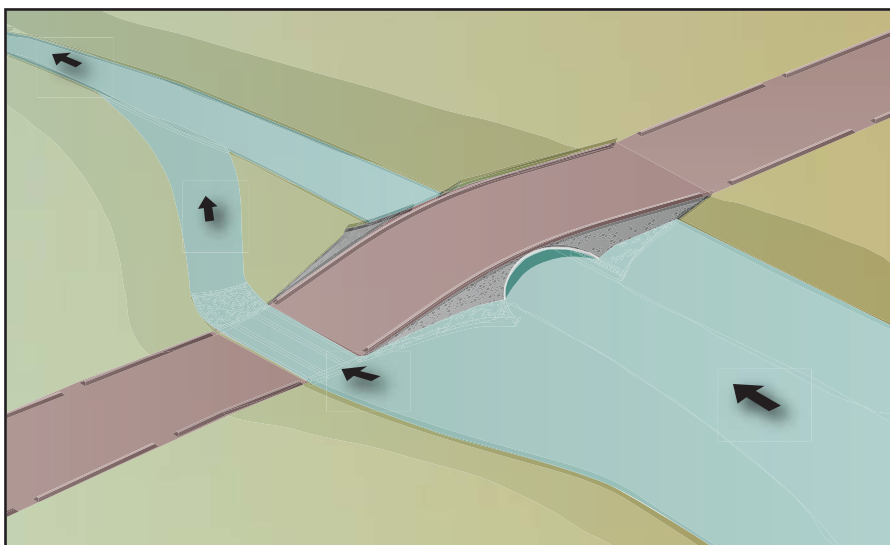
FIGURE 5



No Flow Conditions



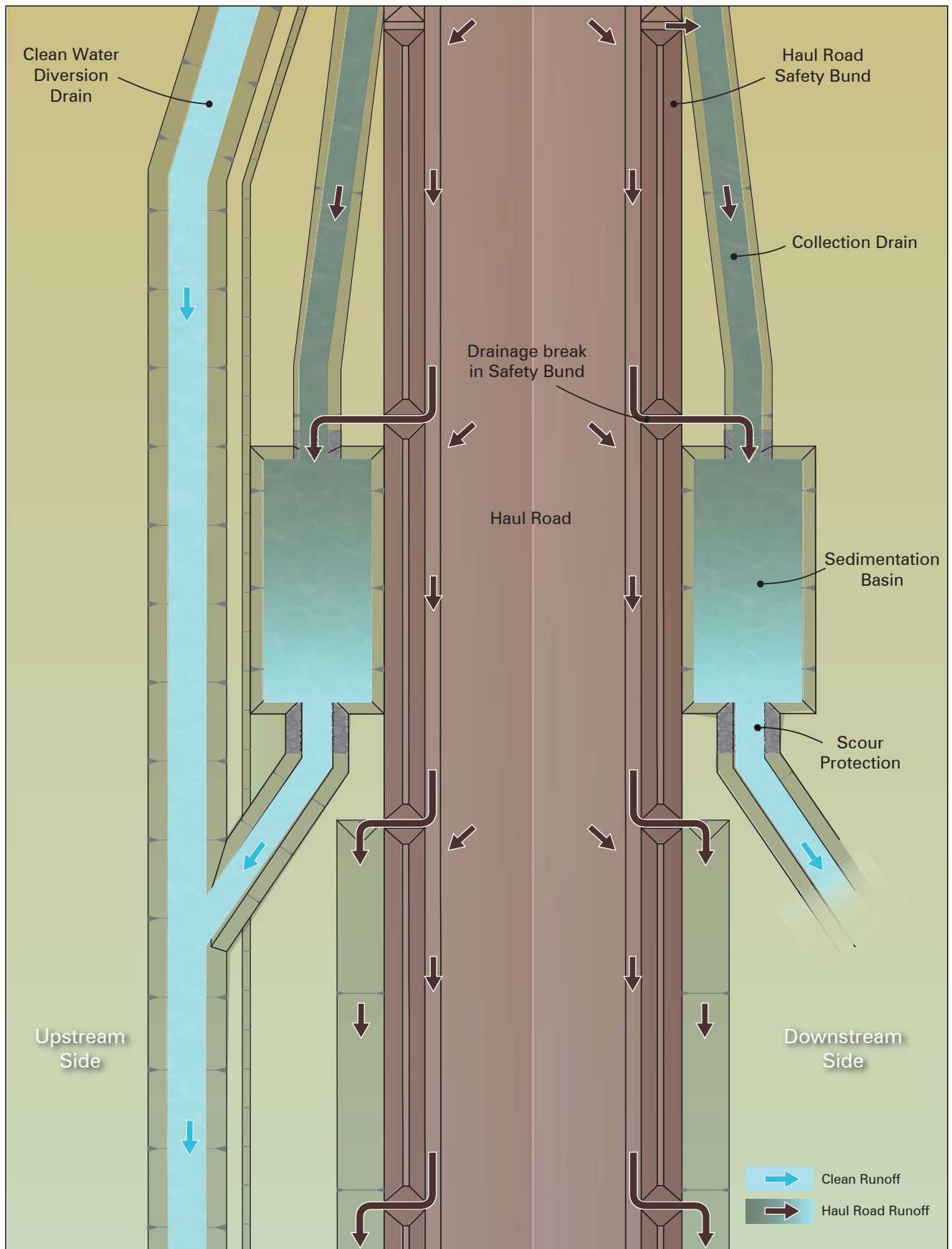
Low Flow Conditions



High Flow Conditions

HB 1354 GEMCO - N - SCHEMATIC BRIDGE - FLOW CONDITIONS.ai

EASTERN LEASES PROJECT



EASTERN LEASES PROJECT

APPENDIX A

APPENDIX A

CONCEPTUAL HAUL ROAD CROSSING DESIGN

CIRCULAR PIPE CULVERT CROSSINGS

Four watercourse crossings will be constructed as circular pipe culvert crossings. These crossings are proposed to be located on the following watercourses:

- The Emerald River will be crossed at two locations in the Northern Eastern Lease (EL);
- A tributary of the Emerald River will be crossed 3 km west of the Northern EL; and
- A tributary of the Amagula River will be crossed at one location in the Southern EL.

The watercourses at each of these locations are highly ephemeral with small contributing catchments and the watercourses therefore experience no flow for the majority of each year. On this basis, the haul road crossings have been designed as causeway crossings.

The crossings will comprise a 5 m high engineered embankment with a 30 m wide crest and slope angles of approximately 23 degrees (1V:2.5H). The embankment will be constructed from compacted fill. The upstream and downstream embankment slopes (i.e. slopes that form the culvert headwall) will be surfaced with rock lining to prevent erosion.

The haul road will be located on the crest of the engineered crossing embankment. The haul road formation will comprise compacted laterite and middlings. The section of haul road located on the crossing will be paved with scour resistant material to prevent erosion. The pavement surface specification will be refined during the detailed design process to ensure a suitable scour resistance based upon the design flows velocities for each specific haul road crossing location.

Each crossing has been designed with between 3 and 5 circular metal pipe culverts within the engineered embankment to allow unimpeded stream flows through the embankment culverts under normal rainfall and low flow conditions up to the 50% annual exceedance probability (AEP) (1 in 2 year) flow event. The pipe culverts will each be approximately 1.5 m to 2.5 m in diameter. The watercourse bed and banks upstream of the culvert inlet and downstream of the culvert outlet will be constructed with scour protection and a concrete apron to minimise erosion. Energy dissipation measures will also be installed downstream of the culvert outlet to further reduce the potential for erosion under high flow conditions.

During higher flow conditions (i.e. greater than the 50% AEP [1 in 2 year] flow event), excess stormwater will flow over the scour resistant haul road causeway and back into the natural watercourse channel on the downstream slope.

EMERALD RIVER ARCH CULVERT CROSSING

The haul road will cross the main channel of the Emerald River 2.2 km downstream of the Northern EL boundary. The Emerald River at this location is ephemeral and experiences no flow for the majority of each year (i.e. approximately 8 months based upon information provided by South32).

This haul road crossing is located downstream of the other proposed crossings on the Emerald River. The river therefore has a larger contributing catchment and will experience larger flows during seasonal flow events. In addition, the river has a relatively wide and deep cross section at this location. In order to accommodate these larger flows and channel characteristics this haul road crossing has been designed with a steel arch culvert.

The proposed culvert has a span of 16 m and a design height of 5 m to the top of the arch. The culvert span is wider than the river channel and the culvert foundations are therefore located outside the high-bank of the river channel. No culvert structures are therefore proposed to be constructed in the river channel at this haul road crossing location.

The crossing will comprise a 7 m high engineered embankment with a 30 m wide crest and slope angles of approximately 23 degrees (1V:2.5H). The embankment will be constructed from compacted fill and the surfaces of the embankment slopes will be stabilised with rock lining.

The haul road will be located on the embankment crest. The haul road formation will comprise up to 2 m of compacted granular subbase and middlings above the steel arch culvert.

The haul road crossing has been designed to allow unimpeded stream flows through the arch culvert under normal rainfall and low flow conditions up to the 50% AEP (1 in 2 year) flow event. During higher flow conditions (i.e. greater than the 50% AEP [1 in 2 year] flow event), stormwater may back up on the upstream side of the haul road crossing. In these circumstances, high flows will continue to flow through the arch culvert. Excess water will be directed to a high flow drainage pathway that will redirect flows of excess water around the haul road crossing. The high flow drainage pathway will be engaged via a low point on the upstream river bank. The high flow drainage pathway will flow into to the watercourse approximately 30 m downstream of the haul road crossing. The high flow drainage pathway and its junction with the receiving watercourse will be constructed with scour protection to prevent erosion of the high flow drainage pathway and the receiving watercourse.

The haul road will cross the high flow drainage pathway. This crossing has been designed as causeway that allows high flows to pass over the haul road. The causeway will be paved with scour resistant materials to prevent erosion during high flow events. The pavement surface specification will be refined during the detailed design process to ensure a suitable

scour resistance based upon the design flows velocities for each specific haul road crossing location. Design flow velocities will be informed by real time data collected from a stream flow gauging station installed at this location in July 2015.

ATTACHMENT F

Copies of Submissions Received on the Draft EIS

ATTACHMENT F

Copies of Submissions Received on the Draft EIS

Responses to these submissions have been provided in Section 5 of the Supplement.

Submission Reference	Submission Author
Federal Government	
1.	Department of the Environment (incorporated within the submission from the Northern Territory Environment Protection Authority)
Northern Territory Government	
1.	Northern Territory Environment Protection Authority
2.	Department of Business
3.	Department of Health – Environmental Health
4.	Department of Health – Medical Entomology
5.	Department of Land Resource Management
6.	Department of Lands, Planning and the Environment – Heritage Branch
7.	Department of Mines and Energy
8.	Department of Primary Industry and Fisheries
9.	Northern Territory Department of Police, Fire and Emergency Services
Other Stakeholders	
10.	Anindilyakwa Land Council
11.	Anindilyakwa Land Council, Land and Sea Management Unit
12.	Environment Centre NT
13.	Jeff Aschmann

1. NT EPA (incorporating DotE)

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

GROOTE EYLANDT MINING COMPANY PTY LTD – GEMCO EASTERN LEASES PROJECT

Section / Subject	Comment
Life of asset planning – Tailings and middlings	The draft EIS states that the “<i>current system for managing tailings and middlings will be extended to include tailings and middlings from the project [GEMCO Eastern Leases Project]</i>” and the “<i>life of asset planning process...ensures that sufficient capacity is available to meet tailings storage requirements associated with ongoing and future mine production, whilst ensuring that tailings are stored and managed with no significant adverse environmental impacts</i>”. The life of asset planning process for tailings and middlings management or details regarding the capacity of the existing tailings storage facilities are not detailed in the draft EIS, and as such, the draft EIS has not demonstrated that: 1. there will be sufficient capacity, and the appropriate conditions, at the existing GEMCO mine to meet future tailings storage requirements 2. tailings and middlings generated from the GEMCO Eastern Leases Project can be handled and stored in a manner that will ensure there are no environmental impacts. It is also unclear whether new tailing storage facilities may be required in the event that life of asset planning identifies that the current facilities cannot accommodate additional tailings and middlings generated from the GEMCO Eastern Leases Project. Facilities may need to be considered outside of this assessment and/or the existing environmental approvals if additional tailing storage facilities are required. Specific details regarding the life of asset planning process; the capacity and integrity of the proposed tailings storage facilities, including details of the location, layout, factor of safety rating, expected design life and permeability, to enable an assessment of the acceptability of the proposed management of the tailings and middlings should be included in the Supplement.
Mine planning – 1% Annual Exceedance Probability	The draft EIS defines the ‘buffer’ as the mine planning constraint developed for the protection of watercourses. The buffers were designed and located to minimise the operational impacts of the GEMCO Eastern Leases Project by limiting the interaction between proposed quarries and flooding events. This approach provides the quarries with protection from watercourse flooding for all events up to and including the 1% Annual Exceedance Probability (AEP) flood event. The draft EIS indicates that “<i>integrated mine planning and environmental impact assessment was conducted to ensure the key watercourses traversing the project site were not significantly impacted while maintaining an efficient and economic mine plan</i>”. It is understood that the 1 % AEP flood event “<i>was selected to avoid disturbance of the main channels of the watercourses and ensure that there would be no interference with surface water flows</i>”. However, there is very little discussion or justification for the appropriateness of the 1 % AEP flood event for the protection of riparian vegetation, which also require consideration of a suitable buffer (see: Department of Natural Resources, Environment, The Arts and Sport (2010) <i>Land Clearing Guidelines</i>, Department of Natural

Section / Subject	Comment
	Resources, Environment, The Arts and Sport, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/_data/assets/pdf_file/0018/5526/NT-Land-Clearing-Guidelines-2010_040310_Updated-April-2013.pdf). This is particularly relevant because riparian vegetation would be cleared as part of the proposed action, primarily for the construction of the haul road crossing. The Supplement should include a discussion on: - the appropriateness of the 1 % AEP flood event buffer for the protection of riparian vegetation, in consideration of NT Guidance material (e.g. Department of Natural Resources, Environment, The Arts and Sport (2010) <i>Land Clearing Guidelines</i>, Department of Natural Resources, Environment, The Arts and Sport, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/_data/assets/pdf_file/0018/5526/NT-Land-Clearing-Guidelines-2010_040310_Updated-April-2013.pdf) - how the selection of buffers relate to stream order (see: Department of Land Resource Management, Factsheet: <i>Vegetation Management in the Northern Territory, Native Vegetation Buffers and Corridors</i>, Department of Land Resource Management, Darwin. Northern Territory. Available at: http://www.lrm.nt.gov.au/_data/assets/pdf_file/0020/5357/Veg-Management-Factsheets_Buffers_Feb2013.pdf) - the potential impacts on watercourses if a flood event is greater than the predicted 1 % AEP and how the excess water will be managed, in consideration of mine water discharge.
Northern quoll	The draft EIS is deficient in information on the northern quoll (<i>Dasyurus hallucatus</i>). The proposed action would result in the loss of 6 ha of potential denning habitat for the species and approximately 1500 ha of suitable foraging habitat. Insufficient information has been provided to ensure that the rehabilitated areas sufficiently offset the loss of these habitat types. In particular, no evidence is provided to ensure that the rehabilitated areas provide the same quality of potential denning and foraging habitat for the species. The rehabilitated areas have not been evaluated from a floral or faunal perspective relative to baseline data pre-clearance or relative to undisturbed areas to determine if rehabilitated areas offset the loss of suitable habitat for <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) listed threatened species. Therefore, it is difficult to determine that the proposed action will not have a residual significant impact on the northern quoll simply because there are records of the species within rehabilitated areas. The Supplement should include a discussion on the significant impacts to northern quoll, including: - loss of potential denning habitat, which is considered critical for the species - effort to offset the loss of potential denning habitat

Section / Subject	Comment
	- the Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the endangered northern quoll, <i>Dasyurus hallucatus</i> Residual significant impacts to the northern quoll are either dismissed or not adequately discussed or addressed. Please refer to the documents and information provided below: The draft EIS indicates that 6ha of sandstone woodland and rock outcrops will be cleared as result of the proposed action. The National Recovery Plan for the Northern Quoll (p.4, 5) states: <i>'Therefore habitat critical to survival is that where northern quolls are least exposed to threats or least likely to be in the future. Given the threats outlined below, two particular broad habitat types fall into this category: rocky areas and offshore islands.</i> <i>Rocky areas provide prime habitat for northern quolls (Begg 1981, Braithwaite and Griffiths 1994, DEWHA in prep.) and many other declining animal species (Freeland et al. 1988, Burbidge and McKenzie 1989). Recent modelling of island populations in the Northern Territory established that occurrence of northern quolls was related to ruggedness or topographic complexity (Woinarski et al. 2007). Analyses by Woinarski et al. (2008) show that northern quoll declines in Queensland have mainly been in lowland and flatter (less rugged) areas and a recent survey found the most abundant remnant populations on the Queensland coast were at sites with large boulders (Foster and Oakwood pers. comm. 2008).</i> <i>Rocky areas retain water and have a diversity of microhabitats, so support higher floristic diversity and productivity and thus greater prey density and/or diversity compared to non-rocky adjacent country (Burnett 1997). In addition, cats forage less effectively in rocky areas. Their topographic complexity may also serve to ameliorate fire impacts, and they are typically not used for livestock production. Whilst rocky habitats support denser populations of quolls, the diverse and dispersed nature of rocky areas makes them very difficult to define or map on a national scale'</i> The Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the endangered northern quoll, <i>Dasyurus hallucatus</i> (p.17, Table 2) indicates the following: Actions that have a <u>high risk of significant impact</u> are those which result in the following: 'actions which remove <u>known</u>¹ habitat critical to the survival of the species

¹ Known habitat critical to the survival of the species is habitat critical to the survival of the species where northern quoll is recorded on site during surveys, or where no surveys were conducted in suitable habitat.

Section / Subject	Comment
	• actions which remove <u>known</u> foraging and dispersal habitat in toad invaded areas • actions which remove > 5 ha of <u>known</u> foraging and dispersal habitat in areas not yet invaded by cane toads • actions which remove >10 ha of <u>potential</u>² habitat critical to the survival of the species • actions which remove >200 ha of <u>potential</u> foraging and dispersal habitat.' The disturbance footprint clearly triggers a number of the criteria for significant impact to the northern quoll including the removal of 6 ha of potential critical habitat (sandstone woodland and rock outcrops habitat type) as identified in the <i>National Recovery Plan for the Northern Quoll</i>. The fact that northern quoll have been recorded in rehabilitated areas does not provide surety that residual significant impacts to northern quoll have been adequately addressed. More information is required to determine the flora and fauna composition within rehabilitated areas and how this compares to baseline data pre-clearing; and evidence of habitat usage or the density of northern quolls in revegetated areas compared to undisturbed areas and/ or areas pre-clearance. This information is vital to understanding if rehabilitated areas offset the loss of critical denning and foraging habitat for the northern quoll. If usage and density is significantly lower in rehabilitated areas, then the project will reduce the area of occupancy for a threatened species and affect habitat critical to the survival of the species as defined by the Department's Significant Impact Guidelines 1.1 for an endangered species.
Potentially acid forming material	The draft EIS identifies the presence of potentially acid forming (PAF) material in the overburden at the north-west section of the Southern Eastern Leases. It is understood that the PAF material would be handled and buried in accordance with the measures provided in Section 11 and Appendix A of the draft EIS. It is unclear whether these measures accord with National Standards or are suitable to mitigate the potential impact on surrounding waterways, including groundwater. More information is required regarding the specific management of PAF to protect water resources and potential impacts on EPBC listed species (e.g. is sufficient non-acid forming material available to buffer / encapsulate PAF?).
3.93 Transportation on Public	It is unclear from the draft EIS whether the increased material usage during construction will result in an increase in the shipment of goods from the mainland. This could result in the consequential increase in the risk of introducing invasive species and should be addressed in the Supplement.

² Potential habitat critical to the survival of the species is habitat critical to the survival of the species occurring within the modelled known / likely distribution of the northern quoll.

Section / Subject	Comment
Access Roads	
General	The draft EIS indicates that the risk of the GEMCO Eastern Leases Project to listed threatened species will be significantly reduced by the proposed mine rehabilitation and closure plan. However, there will be a time lag between the impact and the implementation of mitigation measures, which is not addressed in the risk assessment. There is no baseline comparison to determine the habitat value, usage etc. of rehabilitated areas compared to unaffected areas, which makes it difficult to ascertain the effectiveness of rehabilitation as a mitigation measure.
6.2.1 Statutory Requirements and Corporate Guidelines	The draft EIS states that the “ <i>The NT Mining Management Act, requires that mining companies pay a security deposit to provide for the rehabilitation of mineral leases</i> ”. Describe the criteria used for determining the security deposit for the GEMCO Eastern Leases Project and the expected value of the security deposit, if available.
Fire Management	The draft EIS notes that fire would be restricted from the rehabilitated areas, wherever possible, to allow for floral species to establish. After several years it could be difficult to introduce a controlled or traditional fire regime due to the changes in the species composition and habitat structure of the area (e.g. large build-up of fuel). More information should be provided on how the fire regimes will be controlled within the rehabilitated areas after mine closure, which particular reference to baseline data to determine the effectiveness of rehabilitated areas in providing habitat for listed threatened species.
General	The proposed rehabilitation method identified in draft EIS provides for a uniform landscape and will not replicate all landform types originally found within the project site (e.g. areas of sandy soils, undulations, rocky habitat for northern quolls’ dens etc). More information should be provided on how the proposed rehabilitation methods and final landform would provide suitable habitat for listed threatened species.
Vehicle strike	The GEMCO Eastern Leases Project would operate 24 hours a day, which increases the risk of vehicle strike to nocturnal fauna. Information on traffic management measures to mitigate the impacts of vehicle strike on nocturnal fauna and threatened species listed under the EPBC Act and the Northern Territory <i>Territory Parks and Wildlife Conservation Act</i> should be provided in the Supplement, including a baseline of the number of threatened fauna involved in vehicles strikes from the existing GEMCO mine.
7.6.3 Indirect Impacts	The draft EIS includes an impact assessment of dust on native vegetation but not on faunal species. A justification for this approach should be provided in the Supplement.

Section / Subject	Comment
7.6.3 Indirect Impacts	Further information on the proposed management measures to reduce the spread of feral animals along transport vectors (e.g. cat trapping) should be provided in the Supplement.
General	A number of the faunal surveys did not meet the guidelines requirements of the Department of the Environment (e.g. the number of trapping nights for northern quolls was below that recommended by the Departments SPRAT profiles). However, given the large number of individuals recorded across the mine site coupled with the proponent's acknowledgement that habitat for threatened species is found throughout the impact footprint this inadequacy is unlikely to be an issue.
7.6.4 Impacts on Vegetation Communities	The effects of water drawdown on groundwater dependent ecosystem are poorly examined, particularly as it relates to the effect of water drawdown during mining activity. • What evidence is there to determine that post-mining groundwater levels will recover and that groundwater dependant ecosystems will recover? • What monitoring and adaptive management measures will be implemented to ensure that groundwater dependant ecosystems will not be impacted by the proposed action? • The past 50 years of mining does not necessarily provide evidence that the proposed action will not have an impact on groundwater dependent ecosystems given the different location of the activities and the ecosystems impacted.
7.6.6 Impacts to Threatened Fauna Species	The draft EIS states that "<i>the species [northern quoll] is known to occur in areas adjacent to main roads and is assumed to have a relative high tolerance of light and noise</i>". In consideration of this statement: • is there information available to support this conclusion? • the presence of the species near roads suggest that they will be particularly susceptible to vehicle strike. Are there any known linkages?
7.7.2 Measures to Mitigate Impacts	The draft EIS does not identify measures to reduce the risk of direct mortality during clearing of habitat for listed threatened species. This will be particularly important during the breeding season for the northern quoll if denning habitat is cleared as: • the species only breeds once a year • males die off after mating, therefore the availability of males for the following breeding season relies on the survival of male

Section / Subject	Comment
	offspring • revegetation is unlikely to replace breeding habitat for the species The completion criteria by which the success of rehabilitation is evaluated is not adequately explained or discussed.
8.7.3 Monitoring and Management Plans – Monitoring of Watercourse Crossings	The draft EIS states that periodic inspections will be undertaken following construction to confirm that all culverts are operating effectively and not causing sedimentation. What remediation measures will be undertaken if they are not operating effectively?
19.4.2 Environmental Management Framework	The draft EIS states that the “<i>Biodiversity Offsets Strategy will be approved by the Federal Department of the Environment prior to its implementation</i>”. This statement may be understood as pre-empting the Minister or the Minister’s delegate’s decision. At present the biodiversity offsets strategy does not accord with the EPBC Act offsets policy.
19.4.3 Mine rehabilitation and closure	With reference to page 19-8: • What evidence can be provided that the proposed action will not result in a residual significant impact to the northern quoll and if not, why doesn’t the biodiversity offsets strategy also provide offsets for the northern quoll? • What measures are going to be implemented to provide for the loss of 6 ha of potential critical denning habitat for the northern quoll? With reference to page 19-11: • The ‘internal completion criteria’ should be updated to include an evaluation of: - o success of rehabilitated areas providing suitable habitat for fauna particularly as it relates to EPBC listed species. - o floral and faunal composition of the rehabilitated areas relative to baseline evaluations of floral and faunal composition (or undisturbed areas) prior to disturbance.

Section / Subject	Comment
	There does not appear to be an explanation of how rehabilitated areas will be managed for fire given the absence of fire during the rehabilitation regrowth period and the presence of increase fuel loads in the rehabilitated areas. Inappropriate fire regimes are a key threat to EPBC Act listed species impacted by the proposed action.
6.3 Fauna: Threatened and/or migratory species.	Section 6.3 of the draft EIS relevant to the northern quoll and northern hopping-mouse should be updated in consideration of: - the Threat abatement plan for predation by feral cats - the potential for the sandstone woodland and rocky outcrop habitat to provided suitable denning and therefore critical habitat for the species.
4 Direct and indirect offsets	The biodiversity offsets strategy is not in accordance with EPBC Act offsets policy, particularly in relation to indirect and direct offsets. The EPBC Act offsets policy states (page 8): <i>“Direct offsets are those actions that provide a measurable conservation gain for an impacted protected matter.</i> <i>Direct offsets are an essential component of a suitable offsets package. A minimum of 90 per cent of the offset requirements for any given impact must be met through direct offsets.</i> <i>Deviation from the 90 per cent direct offset requirement will only be considered where:</i> <i>it can be demonstrated that a greater benefit to the protected matter is likely to be achieved through:</i> <i>increasing the proportion of other compensatory measures in an offsets package or;</i> <i>uncertainty is so high that it isn’t possible to determine a direct offset that is likely to benefit the protected matter. For example, this can be the case in some poorly understood ecosystems in the Commonwealth marine environment</i> <i>Conservation gain is the benefit that a direct offset delivers to the protected matter, which maintains or increases its viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:</i> <i>improving existing habitat for the protected matter</i> <i>creating new habitat for the protected matter</i> <i>reducing threats to the protected matter</i> <i>increasing the values of a heritage place, and/or</i>

Section / Subject	Comment
	• <i>averting the loss of a protected matter or its habitat that is under threat.</i> The biodiversity offsets strategy dismisses direct offsets without adequate exploration of the possibilities on Groote Eylandt. There are examples throughout Australia in which proponents offset residual significant impacts through addressing threats to EPBC Act listed matters, thereby providing a measurable conservation gain. Commonly, proponents will provide funding to appropriate programs to address threats such as feral predators and herbivores, weeds, inappropriate fire regimes and grazing.
4.3 Mechanism for project offsets	The draft EIS states that “ <i>direct offsets have very limited potential to achieve conservation gains</i> ”. This statement is not adequately explained, nor is there evidence to indicate that this statement is correct.
5 Project offsets	The proposed offsets for research do not accord with the EPBC Act offsets policy. Direct offsets must be an essential component of the offsets package. Research can assist in achieving the outcomes of the direct offset, but must not comprise more than 10 per cent of the offsets package unless it can be demonstrated there is greater benefit to the protected matter, or scientific uncertainty of the effectiveness of a direct offset is high.
5.2 Research Principles	While the proposed research programs have been demonstrated to be useful in some cases, further explanation is required as to how they will lead to either a direct offset and/or measurable conservation gain.
5.3.1 Feral cat research	The Australian Government Department of the Environment is currently implementing a national feral cat program ³ which includes research undertaken at Groote Eylandt in partnership with the NT Government. Any proposed offset program involving the management of feral cats should provide additional benefits to that being achieved by the existing programs. There is an opportunity to build on the valuable information provided by the federal and territory research program and engage in feral cat eradication on Groote Eylandt, which could demonstrate a measurable conservation gain and therefore qualify as a direct offset.
5.4 EPBC Act Offsets Policy	It has not been demonstrated how indirect offsets will lead to a better outcome than direct offsets for EPBC Act listed species impacted by the proposed action. Direct offsets have not been adequately explored as a viable option, and as such, the proposed offsets program is unlikely to be acceptable to the Department of the Environment. The proposed offsets program does not directly relate to the impacts of the proposed action given that impacts to the northern quoll,

³ <http://www.environment.gov.au/biodiversity/threatened/publications/factsheet-tackling-feral-cats>

Section / Subject	Comment
	particularly the loss of 6 ha of potential critical denning habitat have not been addressed. In addition, there has been no explanation of how the regenerated areas will adequately offset the loss of approximately 1500 ha of suitable foraging habitat for the northern quoll.
6 Conclusions	Residual significant impacts to the northern quoll have not been addressed. There is not an adequate explanation as to why Groote Eylandt does not provide opportunities for direct offsets. Direct offsets have not been adequately explored, particularly in respect of feral cat management, fire regimes and rehabilitation of impacted areas to the benefit of the northern hopping mouse and the brush-tailed rabbit rat.

2. Department of Business

Economics and Policy
Development House, Level 2
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Ms Alana Mackay
Environmental Assessment
Environmental Protection Agency
GPO Box 3675
Darwin NT 0801

Dear Ms Mackay

Re: Draft EIS for Comment – GEMCO Eastern Leases Project

Thank you for your email dated 29 May 2015 and the opportunity to review the EIS for **Groote Eylandt Mining Company Pty Ltd – GEMCO Eastern Leases Project**.

The Department of Business (DOB) does not have any major issues in relation to the Draft EIS.

DOB notes that this project is an additional mining area to be operated as part of the existing mine, and the existing facilities and workforce will be utilised.

The Department has also noted that the project will extend the life of the existing mine by four years and will continue to provide socio-economic benefits to the economy of Groote Eylandt as well as the broader Territory economy.

The agency contact officer for this matter, Mr Shiw Murti, Principal Economist, can be contacted on 8999 5139.

Yours sincerely



Tracy Clark
Director, Strategic Policy & Research
9 June 2015

3. Department of Health – Environmental Health

From: Chris Daly
Sent: Wednesday, 8 July 2015 2:39 PM
To: eia NTEPA
Cc: Xavier Schobben; envirohealth THS
Subject: TRIM: Department of Health (Environmental Health)

Attention: Alana Mackay,

DoH Environmental Health makes the following comments with respect to the Draft Environmental Impact Statement for Comment - Groote Eylandt Mining Company Pty Ltd - GEMCO Eastern Leases Project:

- It is noted that the expansion of the mining operation into the Eastern Lease area relies upon infrastructure within the existing lease areas for processing ore and supporting mining activities.
- The following is offered with respect to Air Quality:
 - The Draft EIS recognises sensitive receptors about the mine site and current processors but does not specifically outline whether these sites will be monitored as part of an ongoing air quality monitoring network
 - It is therefore suggested that the EIS address sensitive receptors including monitoring of the community of Angurugu for air quality factors related to human health and amenity including size and chemical composition of particulate matter

Regards,

Chris Daly

Christopher Daly | Senior Program Development Officer
Environmental Health | Territory-Wide Services | Department of Health
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4. Department of Health – Medical Entomology

From: Allan Warchot
Sent: Thursday, 9 July 2015 9:08 AM
To: Alana Mackay
Subject: RE: Draft Environmental Impact Statement for Comment - Groote Eylandt Mining Company Pty Ltd - GEMCO Eastern Leases Project

Hi Alana

There are no Medical Entomology comments on the above draft EIS. Mosquito issues are covered by their commitment to carrying out mosquito monitoring and control.

Best regards

Allan Warchot | Advice and Control Officer, Medical Entomology
Centre for Disease Control, Territory Wide Services | Department of Health
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p... (08) 892 **28337** | f... (08) 892 **28820** | e... allan.warchot@nt.gov.au | www.nt.gov.au/health

Website address:
[http://www.health.nt.gov.au/Medical Entomology/index.aspx](http://www.health.nt.gov.au/Medical_Entomology/index.aspx)

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5. Department of Land Resource Management



DEPARTMENT OF LAND RESOURCE MANAGEMENT

Our ref DLRM2015/3623

Your ref

Alana Mackay
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Dear Ms Mackay

RE: Draft Environmental Impact Statement (EIS) for Comment - Groote Eylandt Mining Company Pty Ltd - GEMCO Eastern Leases Project

The Department of Land Resource Management has assessed the information contained in the above Draft EIS and provides the following comments:

- The Draft EIS identifies most of the biodiversity values within the mineral lease area and assesses the potential risks to these values. The baseline flora and fauna surveys in the project area are generally adequate for the identification of species present.

Based on available data and expert knowledge of the current distribution and ecological requirements of relevant species, the Draft EIS correctly identify Matters of National Environmental Significance (MNES) potentially affected by the development; and provides a reasonable assessment of habitat values for these species within the project area. However, the low intensity of fauna sampling within the project area and the simple island-wide habitat mapping provided in the Draft EIS does not provide sufficient context to accurately assess the relative importance of the project area for each of these species and their preferred habitats. Similarly, the assessment of use by native fauna of existing rehabilitation areas is based on minimal data, and should not be used to draw conclusions on the residual risk to the significant species occurring in the project area.

The Draft EIS confirmed the presence in the proposed mining area of all four *Environmental Protection and Biodiversity Conservation* (EPBC) Act-listed threatened terrestrial fauna species known from Groote Eylandt (Northern Quoll, Masked Owl, Brush-tailed Rabbit-rat, Northern Hopping Mouse). Major risks are associated with direct loss of habitat for the threatened species, potential increased risk of Cane Toad colonisation, potential increased risk of predation by feral cats, and potential spread of introduced rodents and environmental weeds. More details for each of the key species and threats are provided below.

These comments concentrate on the four threatened terrestrial fauna species, as these are the most significant matters to which the proposal poses the greatest risk. The Draft EIS is accurate in the assessment of the likelihood of occurrence of other threatened and migratory fauna species (Table 6.7) and the Department considers that the project does not pose a significant risk to any of these species apart from those discussed below. The Draft EIS also correctly identifies that no threatened plant species are likely to occur in the project area, and available data suggests that the area is not likely to contain important

habitat for other significant (restricted, data deficient or near-threatened) plant species. The potential impacts of the project on aquatic ecology are not considered here, other than to note that there are no threatened aquatic species known within or near the project area, and that measures to prevent impacts on groundwater and surface water have been addressed in detail in the Draft EIS.

Comments are also provided in relation to habitat mapping and vegetation (fauna habitat rehabilitation), as these are important for assessment of the risk to biodiversity from the project.

Masked Owl

The Draft EIS confirmed the presence of Masked Owl (listed as Vulnerable under the EPBC Act) in the project site. The EIS correctly identifies that these individuals are considered to represent an important population as defined by the Significant Impact Guidelines 1.1 for MNES under the EPBC Act. However the Draft EIS may have underestimated the risk of the proposed project to this species, for the following reasons:

- The estimated area of occupancy for Masked Owls is based upon the assumption of uniform population density throughout forests and woodlands on the island, but this is unlikely to be the case. Masked Owls typically have patchy distributions and in other parts of their range likelihood of occurrence is higher in ‘old-growth’ forests with relatively large trees and well developed hollows (> 40cm diameter). Most of the habitat affected by the GEMCO development is described as “old growth” forest (MU4) and is more likely to support Masked Owls than other woodland vegetation types. Therefore the proposed development may reduce the area of occupancy by a substantially larger amount than the stated 0.8% for the Groote Eylandt population.
- The Draft EIS suggests that rehabilitation of the site could be expected in the long term to provide foraging areas for the species, and therefore is unlikely to reduce the area of occupancy of the species in the long term. However, this species depends upon large tree hollows for roosting and reproduction, and these resources comprise critical components of the species’ habitat. The time taken for savanna open forest or woodland to reach ecological maturity and develop hollows is at least 65 years (Woinarski & Westaway 2008) and likely considerably longer to develop large hollows suitable for Masked Owl. Tree hollow development requires (amongst other factors) fire, which is largely excluded from mine rehabilitation areas, further extending the expected time for hollow development. The assessment of existing mine rehabilitation areas provided no evidence that these areas could support Masked Owl, either directly from comparable population densities or home ranges, or indirectly from evidence that suitable hollows for this species have developed, or that food resources for Masked Owls are returning to pre-clearing densities and species composition.

The removal of suitable Owl habitat by the GEMCO development should therefore be carefully considered a long-term residual detriment to the Groote Eylandt population, and it would be appropriate to consider environmental offsets for this impact.

Northern Quoll

The Draft EIS confirmed the presence of the Northern Quoll (listed as Endangered under the EPBC Act) in the project site. The Draft EIS also correctly identifies the Groote Eylandt population as having very high conservation significance and an important population under the Significant Impact Guidelines. The Draft EIS concludes that the project will not have a significant impact on the Northern Quoll, but this may underestimate the residual risk to this species, for the following reasons:

- The Draft EIS states that the Northern Quoll population on Groote shows no evidence

of decline. However, no information is available on medium-term population trends on Groote to support this assumption. There is accumulating evidence that island populations of other mammal species, including some species on Groote Eylandt, are declining, so caution is required in predicting the stability of the quoll population on Groote Eylandt, and minimisation of all pressures on the species is desirable. The identified risks from increased predation from feral cats and increased potential for disease transmission from feral cats and feral rodents are also relevant to Northern Quoll populations in the project area.

- The Draft EIS states that Northern Quoll has been demonstrated to use rehabilitated vegetation within the existing mine area. However, with only limited data available, the significance of quolls being recorded in some rehabilitation areas must be interpreted cautiously. More detailed data is required on relative population density in comparable rehabilitated and undisturbed habitats, and the trajectory of “recovery” of quolls into rehabilitated habitats, before it can be concluded that there is no residual detriment to Northern Quoll populations from mining within the project area.
- The most severe risk to Northern Quoll on Groote Eylandt is the introduction and spread of cane toads, which has the potential to cause island wide extinction of the Northern Quoll. This is recognised in the Draft EIS as a high risk, even after mitigation. The treatment of this issue within the Draft EIS is predicated on the assumption that the development of the Eastern Leases poses no additional risk (in relation to cane toad introduction) to that already present from the existing mine. This may be questionable (see below) but, nevertheless, the EIS provided an opportunity to reassess the risk treatment across the whole mining operation, including the potential for additional offsetting of the significant residual risk.

Brush-tailed Rabbit-rat

The Draft EIS confirmed the presence of the Brush-tailed Rabbit-rat (listed as Vulnerable under the EPBC Act) in the project site. The Draft EIS correctly identifies that the proposed development area support an important population of this species as defined by the Significant Impact Guidelines. The Draft EIS identifies that the project may have a significant impact on the rabbit-rat and evaluates the mitigated risk as Medium. However, data for this species is sparse and there is uncertainty around this risk assessment, with the potential for the risk to be more severe.

There has been sufficient biodiversity survey across Groote Eylandt to indicate that rabbit-rats have a patchy, and possibly highly restricted, distribution on Groote Eylandt. Ecological information from other locations indicates that the species generally prefers taller eucalypt open forest with low cover of annual grass and bare ground, and where the impact of fire is less severe (Firth *et al.* 2006). While open forest and woodland occur extensively on Groote Eylandt, a more subtle combination of habitat features is likely to determine rabbit-rat distribution. These factors are poorly known, and no appropriate finer scale habitat mapping available. Consequently the area of Groote occupied by this species is almost certainly substantially lower than estimated in the Draft EIS, and the proposed development will likely remove a much larger proportion of occupied habitat than the 0.6% stated in the Draft EIS.

Inclusive of the record reported in the Draft EIS there are only four records of this species on Groote post 2002, three of which are within the proposed development area and one is immediately adjacent. All other records from Groote Eylandt predate 1976. Given the widespread and continuing decline of this species throughout most of the rest of its range, including some other island populations (Department of Land Resource Management unpublished data; H. Davies, Melbourne University, pers. comm.), it is possible that the Groote Island population is also declining, which emphasises the significance of recent records for the species within or close to the project area.

As shown by the rehabilitation surveys described in the draft EIS, introduced rodents House Mouse *Mus musculus* and Black Rat *Rattus rattus* may colonise rehabilitated areas, including in the future those within the project area. While limited detail is provided, proposed feral animal control measures are unlikely to be effective in mitigating their establishment. Experience from the mainland Top End shows that colonisation by Black Rat of disturbed areas provides a vector for this species' wider dispersal into undisturbed adjacent habitats. These introduced rodents have the potential to compete with the Brush-tailed Rabbit-rat and spread disease, and therefore may not only impede recolonisation of rehabilitated areas but pose a wider threat to the populations of rabbit-rats and hopping mouse in undisturbed habitats on Groote Eylandt.

The Draft EIS indicates that there is no evidence for Brush-tailed Rabbit-rat occurring within previously rehabilitated areas, so it prudent to assume that clearing of habitat has a residual detriment.

Based on available information, it appears that the project may pose a high risk to this species, which is not readily mitigated, and it would be appropriate to consider environmental offsets for this residual detriment.

Northern Hopping Mouse

The Draft EIS confirmed the presence of the Northern Hopping Mouse, listed as Vulnerable under the EPBC Act, in the project site. The Draft EIS identifies that the proposed development supports an important population of this species as defined by the Significant Impact Guidelines and that the proposed development is likely to contribute to local population decline.

As for the rabbit-rat, available data suggest that the hopping mouse occurs patchily on Groote Eylandt, and does not occupy all habitat within that broadly defined as "potentially suitable" for the species. Therefore the proposed development may remove a much larger proportion of occupied habitat than the 0.6% stated in the Draft EIS.

While Northern Hopping Mouse was apparently previously common in at least some areas on Groote Eylandt (Dixon & Huxley 1985, Woinarski *et al.* 1999), recent extensive surveys using methods highly sensitive to its detection suggest that this species has undergone a substantial decline on Groote Eylandt. Assessment of its status is also complicated by evidence that some surveys based solely upon spoil heaps are likely to be unreliable (Diete *et al.* 2015). The species is now known to be extant in only three areas (R. Diete, Qld University, pers. comm.), inclusive of the record reported in the Draft EIS within the project area. Consequently, the confirmed occurrence of the species in the project area must be regarded as significant, and clearing and fragmentation of suitable habitat within the project area to pose a moderate to high risk to the population. As this species has not been recorded as recolonising rehabilitation areas, this risk is not readily mitigated.

The discussion for Brush-tailed Rabbit-rat (above) of the potential impacts of feral rodents applies equally to Northern Hopping Mouse.

Habitat mapping

Vegetation mapping was undertaken within the project area at a moderately fine scale, using aerial photo interpretation supported by field survey and validation. This resulted in the mapping and description of thirteen vegetation communities within the project area. Somewhat unusually, the more extensive eucalypt open forest communities (notably MU4) are of greatest significance as potential habitat for threatened terrestrial vertebrate species. It should be noted however that, even at this scale of mapping, the significant

species may have a patchy distribution within a vegetation community. The species distribution may be influenced by subtle environmental factors beyond the resolution of mapping, as well as spatial and temporal variation due to short- and longer-time fire history.

Unfortunately, vegetation/habitat mapping for the whole of Groote Eylandt is only available at a coarse scale, and this is further simplified in the Draft EIS to five broad habitat types (e.g. Figure 7.3). This means that it is very difficult to meaningfully quantify the level of habitat disturbance in the context of the extent of that habitat across the entire Groote Eylandt. The statement in the Draft EIS that the area of Open Forest within the disturbance footprint is only 1.28% of the total area of this habitat on Groote Eylandt is true in the coarsest sense, but this is not necessarily informative about the proportion of high quality, occupied habitat for each of the key threatened species that will be removed. Similarly, as discussed above for individual threatened species, statements in the Terrestrial Ecology Report (Appendix C) for the Draft EIS regarding the proportion of potential habitat for each threatened species that will be cleared during the project are likely to be substantial underestimates of the real proportion of occupied habitat that will be impacted.

Vegetation Rehabilitation

Mined areas are rehabilitated following mining, and the use of mined areas by native biota, and particularly key threatened species, is relevant to determining the residual impact of this project. A brief study of fauna use of “mature” mine rehabilitation is presented in the appendices of the Terrestrial Ecology Report. This is based on fauna survey over a four day period at 3 sites, and 169 camera-nights at 4 sites. Some additional data is drawn from previous surveys (URS Australia Pty Ltd, 2012) although details of the site locations and sample intensity is not provided in the draft EIS. The current report states that sites were in mine rehabilitation aged between 19 and 27 years, although no further information about the spatial context of these sites is provided.

While studies of fauna use in mine rehabilitation are definitely required, the studies reported in the Draft EIS have very low sample intensity (both in number of sites and period of sampling), and can provide only very limited information about the potential for key threatened species, or fauna more generally, to recolonize rehabilitated areas. Explicit “completion criteria” are also required by which to assess the success of rehabilitation. The Terrestrial Ecology Report describes the presence of species in rehabilitation sites and states that 56% of native (vertebrate) fauna species recorded in the project site are also recorded from rehabilitation sites, which is one basic metric for rehabilitation outcomes. However, the presence of a species in rehabilitation areas is not very informative about the value of those areas as habitat for that species. More sophisticated metrics or completion criteria are required to assess the potential value of rehabilitation areas for key threatened, including estimates of density or occupancy rates relative to undisturbed habitat, and much more intensive sampling is required to develop an understanding of the trajectory of any recovery of threatened species into rehabilitation areas.

Cane Toads

The Draft EIS correctly identifies establishment of Cane Toads as a severe threat to the biodiversity of Groote Eylandt, and particularly as an extreme risk to the highly significant population of Northern Quoll. The proposed development, as an extension of existing mining activity, poses continuing and possibly increased risk of toad establishment due to continuing and possibly increased freight movement and human transport to the island. Expansion and increased use of transport routes to the eastern leases also has the potential to facilitate more rapid and wider dispersal of toads on Groote if they are introduced. Even with the introduction of a small number of toads, probability of

establishment and dispersal over the entire island will be high, and eradication is likely to be very difficult or impossible. The Draft EIS identifies that an existing Cane Toad Management Plan and associated quarantine procedures will be strengthened by the implementation of formal quarantine audits, although no further details of the Cane Toad Management Plan or the auditing process are provided. Given that cane toads have emerged relatively recently as a significant risk associated with the GEMCO mine operation on Groote Eylandt, this Draft EIS provides an opportunity to review and potentially strengthen management of this risk, particularly as the mitigated risk is still assessed as High in the Draft EIS (p 4-16). There is also potential for environmental offsets to contribute to reducing the risk of cane toad introduction across the island as a whole, through support for quarantine and surveillance activities undertaken by the Anindilyakwa Land Council and rangers.

Feral Cats

Feral cats are strongly implicated in the widespread decline of small and medium-sized mammals across northern Australia. Areas where most threatened mammal species persist are either free of cats, or retain habitat characteristics that ameliorate cat predation. Ecologically benign fire regimes and absence of grazing by introduced herbivores helps retain complex habitat structure and other resources important for small mammals, and reduces the impacts of cat predation. These factors are strongly implicated in the persistence of some threatened species on Groote Eylandt compared to the mainland. Nevertheless, there is accumulating evidence that the Northern Hopping Mouse is in decline on Groote Eylandt, and this may also be the case for Brush-tailed Rabbit-rat and, given the absence of other known or potential causal factors, cat predation is likely to be a major factor in these declines. Locations on the island where these threatened species are known to be extant are of particular significance as it suggests that habitat quality has remained high in these areas, including factors that reduce cat density and/or ameliorate predation pressure.

The Draft EIS correctly identifies the risk of increased impacts from feral cats created by the development, through clearance of vegetation and expanded road network, creating disturbed areas and corridors that are likely to increase feral cat dispersal and facilitate hunting efficiency. Additionally, cats are the primary vector for toxoplasmosis, which has been implicated as a factor in the decline of some mammal species and is now highly prevalent in Eastern Quoll in Tasmania. Transmission of toxoplasmosis to native mammal species has already occurred elsewhere in the Top End of the NT. Increased feral cat numbers or cat activity in the proposed development area may also pose an increased risk of disease transmission to threatened mammal species.

The management and control measures identified in the Draft EIS to mitigate the threat posed by feral cats are not adequate or practical. Localised cat trapping is ineffective at reducing cat numbers in open populations. Currently the only effective way to mitigate the impacts of feral cats on native wildlife is with sustained baiting and ultimately eradication programs at appropriate landscape scales, with effective barriers to recolonization such as cat eradication on entire islands or within large predator-proof enclosure fences.

Introduced Rodents

The mine rehabilitation study in the Terrestrial Ecology Report showed that the introduced rodents House Mouse *Mus musculus* and Black Rat *Rattus rattus* have colonised rehabilitation areas in the GEMCO leases. Not only may these species also colonise future rehabilitation areas within the new project area, but these may act as source populations for a gradual spread into adjacent extensive undisturbed vegetation, which has been recently observed to occur in many areas in the Top End mainland. These introduced rodents potentially compete with the Brush-tailed Rabbit and Northern Hopping Mouse, or may spread disease, and therefore not only impede recolonisation of

rehabilitated areas by native species but pose a wider threat to threatened mammal populations on Groote Eylandt.

Proposed feral animal control measures will not be effective in mitigating their establishment. Without very careful design, baiting to control introduced rodents has the potential for adverse impacts on native threatened rodent species.

Biodiversity Offsets

The Draft EIS identifies that in accordance with the EPBC Act Environmental Offsets Policy, biodiversity offsets are required to offset any significant, residual impacts. The Draft EIS states that the project has the potential to give rise to significant residual impacts for the Northern Hopping-mouse and Brush-tailed Rabbit-rat and a Biodiversity Offset Strategy (Appendix E) has been prepared with proposed offsets relating to these species. In general these are “indirect” offsets involving research in to the ecology of, and threats to, these species.

A detailed analysis of the Biodiversity Offset Strategy has not been undertaken, as this is not necessarily appropriate at this stage of the EIS process. However, the following general comments are made in relation to potential environmental offsets:

- The residual risk to each of the four key MNES species is at least Medium (see Table 4.5 and the summary of this assessment), so it would be appropriate to consider offsets in relation to each of these species.
- For all species, landscape-scale actions that improve conservation security of the species within Groote Eylandt as a whole are likely to be most effective.
- Such actions would address the most important threatening processes affecting each species including more stringent quarantine and surveillance to prevent cane toad establishment; landscape-scale management of feral cats and introduced rodents; and maintenance of ecologically benign fire regimes.
- While further research may be required to most effectively manage these species and key threats, it is preferable that this research is embedded as part of an adaptive management process within offsets that also have a significant on-ground management component.

Flora/ Fauna Summary

- Groote Eylandt is a critical refuge for northern Australian biodiversity and has a high level of ecological integrity unmatched elsewhere on the mainland or other large offshore Australian islands. As long as the integrity of Groote Eylandt is maintained, this refuge value is likely to increase into the future as threatening processes continue or intensify on the mainland and largest islands of Northern Australia.
- The Draft EIS correctly identify the matters of national environmental significance (MNES) potentially at risk from this development, notably four threatened terrestrial fauna species – Northern Quoll, Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse.
- The sampling done for the Draft EIS was adequate to demonstrate that each of the four species occur within the project area, although for at least three of these species with sparse and/or patchy distribution (Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse) sampling intensity was too low to provide a precise delineation of high quality habitat occupied by the species.
- Vegetation communities (and by extension fauna habitats) have been mapped at a moderately fine scale within the project area and the most extensive habitat type (“old growth” open forest) is potentially suitable habitat for each of the key MNES species.
- Vegetation communities or habitat types are only mapped at very coarse scales for Groote Eylandt as a whole, making it difficult to assess the significance of important habitats in the project area in a whole-island context. Given the sparse and patchy

distribution of three of the key MNES species (Masked Owl, Brush-tailed Rabbit-rat and Northern Hopping Mouse), it is likely that the estimates presented in the Draft EIS of the proportion of available habitat affected by the project are substantial underestimates of the proportion of occupied habitat affected.

- The distribution of the few recent records for the Brush-tailed Rabbit-rat, and accumulating evidence for decline of Northern Hopping Mouse mean that evidence for their current presence within the project area is highly significant.
- There is only sparse information about the extent and rate of recolonisation of rehabilitated areas by the key threatened species, and the ultimate recolonisation at densities similar to pre-mining levels by any of these species cannot be assumed. The assessment in the Draft EIS that the project will not give rise to significant impacts on the Masked Owl is not supported, given the very long time-frame for the development of large hollow-bearing trees in tropical savanna regrowth.
- The development of the Draft EIS provides an opportunity for review and potentially strengthening of the Cane Toad Management Plan to address the high risk to the biodiversity values of Groote Eylandt from accidental introduction and establishment of cane toad, and it is recommended that this is addressed in greater detail in the EIS.
- The Draft EIS correctly identifies additional indirect risks associated with the spread of feral cats and introduced rodents, although the local-scale management measures described for these feral animals are unlikely to be effective. Particularly for feral cats, management of this risk must be placed in the context of action to reduce feral cat impacts across landscape scales.
- As the effects of removal of habitat of the four key MNES species are hard to mitigate, the mitigated risk for all four species remains at least Medium (as identified in the Draft EIS) and for some species may be High - for Brush-tailed Rabbit-rat and Northern Hopping Mouse because the project area may contain a significant proportion of occupied habitat on the island; and for the Northern Quoll due to the consequence of accidental introduction and establishment of cane toads.
- More precise explanation of the residual risk to Brush-tailed Rabbit-rat and Northern Hopping Mouse will be difficult without very extensive and intensive survey using techniques appropriate to detecting these species across the entire island.
- Environmental offsets may be required to offset the residual risks from this project to each of the key MNES species. Appropriate environmental offsets would improve the conservation security of these threatened species across the whole of Groote Eylandt through more stringent quarantine and surveillance to avoid cane toad establishment; landscape-scale management of feral cats and introduced rodents; and maintenance of ecologically benign fire regimes. While some research may be required to most effectively implement these actions, offsets should primarily be directed towards on-ground action in an adaptive management context.

- In regards to Chapter 8 Aquatic Ecology, and Appendix D Aquatic Ecology Report:

Aquatic macroinvertebrates and fish were surveyed at 17 sites, although the objectives (e.g. baseline monitoring data) of the surveys have not been clearly defined.

Macroinvertebrate taxa have been identified to (in most cases) family level. This level of reporting prevents assessment of the significance of the local fauna. Most of the families reported are present in streams throughout Northern Australia. The absence of some families may reflect actual absence or be a consequence of inadequate sampling.

Results appear to suggest a depauperate fauna, likely composed of common, widely distributed species. However, without species-level data this can only be guessed. Future assessments could attempt to obtain this type of data.

The fish survey was confined to safe nettable waters and likely represents an underestimate of the total number of species present.

As a general note, these types of assessments are undertaken to varying degrees of scientific rigor. Comments would be best made if they were with reference to guidelines for the proponent to design an assessment/monitoring program.

- The Department provided comment for GEMCO's Eastern Leases Project as a Notice Of Intent (NOI) in May 2014 (NR2461) and the Draft Terms of Reference (ToR) in September 2014 (DLRM2014/2161) recommending the preparation of an Erosion and Sediment Control Plan (ESCP).

Section 10.8.2 of the Draft EIS identifies that an ESCP will be prepared in *accordance with the Department of Land Resource Management (DLRM) Fact Sheets Erosion and Sediment Control Plans for Rural Development and Model Erosion and Sediment Control Plans for Rural Development* prior to the commencement of the project. The draft EIS also references the IECA Best Practice Guidelines.

The Department supports the applicant's intention to develop an ESCP for the works; however due to the nature and scope of the works, the Department recommends that the IECA Best Practice Erosion and Sediment Control Guidelines 2008 (www.austieca.com.au) and the Soils and Construction Volume 2E Mines and Quarries (<http://www.environment.nsw.gov.au/resources/stormwater/08208soilsconststorm2e.pdf>) are more relevant to and contain information that will assist in the development of effective Erosion and Sediment Controls (ESC) and an ESCP.

The ESCP should include details of permanent and temporary ESC methods and treatments to be implemented during both the construction (development) and operational phases (including post-extraction), and be cross-referenced with the Rehabilitation Plan addressing final landform and drainage and related stabilisation measures, soil management and establishment of vegetation cover, including ground cover standards/targets, monitoring and contingency.

The ESCP should address management of vegetation clearance; management of road formation and drainage, including stabilised crossings and discharge points. Note: soil windrows formed when blading access tracks should be removed to prevent concentration of surface flows, and the Department does not recommend the use of 'V' drains - parabolic or trapezoidal profiles are preferred.

The ESCP can be based on site plan maps and should include Construction Notes on timing of works, flagging of No-Go areas, types of ESC structures to be installed, and reference the Rehabilitation Plan. Map symbols should be used to indicate locations of works, and be referenced in the legend. Standard drawings or other information sheets, giving detail of ESC structures or methodologies, should be included as attachments.

ESCP's and ESC implementation should be to the satisfaction of the Department of Mines and Energy, to ensure the applicant takes sufficient measures to avoid or minimise sediment runoff during both the construction and operational phases, to prevent environmental harm or nuisance.

- An assessment of the NT Weeds Database for the proposed site, surrounding areas and adjoining roads has revealed previous data records of the following:

COMMON NAME	BOTANICAL NAME	DECLARED
Gamba grass	<i>Andropogon gayanus</i>	Class B
Perennial mission grass	<i>Cenchrus polystachios</i>	Class B
Hyptis	<i>Hyptis suaveolens</i>	Class B
Grader grass	<i>Themeda quadrivalvis</i>	Class B
Ornamental rubbervine	<i>Cryptostegia madagascariensis</i>	Class B
Bellyache bush	<i>Jatropha gossypifolia</i>	Class B

The *Weeds Management Act* (The Act) enables the following weed declarations: Class A (to be eradicated); Class B (growth and spread to be controlled); Class C (not to be introduced into the NT). All Class A and B weeds are also Class C.

All land in the Northern Territory is subject to the Act. The Act states that the owner and occupier of land must - (a) take all reasonable measures to prevent the land being infested with a declared weed; (b) take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land.

Gamba grass is subject to a Statutory Weed Management Plan. Management obligations outlined in this plan must be adhered to by all land holders.

The Draft EIS makes little reference to the management or mitigation of weeds.

It should be noted that gamba grass (*Andropogon gayanus*) and mission grass (*Pennisetum polystachion*) are listed as a 'Key threatening process' under the EPBC Act.

Mission grass is known to be currently present on the island. It has shown potential to successfully colonise rehabilitation sites, roadways and areas containing disturbed soils when soil and vehicle hygiene protocols are not adhered to.

Special mention to Declared Class A weeds bellyache bush (*Jatropha gossypifolia*) and ornamental rubbervine (*Cryptostegia madagascariensis*) is advisable. These are known to occur/have occurred in the townships and community gardens on Groote Eylandt. These weeds are highly invasive, however at this stage considered to be eradicable from the Northern Territory.

The Weed Management Branch of this Department may conduct random inspections of the proposed sites to ensure weeds have not been spread or introduced to the site.

Further information as to management requirements and copy of the Weed Management Plan for Gamba Grass (*Andropogon gayanus*) is available at www.nt.gov.au/weeds or alternatively contact the Weed Management Branch for further advice on (08) 8999 4567.

Should you have any further queries regarding these comments, please contact Bill Cumberland by email bill.cumberland@nt.gov.au or phone (08) 8999 4572.

Yours sincerely

A handwritten signature in black ink, appearing to read 'J Pratt', with a stylized flourish at the end.

JAMES PRATT

27 July 2015

6. Department of Lands, Planning and the Environment – Heritage Branch

From: Dianne Bensley
Sent: Monday, 1 June 2015 11:27 AM
To: Planning Coordinator
Cc: Alana Mackay
Subject: RE: Draft Environmental Impact Statement for Comment - Groote Eylandt Mining Company Pty Ltd - GEMCO Eastern Leases Project

Good morning,

I have reviewed the Draft EIS for the GEMCO Eastern Leases Project and provide the following heritage comments:

- An extensive archaeological survey has been conducted of the proposed project footprint and an archaeological survey report produced.
- Only one archaeological site (object) will be impacted upon by the project and the archaeological object can be relocated to an area outside the project footprint. Permission to do so will be required from the Minister for Lands, Planning and the Environment and the final location will be a matter between the custodians and the proponent.
- A Cultural Heritage Management Plan will be prepared which will document the restrictions to be placed on access to the archaeological sites, document a program of awareness training for employees, and outline a program of annual monitoring of changes to archaeological sites.
- In the event that unexpected archaeological sites are located, measures have also been established as to how to deal with that.

Heritage Branch is satisfied that all heritage and archaeological issues have been adequately addressed for this project.

Regards,

Di

Dianne Bensley | Senior Heritage Officer | Heritage Branch
Department of Lands, Planning and the Environment
p... (08) 8999 5051 |
e... dianne.bensley@nt.gov.au | www.nt.gov.au/dlp

Level 1 Arnhemica House, 16 Parap Road Parap
GPO Box 1680, Darwin NT 0801



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7. Department of Mines and Energy



Northern
Territory
Government

DEPARTMENT OF MINES AND ENERGY

www.nt.gov.au

Mines Directorate

5th Floor, Centrepont Building

The Mall, Darwin

Postal address GPO Box 4550

Darwin NT 0801

Tel 08 8999 6528

Fax 08 8999 6527

mineral.info@nt.gov.au

Doc ref MDoc2015/05185

Dr Bill Freeland
Chairman
Environment Protection Authority
GPO Box 3675
DARWIN NT 0801

To: Alana Me

Dear Dr Freeland

**RE: GROOTE EYLANDT MINING COMPANY PTY LTD : EASTERN LEASES
PROJECT DRAFT EIS**

I refer to the above report submitted by the Environment Protection Authority to this Department on 1 June 2015.

Department officers have reviewed this document and comments have been included in attachment A for your consideration.

Please contact Christine Fawcett on (08) 8999 5371, or by email to mineral.info@nt.gov.au, if further information is required.

Yours sincerely

PETER WAGGITT
Director Mining Compliance
July 2015

RECEIVED
6 2 JUL 2015

BY: Cynthia

Attachment A

Comments on GEMCO – Eastern Leases Project Draft EIS

Department Reference : MR2015/0218

Section / Reference	Comments
	The issues identified by DME are considered operational and would be expected to be addressed in the MMP prior to commencement.
3.6.2 Mining and Rehabilitation method	Consider stockpiling the cleared vegetation for resspreading during rehabilitation instead of burning.
6.2.4 Monitoring and Remediation	Completion Criteria could include the measurement of abiotic ecosystem properties at the interface between mined and non-mined areas. I.e. will soil testing be undertaken to confirm presence or absence of bacteria, fungi etc. Is soil structure and function included in completion criteria? Consider management of 7-10 year rehabilitated areas to include fire i.e. a cool burn. A fire management strategy could be developed to ensure rehabilitated areas are protected from 'hot' fires into the future.
6.2.5 Rehabilitation Status	The rehabilitation should be tested for fire resilience prior to handing back to the traditional owners. Completion criteria must be agreed by all stakeholders.
6.3.4 Rehabilitation Methods	Will rehabilitation methods include returning rocky outcrop habitats that may have been removed during clearing?
12.10 Greenhouse Gases	Estimate the GG emissions from burning cleared vegetation.
9.3.5 Cretaceous Sandstone	Water bores developed for communities which do not meet drinking water guidelines is a concern. Include information on how this is communicated and managed.
10.4.2 Runoff from Areas Disturbed by Mining Activities	Sediment dams and traps must be of sufficient size to cope with high rainfall episodes to minimise release of sediment laden water before sufficient retention time. This would be expected to be addressed in the Erosion and Sediment Control Plan.
10.6 Impact Assessment	Does the creation of post-mining landform similar to the pre-mining landform mean that the drainage lines within each catchment will attempt to be replicated i.e re-create catchment flows.

8. Department of Primary Industry and Fisheries

From: Suzanne Simonato
Sent: Thursday, 25 June 2015 1:39 PM
To: Roderick Johnson
Subject: RE: Draft Environmental Impact Statement for Comment - Groote Eylandt Mining Company Pty Ltd - GEMCO Eastern Leases Project

Good afternoon,

The Draft EIS has been assessed by DPIF and there is no comment.

Regards

Suzanne

Suzanne Simonato | Project Officer
Strategic Services and Policy Coordination
Department of Primary Industry and Fisheries

Goff Letts Building, 29 Makagon Road, Berrimah
GPO Box 3000, Darwin, NT 0801

P: 08 8999 2384
e: suzanne.simonato@nt.gov.au
W: www.dpif.nt.gov.au/

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9. Northern Territory Department of Police, Fire and Emergency Services

From: Cheryl Fitzsimmons
Sent: Thursday, 9 July 2015 2:46 PM
To: eia NTEPA
Subject: TRIM: NT Police, Fire and Emergency Services

ATT: ALANA MACKAY

Good afternoon Alana,

The Northern Territory Police, Fire and Emergency Services have reviewed the draft EIS for the GEMCO Eastern Leases Project and notes that the project sits outside of Northern Territory Fire and Rescue Service Emergency Response Areas. We note that Groote Eylandt Mining Company has its own Emergency Response Team in place.

Any provided accommodation however, must comply with the *Fire and Emergency Act and Regulations Part 2A – Requirements relating to smoke alarms*.

Kind regards,

Cheryl Fitzsimmons | Staff Officer
Executive Director's Office | Office of the Commissioner of Police and CEO of Fire and Emergency Services
NT Police, Fire and Emergency Services
6th floor NAB building, 71 Smith Street, DARWIN NT 0800
PO Box 39764, WINNELLIE NT 0821
p...(08) 8985 8840 | f...(08) 8981 6324 | e...cheryl.fitzsimmons@pfes.nt.gov.au | www.nt.gov.au/pfes

Working in partnership with the community to ensure a safe and resilient Northern Territory.

10. Anindilyakwa Land Council



ANINDILYAKWA LAND COUNCIL

ANINDILYAKWA LAND COUNCIL SUBMISSION ON THE EASTERN LEASES PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT

The Anindilyakwa Land Council (ALC) has reviewed the Draft Environmental Impact Statement provided by GEMCO for the Eastern Leases Project areas ELR 28161 and ELR 28162.

Overall the Land Council found the report to be very comprehensive in its coverage and showed evidence of in depth research for most aspects and we believe this will provide a reliable baseline for future mining projects in this region.

As the Anindilyakwa Land Council represents the interests of the Traditional Owners of the country proposed to be mined by this project it is essential that we question the assumptions and modelling conducted for this report so the best possible outcomes can be achieved for all stakeholders involved. The interests and concerns of the Anindilyakwa land Council and the Anindilyakwa people in relation to this country do not necessarily match those of the researchers or the proponent for this report and it is our aim to ensure that those interest and concerns are raised through this submission.

Comments on Eastern Leases Project Draft EIS

Section 3.5.4 Manganese

The report indicates that Oolite product is present on the leases, this material should be considered an additional environmental risk due to its fine particle size and special management considerations should be given to its handling at all stages due to dust issues, runoff water contamination and transport difficulties through to shipping.

Section 3.7.5 Infrastructure and Utilities

Due to the pristine nature of this site it is vital that quarantine risks are kept to a minimum in all aspects of the project. All service areas need to be fully contained with restricted run off to the environment. Bulk fuels, oils or other hazardous materials should not be stored on this site. It needs to be remembered that the Owners of this country will inherit any post closure legacies from this mine.

Section 3.7.8 Construction Activities

The proposed overpass of the Emerald River public road needs to be installed very early in the development of this site so as to avoid the risks to other road users from increased mine traffic in this area.



ANINDILYAKWA LAND COUNCIL

Section 3.9.1 Road Network

It needs to be clarified that under the current terms of the Main GEMCO Leases (2006) GEMCO remains responsible for the maintenance of the Emerald River road from the Angurugu Community to the Emerald River road bridge.

Figure 3.2 Local setting

During our review we noted that several maps used in this report do not accurately show the southern tributary of the Emerald River (referred to in this report as Tributary 2), this tributary provides the main perennial flow to this river system commencing as ground water springs near the western boundary of the South Eastern Lease (ELR 28162), as such it is very important environmentally and culturally and should be included in all report maps.

Section 4.3 Environmental Risk Assessment

The ALC believes more can be done to ensure Cane Toads are kept off Groote Eylandt, current plans maintained by GEMCO lack a functional contingency plan for a toad outbreak and firm commitments around the proposed Quarantine Officer positions for Groote and Darwin and purchase of a replacement toad detection dog are yet to be made by GEMCO. As such any increase in disturbance or infrastructure expansion from this project potentially increases the risk of toads entering and establishing on Groote Eylandt.

Table 4.5 Ground Water

The ALC remains concerned that dewatering and construction of mining pits may result in decreased flows to the Emerald River. The upper aquifer hydrology maybe be severely disrupted or altered by the mining process resulting in reduced groundwater flows. The mixing of Aquifer Laterite material and Lateritic Clay Aquitard during overburden replacement may have an unpredictable outcome for the aquifer recovery and hence adversely impact on existing vegetation and ecosystem function.

Section 5 Consultation

The level of consultation within the community was comprehensive and generally well executed by the proponent. While there will always be some community members missed for various reasons in this process we believe most people were happy with the consultation undertaken.

Section 6.3.3 Overburden Geochemistry

It is reassuring that the proponent has found that smectite clays located within the site are non dispersive. It is requested that if this is found to be not correct for all material across the project that management systems would be put in place to prevent broader contamination of waters on the site and that this material will not be utilised for use in any drainage related works. It is also appreciated that GEMCO are putting in place procedures for the management of any PAF material found on the site.



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Section 6.3.4 Rehabilitation Methods

Currently the proponents pre mining clearing requires the burning of all cleared vegetation and the ALC believes this is not best practice and requests that this material placed into Rehabilitation areas as refuges or habitat to allow the more rapid recolonisation by fauna or as wood chips to improve organic matter content of the depleted soils and hence the quality of rehabilitation outcomes. In recent times the ALC and other community groups have also requested access to valuable timber from this clearing for local milling projects. The greenhouse gases created by the current disposal of this vegetation are we believe poor practice, excessive and unacceptable in this era.

It is important that the proponent balances out any shortfalls or deficiencies in overburden material requirements for post mining surfaces as any unnatural mounding or depressions will be unacceptable to the Traditional Owners at closure.

Section 7.2 Overview of Project Sites

Throughout the report there is mention of the frequency of burning in the project area by Traditional Owners inferring that it is burnt annually. Prior to extensive exploration being undertaken in this area in the past 6 years this was not the case as can be seen further to the east of the leases where very few fires occur. The increased interest in this area and the need for Traditional Owners to visit the area for mining related meetings has meant increased burning in recent years, some of these fires have been in the late dry season resulting in a more severe impacts.

Section 7.3.1 and 7.7.3 Offset Strategy

The ALC is supportive of Offsets to conduct research on Feral Cats controls and on the ecological requirements of the Northern Hopping Mouse to enable better management through gaining a better understanding of the habitat requirements, threats and dietary needs. The ALC would also like to see further research on the Masked Owl around its population status and requirements for territory and nesting locations. The ALC is less supportive around mine site rehabilitation research for the return of the Northern Hopping Mouse and Rabbit Rat as we believe these funds would better placed into protecting remaining populations in other areas not impacted by mining. We believe the requirements around reinstating the substrate required for Northern Hopping Mouse return post mining are unlikely to be met under current mining practices. Although little is known about the Rabbit Rat on Groote Eylandt and any research is welcome, we believe any research on the ecology of this species would be better centred on the Coburg region where this species is reported to be more abundant.

The Anindilyakwa Land & Sea Ranger group are also very interested in being involved in any research being conducted on Groote as part of these offsets.

Section 7.3 Northern Hopping Mouse

Due to the selective nature of this species particularly in relation to substrates it would have been useful to identify what areas of the site are suited to this species. It would appear that no



ANINDILYAKWA LAND COUNCIL

additional areas have been put aside in this project for fauna conservation in particular the critically endangered Northern Hopping Mouse.

Section 7.6.3 Edge Affects

Prior to this study being released the ALC had already identified areas of cultural and environmental importance to the owners of this country and we will be continuing to talk with the proponent to ensure the proper protection of these areas through adequate buffering. In some areas this protection extends beyond that indicated by GEMCO through this report and takes into account potential edge affects.

Section 7.6.3 Erosion and Sedimentation

The ALC remains concerned at the risks of erosion and increased sediment running to the Emerald and Amagula Rivers. Such sediment would impact on water quality and aquatic habitats. Much of the stratum in these leases is vulnerable to erosion and large areas are planned to be disturbed in a high rainfall area potentially increasing the risk of unplanned releases. The proposed Erosion and Sediment Control Plan to be developed by GEMCO will be a key document to avoiding future issues in this area.

Section 7.6.4 Impacts on Vegetation Communities - Groundwater Dependent Communities

The ALC remains concerned that the shallow groundwater aquifer will not adequately return to these areas in the short term post mining. The removal of the shallow aquifer during mining and the placement of this overburden material post mining will result in sediment realignment and this may see the aquifer reform at the new basement level (potentially the pit floor) resulting in a significant vegetation decline due to a change in available groundwater during the dry season.

Section 7.6.6 Impacts to Threatened Fauna Species

There is currently little known about the populations of the Masked Owl on Groote with most surveys occurring on GEMCO leases or adjacent areas. The major impact on this species is the potential removal of roosting and nesting trees. It is expected that suitable trees with large hollows would be in excess of 100 years old and such trees are uncommon on Groote. Obviously the planting of rehabilitation is going to take some time to rectify this deficit; the ALC believes offsets should be made available for this species so more can be done to research their current status and protection requirements.

As previously mentioned the ALC believes the edge affects in mining areas are greater than other disturbance areas due to the ongoing pattern of clearing attracting increased predator activity placing greater pressure on threatened species departing the clearing area and adjacent uncleared or buffer areas. This needs to be considered in determining the appropriate size of buffer areas and the perceived benefits of young rehabilitation areas surrounded by active mining with limited refuge sites. We believe that it is unlikely that any threatened species will move into back rehabilitated areas of the site other than for opportune foraging while active mining is occurring.



ANINDILYAKWA LAND COUNCIL

Figure 7.2 Terrestrial Fauna Survey Sites

It appears from the report map provided that the fauna survey sites were quite limited in number and most monitoring sites appear to be in areas other than where mining is proposed. It is unclear to the ALC why the survey was designed in this manner as it limits our knowledge of species living within the mining footprint that will be lost or displaced? The ALC requests that further fauna surveys are conducted within the footprint of the proposed mining area so as a full understanding of the species most affected and displaced can be made.

Section 8.6.3 and 10.4.2 Aquatic Ecology - Impact Assessment - Water Courses

The installing of low flow drainage culverts suited to a 2 year average flood flow and allowing larger flood events to flow over the culvert and earthen haul road will ultimately create issues of water quality and sedimentation of the Emerald and Amagula rivers which as per the Traditional Owners wishes needs to be avoided. The ALC requests that this proposal is reviewed and that culverts able to cater for greater flows during intense rain events should be considered. The proposed sediment traps are unlikely to be very effective in such events unless they have a large capacity to enable sediments to settle out prior to release.

Section 9.3.1 Groundwater - Laterite

As stated in the report this layer contains the shallow aquifer so important for existing vegetation health and it is confined at the lower levels by the Lateritic Clay Aquitard. Both these layers are to be removed in the proposed mining areas disrupting the aquifer flow for the period of the project. More importantly is that the shallow aquifer in these mining affected areas will be disrupted for some undefined period post mining and it may reform at a different level in the soil profile due to realignment of the sediments and the former aquitard being removed.

Section 9.3.4 Marine Claystone

This report indicates that the upper layer of the Marine Claystone contains most of the manganese ore for mining. This layer also acts as an aquitard for the contained lower (major) aquifer. The ALC wishes to know if disruption to this aquitard poses a significant risk to the Emerald River flows if this layer is fractured by drilling or blasting operations and the resulting aquifer flow needs to be dewatered from the mining pits? The report also states this water is unsuitable for drinking - does it pose any risk to the environment in relation to heavy metals? Will disruption to the aquifers potentially result in depressurisation of the groundwater systems in areas of the site post mining and hence base flows of the water courses?

Section 9.4.5 Impact on Water Courses

With the Groundwater models predicting groundwater draw downs in the South Eastern lease up to 1 kilometre from the abstraction area this raises concerns within the ALC on the possible impacts on culturally and environmentally important springs and the major recharge of perennial flows in the upper reaches of the Emerald River located on the western boundary of the lease particularly during the dry season. This risk highlights the need for appropriate buffering in this area to minimise this risk. A reduction in perennial flow within either river system as a result of this project would be seen as a significant event by the Land Council.



ANINDILYAKWA LAND COUNCIL

Section 9.4.6 Impact on Groundwater Dependent Ecosystems

With the predicted aquifer disruption, groundwater depressurisation and some areas significant groundwater drawdown it would be expected that it may take up to 30 years from the commencement of the project for most areas to return to some state of stability. This being the case the ALC questions if significant die back of mature vegetation is likely to occur in some areas – particularly in riparian areas?

Section 10 Surface Water

This topic has been comprehensively covered in the report however the ALC remains concerned that controls on surface water flows may be inadequate and contaminated water may flow to the Emerald and Amagula Rivers. This is a high rainfall area and multiple high rainfall events may occur in a short time period resulting in an unplanned release. Much is reliant on the yet to be produced Erosion & Sediment Control Plan. The Traditional Owners have requested that no impacts occur to the rivers and the release of contaminate waters is not considered an option by the ALC.

Section 10.5.5 Water Balance – Dam Sizing

While the data used in this model is based on 1,206mm average rainfall it is likely to be found that rainfall at this site area will in most years exceed this figure. This area to our knowledge has never had rainfall recorded and from local observations it appears to receive consistently higher rates of rainfall than Angurugu. GEMCO would be encouraged to err on the side of caution with dam sizing as the risks of uncontrolled discharge of quarry water to the river systems in this area is not seen as acceptable by the Traditional Owners of this country.

Controlled release of Quarry Water

During consultation with Traditional Owners by the ALC it has been made clear that no mine water should go to the rivers in this project area, as such the ALC would be reluctant to agree to any discharge license for this site. The proponent is familiar with the site and needs to ensure adequate contingency for extreme rain events is built into their designs.

Section 13.6.7 Blasting – Cultural Heritage

The proponent needs to ensure that monitoring is routinely conducted to ensure blasting activities are not resulting in damage to cultural sites adjacent to mining areas. The ALC appreciates the geotechnical survey being undertaken to set vibration limits to protect these sites.

Section 15.6.2 Local Aboriginal Employment

The ALC would like to see new initiatives for local Aboriginal People to provide business opportunity or employment with the mine come from this project. There does not appear to be any new commitments by the proponent in this report.

Section 16 Archaeology

The areas of cultural significance such as art sites or shelters need to have their access restricted other than for monitoring purposes to ensure disturbance is limited. Dust may become an issue for



ANINDILYAKWA LAND COUNCIL

some art sites during mining and in this instance GEMCO should be prepared to install temporary protection to prevent damage. The Land Council welcomes the development of a Cultural Heritage Management Plan by the proponent.

Section 19 Ecology - Mining

The proposed mining process will result in the removal of Northern Hopping Mouse and Masked Owl habitat due to their particular ecological requirements for nesting sites. It appears no additional reserve areas have been put aside for these species from this study.

Section 23 and 7.6.4 Introduction of Weeds

The exclusion of weeds should to be a higher priority for the proponent as current requirements for quarantine around weeds are inadequate. This site is mostly free of weeds and the ALC would like to see the introduction of strict quarantine arrangements for all equipment and vehicles entering the site. This could involve the creation of a quarantine station area on the Main Leases or on entry to the Eastern Leases where all vehicles and equipment are inspected and where necessary treated daily prior to commencing work in the area. While this process may appear onerous, the time, effort and money saved by not having to control weeds into the future in this pristine area would be a saving for GEMCO and importantly not be a burden to the Owners of this country post mining.

Section 33 Social

It appears from the report that access for Traditional Owners will be restricted to the North Eastern Lease. An important cultural site is located in the north eastern corner of this lease and some form of access road/track will need to be created for Traditional Owner use.

The Anindilyakwa Land Council appreciates the opportunity to make comment on this Draft Environmental Impact Statement for the Eastern Leases ELR 28161 and ELR 28162 on behalf of the Anindilyakwa people that own and place cultural importance on these lands.

Mining & Environment Manager
Anindilyakwa Land Council
10 July 2015

11. Anindilyakwa Land Council, Land and Sea Management Unit



ANINDILYAKWA LAND COUNCIL

Anindilyakwa Land Council, Land and Sea Management unit, submission on the Eastern Lease Project Draft EIS

The Land and Sea Management (LSM) unit has reviewed the Draft Environmental Impact Statement (EIS) for the GEMCO Eastern Lease Project. We value the opportunity to comment on this Draft EIS and appreciate the extension (to 15th July 2015) granted by the Northern Territory Environment Protection Authority.

The LSM unit believes the Biodiversity Offset Strategy requires a number of improvements to ensure programs have applied conservation outcomes and thus benefit threatened species on Groote Eylandt.

1. Importance of project site for threatened species

The significance of the brush-tailed rabbit-rat (and northern hopping mouse) record from the project site is not considered or valued adequately in the EIS.

According to the Terrestrial Ecology Report (C), the brush-tailed rabbit rat has the 'potential to inhabit several habitat types' outside of the project site. However the paucity of records in recent times - despite numerous fauna surveys - suggests they do not. This is also the case for the northern hopping-mouse.

We know that the project site provides critical habitat for these species and thus its destruction may have irreversible effects on viable populations of the brush-tailed rabbit-rat and northern hopping-



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mouse on Groote Eylandt. As such, we believe significant offset proposals, that include substantial support for the long-term applied conservation of these species, are required.

2. Including masked owl in Biodiversity Offset Strategy

We believe there is potential for the population of masked owls on Groote Eylandt to be significantly impacted by the Eastern Lease Project and thus we believe appropriate offsets should be developed for this species.

The assessment of the habitat resources of the masked owl used in this EIS is too broad and thus it provides only a limited understanding of how important the project area is for the survival of masked owls on Groote Eylandt. While there may be 'extensive areas of potential habitat' outside of the project site, it is unclear what proportion of this habitat is useful for foraging only, and the extent of features critical to the persistence of masked owls (i.e. hollow bearing trees).

It is possible that the effects of clearing over 15,000 hectares of vegetation (together with a number of indirect impacts) may negatively impact masked owl populations given the recovery of key habitat features take decades (or even centuries) to develop.

3. Increasing direct offset strategies

The LSM unit believes there is considerable value in undertaking research to fill knowledge gaps regarding threatened species on Groote Eylandt. However, we also believe there is potential to achieve applied conservation outcomes through direct offsets not considered in the Biodiversity Offset Strategy (E).

Despite current control measures, the threat of cane toad incursion and establishment on Groote Eylandt persists. The extension of mining activities for four additional years (by mining the Eastern



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Leases) increases the long-term risk of cane toad establishment on Groote Eylandt through the receipt of mining / mining community supplies and equipment by barge. The introduction of this species is likely to have a devastating impact on many threatened species, including the northern-hopping mouse, brush-tailed rabbit-rat and northern quoll. The LSM unit recommends development of offset strategies that invest in collaborative arrangements that aim to improve strategies to mitigate cane toad incursion.

The impact of feral cats on threatened species on Groote Eylandt is unclear and thus further investigation into feral cats (and their control) is important. Nevertheless, a direct offset strategy could be developed that includes control activities and / or the eradication of cats from Groote Eylandt. This strategy could partner with, and draw insights from, research that is planned for 2016 by the NT Department of Land Resource Management.

4. Research into improving the value of mine rehabilitation

The LSM unit does not support research into the value of mine rehabilitation as an offset strategy for threatened species on Groote Eylandt. Proposed research into the general ecological requirements of the brush-tailed rabbit-rat and northern-hopping mouse will likely provide adequate insight into the value (and potential value) of mine rehabilitation areas. We believe funds would be better invested in direct offset strategies (such as those mentioned above) or additional research outside mining areas.

Yours sincerely

Rick Taylor

Land and Sea Manager,

Anindilyakwa Land Council

12. Environment Centre NT



Environment Centre NT

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NT Environment Protection Authority
GPO Box 3675
Darwin NT 0801

Friday, 10 July, 2015

To Whom It May Concern,

The Environment Centre NT considers that the activities outlined in the Draft EIS of the Eastern Leases Project on Groote Eylandt to be wholly incompatible with the conservation and ecologically sustainable management of an International Site of Conservation Significance.

This is due to:

1. The high level of environmental impact of this development in terms of hectares of native vegetation cleared and disturbance to fragile soils.
2. High risk of introduction and spread of invasive species such as feral cattle, horse, donkey, Water Buffalo, cane toads and pig currently absent from the island as well as the spread of feral cats, grasses and other weeds not yet widespread on Groote Eylandt.
3. Some risk of contamination of surrounding waterways, including rivers used for drinking water, swimming, fishing and cultural purposes.
4. Vulnerability of threatened species on Groote Eylandt to disturbance, including that of the Northern Hopping Mouse, Northern Quoll and other small mammals. The well-documented rapid decline of small mammal populations is an ecological emergency deserved of national attention and there is an opportunity now to refuse approval to this development to allow Groote Eylandt to continue to be a refuge for small mammals in decades to come.
5. As outlined in the Socio-Economic study, the lack of viable alternative ecologically sustainable industries on Groote Eylandt which create a situation of economic and social dependence on increased mining activity.
6. The potential negative social impacts including impacts on social amenity, loss of land for recreation and traditional practices; anxiety and uncertainty surrounding new mining areas and impacts on spirituality and sacred places, do not offset those positive impacts in the form of royalty payments or government payments. The relatively short-term employment benefits generated from this development do not offset the high long-term cost of this significant environmental impact.
7. The risk of ore dust being spread through transport, particularly at the haul road where it crosses the Amagula River.
8. The increased risk of vehicle accidents given that the haul road is accessed via a public access road.
9. The environmental impact posed by the construction of an overpass over the Emerald River to the aquatic and riverine species dependent on the river, including alteration of the river channel, erosion, siltation and risk of contamination from ore dust.
10. The impact of increased sedimentation and erosion from the mining site upon surrounding aquatic ecosystems.



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11. The increased risk of spills at the port, which was originally constructed to provide for shipping of ore from the current mining lease, to the marine environment which includes internationally significant marine habitat.
12. The lack of evidence to demonstrate that rehabilitation efforts are sufficiently effective to sustain the long-term growth of populations of small mammals, birds and other threatened species.
13. The proponent has not critically or independently assessed rehabilitation efforts undertaken in the current mine site to apply learnings to future rehabilitation efforts, despite a long-term impact of mining over the past 50-years.
14. Capacity of tailings dams and sediment traps to contain contaminated waters during significant rainfall events during the wet season.
15. A lack of information to support the proponent's claims that sufficient capital will be provided for proper rehabilitation of the site, even in the event of economic hardship by the proponent once mining has started.
16. Insufficient detail provided in the Risk Assessment to demonstrate that the proponent has diligently assessed all best practice and low impact alternatives, including the decision not to decrease the environmental footprint of this development further beyond this proposal.
17. Lack of provisions for immediate and public notification of environmental/health incidents occurring on the mine site beyond those limited requirements of the NT Environmental Assessment Act.
18. Inadequate assessment of the development's greenhouse gas offsets despite ECNT's previous recommendations to the Draft Terms of Reference for this EIS.
"ECNT recommend that in this ToR and all future EIS ToR, the NTEPA must require a Climate Action Plan aimed at carbon neutral development, including reference to efforts to mitigate greenhouse gas emissions through the use of renewable energies such as solar."
19. The extremely high conservation values of the project site, which include near pristine habitat for a variety of species severely threatened on the mainland, including the Northern Quoll, Northern Hopping Mouse, Brush-Tailed Rabbit Rat, Merten's Water Monitor, Floodplain Monitor and many others.
"Many of the threatening processes operating on the Northern Territory mainland are absent from, or at low levels in, the Groote archipelago, offering a rare opportunity to maintain a virtually intact biota in this Site." (NT Government, Site of Conservation Significance)
20. The very high cultural values of the site, including a large number of Sacred Sites.

Groote Eylandt has all the characteristics of a very high conservation site. Conservation of the threatened species and biodiversity of Groote Eylandt must be prioritised if these values are to be maintained for many generations to come, and are likely to serve as critical refuge habitat for species which are at risk of local extinction at many mainland sites due to the combined impacts of spread of invasive species, habitat loss, fire and pastoral activity.

The extremely high conservation and cultural values of Groote Eylandt warrant proper investment by both NT and Federal Governments in supporting the expansion of cultural and eco-tourism opportunities and ecologically sustainable types of development beyond strip mining which seek to enhance rather than destroy the island's incredible natural assets.



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Environment Centre NT wishes to object to the Eastern Leases Project on the grounds of the significant threat it poses to Matters of National Environmental Significance and the lack of assurance that rehabilitation and mitigation efforts by the proponent will sufficiently offset the long-term negative environmental, social and economic impacts of strip mining large sections of Groote Eylandt for the purpose of exporting manganese ore.

Sincerely,

Anna Boustead
Acting Director, Environment Centre NT

13. Jeff Aschmann

July 10, 2015 ✓

Submission - GEMCO

Eastern Leases Project -

DRAFT ENVIRONMENTAL IMPACT
STATEMENT - By JEFF Aschmann

The Groote Island Manganese mine Proposal EIS summary rightly points out 50 "risks" that are associated with the proposal. The cumulative impact of these new risks (even with the proposed mitigation measures) as well as present and past mine impacts clearly indicate that the proposal should Not go ahead.

* Page 1, E.I.S. Summary - It states that the proposal "provides significant socio-economic benefits". GEMCO has been operating for 50 years on Groote Island and has generated economic wealth but the Aboriginal community has gained little economic benefits in relation to overall health, life expectancy and general "well being". Indeed statistics show Groote Island as one of the lowest. IF the New Proposal goes ahead

it will be more of the same. Aboriginal People will again experience ^{loss of} access to land, impact on social amenity and spiritual and sacred sites undermined. Well being will again be eroded. As well, let us not forget that we have segregated communities (Black & white) on Groote. This is not a good thing and is fostered by the mine.

Points of concern

* The New Proposal extends over water catchments. ELR 28161 has crossing over Emerald Creek that is a popular swimming spot as well. Even with buffer zones, it is difficult to imagine that such an intrusive operation will not detrimentally impact on the waterways. The Area is located in a cyclone Area that will increase the risk

* Threatened species — (Page 27 EIS summary)

The EIS points out threatened species on Groote Island. As well, NT GOV "sites of conservation significance" points out more

as well as areas of National and International Significance. The cane Toad risk is also pointed out in the EIS. IT will impact drastically on the Flora and Fauna and thus the Ability of Aboriginal people to Hunt and Gather.

* Sensitive Receptors (A Kind heading for areas that will be detrimentally impacted on by the proposal.) IT should be pointed out that the Aboriginal community of Anguragu will now be surrounded by mining activities according to the map. Importantly it will be in direct line of dry SE Trade Winds (Anguragu being only 6.5 kms away) and blowing manganese dust. Presently it cops dust from the North and East but this is wet season activity. Climate and weather data show that dust will dramatically increase. This is unacceptable and will have potential to cause severe health problems. The other areas of Yedikbay (2.2 kms), Warramerbumanja (3.5 kms) and Leske Pools Swimming

hops (2.4 Kms), Are located much too close to the impacts and their attributes will be undermined as well. They are Not a "significant distance away" as the EIS states.

* Risks - As stated before, there are 50 risks, most being significant and should be considered in a cumulative context. They will be very difficult if not impossible to mitigate in the short and long term. They must be considered in relation to the present mine impact and associated risks.

* Aquatic Impacts - Summary ^{EIS} page 29, states they are high. Dams and other mitigation measures (eg. chemical use for cane toads, etc) and infrastructure present major problems to environmental integrity to streams. Also the seasonal climate extremes will make mitigation attempts difficult. (wet and dry)

Ground water - Ground water and aquifers are extremely sensitive and an important source for streams and creeks. The EIS summary states that "depressurisation will

occur on the aquifer" As well it states a 20 year recovery time. This is a shameful and outrageous statement that admits to environmental damage to the aquifer flow and thus the integrity of the streams and creeks as well. When one considers the lifespan of the Groote Island Aboriginal people, many will be dead before the aquifer recovers! This is UNacceptable.

* Archeology - IT is significant that there are 28 Archaeology sites, a majority of high cultural value. Most are only 1 km away, one being 400 m and one will be relocated. There is little doubt that they will be detrimentally impacted on, and thus Aboriginal culture undermined. Aboriginal people will no doubt be "payed out \$) by GEMCO for this act of environmental vandalism. The truth is that future Aboriginal generations and all Australians will SUFFER in the long term from this selfish act.

6.

* Blasting/Noise/Dust - The combined impacts of this especially within a quiet peaceful Area such as Groote Island Near swimming pools, outstations, sacred sites etc. makes this UNACCEPTABLE.

* Tourism - "Mine Tourism" does NOT complement the current NT strategy and does NOT fit in with the natural and cultural attributes of Groote Island.

* Visual Amenities - The present mine and the proposed mining area together make up a significant area on the Island and a significant altered land-use and visual amenity. This detracts and does NOT complement environmental and cultural attributes of Groote Island. The proposal will simply be an "eyesore", and NOT ACCEPTABLE.

* Education - The EIS mentions that there will be an Education Element, that will lead to employment. GEMCO in my view, has been operating for 50 years, and still unemployment is high.

and school Education STATISTICS (reading, writing etc) are as bad or worse as in other areas without a mine. The company has a poor record and its future promise in regard to the proposal can not be taken seriously. The Groote Island community is dysfunctional at the moment after 50 years OF GEMCO.

* Petrol SNIFFING - There will likely be an increase in petrol SNIFFING due to the increased mine infrastructure. This has been a problem in the past and is likely to increase if the proposal is approved.

* Emerald creek - I have observed pictures of people swimming in Emerald creek (1985). One of the swimmers (white tourist Vick Kimber 08-8941/668) says "IT was magical, crystal clear". The name also denotes the beauty. IF the creek is used for swimming now, to put a mine in that area will be criminal.

Cave Toad - The cave toad is a high risk, and chemical control will also be a risk. Groote Island (Now having a minimal problem) can be a special place for Native Flora and Fauna and a haven for cultural Hunting and Gathering activities. If cave toads are restricted. Sadly this is unlikely to happen on Groote Island if the proposal goes ahead. According to Dr. John Woinarski (NT News 11/7/2015) the Number of species in Kakadu National Park has declined by ~~the~~ 54%. We can and should be combating this problem on Groote Island. This risk in regard to this proposal is UNACCEPTABLE.

CONCLUSION - The Groote Island area is of National and international significance in relation to Environmental and cultural attributes. The cumulative risks of the proposal are many and compounded with the present mine impacts.

The previous 50 years of mining has not improved the overall environmental integrity as well as the overall "wellbeing" of the Aboriginal Traditional Owners. Statistics show that the economic royalty has led to a deterioration in cultural activities, increased drug use, violence and social dysfunction. The track record of GEMCO in successfully attacking these problems is poor.

For these reasons I object to the mine proposal going ahead

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