

Health and Safety 18



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18 HEALTH AND SAFETY

18.1 INTRODUCTION

This section describes the potential hazards and risks on human health and safety that may be associated with the development of the Eastern Leases Project (the project). Environmental and social risks are discussed in Section 4 – Environmental Risk Assessment.

18.2 OVERVIEW OF EXISTING HEALTH, SAFETY AND RISK MANAGEMENT SYSTEM

18.2.1 Health, Safety and Risk Management System

The proponent has extensive health, safety and risk management systems and procedures in place for its existing mine, and risks associated with the project will be managed in accordance with these systems and procedures. In particular, the proponent has a detailed Risk Management Plan (RMP) which is the company's overarching plan designed to manage health, safety, environment and community (HSEC) risks associated with the operation of the existing mine. The RMP provides a framework for achieving the proponent's objectives in relation to health and safety and ensuring compliance with all applicable legislation. It is supported by an extensive number of associated internal plans, procedures and manuals.

The RMP and associated documentation were developed based on the following:

- *NT Work Health and Safety (National Uniform Legislation) Act (WHS Act);*
- *NT Work Health and Safety (National Uniform Legislation) Regulations (WHS Regulations);*
- *NT Model Workplace Health and Safety Act (repealed) and Model Workplace Health and Safety Regulations (repealed) (with consideration of transitional arrangements for the WHS Act); and*
- Australian and ISO Standards and Guidelines:
 - *AS/NZS ISO 9001:2008 Quality Management Systems – Requirements;*
 - *AS/NZS 4801:2001 Occupational Health and Safety Management Systems – Specification with Guidance for Use;*
 - *BS OHSAS 18001:2007 Occupational Health and Safety Management Systems – Requirements;*
 - *AS/NZS ISO 14001:2004 Environmental Management Systems – Requirements with Guidance for Use;*
 - *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines;*
 - *HB 203:2012 Managing Environment-related Risk; and*
 - *SA/SNZ HB 436:2013 Risk Management Guidelines – Companion to AS/NZS ISO 31000:2009.*

The RMP complies with the proponent's internal corporate standards and is comparable to best practice systems used at mining operations within Australia. All project personnel are expected to comply with the requirements of the RMP. The elements of the RMP are discussed in the following sections along with an overview of the key documents of the RMP. This framework forms the basis of an iterative cycle of continual improvement in the RMP and its associated procedures.

Policy and Objectives

The proponent is committed to providing a healthy and safe working place for all personnel, and its key goal is to achieve “zero harm” to people and the environment. This fundamental belief is reflected in its continuous improvement culture towards health and safety performance.

The proponent is cognisant of the importance of health and safety, and endeavours to instil the following ideology within its workforce:

- Safety is a value which is not compromised;
- Safety excellence is recognised as essential to being a successful business;
- Leaders at all levels are expected to be safety role models and provide effective leadership for a strong safety culture;
- Effective safety leadership is a prerequisite for promotion;
- People are aware of the hazards and risks in their workplace and act accordingly;
- The essential skills required to lead and work safely are developed through training, education and coaching;
- Compliance with safety standards and procedures is absolute;
- “At risk” behaviours are not acceptable in the proponent’s safety culture and are addressed when observed;
- The alignment of the business with contractors and suppliers who are dedicated to safety excellence; and
- Repeat incidents of the same kind are unacceptable.

These elements have formed the basis for the proponent’s RMP, and health and safety policies and objectives.

Planning

The RMP identifies legislative, regulatory and voluntary requirements in order to ensure legal compliance and adherence to corporate standards. These requirements are communicated to employees and other relevant parties through a range of methods including site inductions. Roles and responsibilities are clearly defined to ensure transparency and accountability.

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. The register will list potential risk issues and events so as to facilitate the recognition and subsequent management of these potential risks. The risk register will be based on the preliminary hazard analysis (PHA) conducted for this EIS (discussed in Section 18.3). The risk register will also include the environmental and social risks identified in Section 4 – Environmental Risk Assessment. Development of the risk register will include a rigorous reappraisal of the risks based on detailed design and operating plans.

Implementation and Operation

The RMP is a working document and is therefore subject to ongoing review as part of a process to continually monitor and, where necessary, improve safety management. The RMP has been developed in accordance with relevant legislation and standards (as detailed in Section 18.2.1), including AS/NZS ISO 31000:2009, and utilises a detailed risk assessment procedure.

Under the RMP framework, the proponent has developed a series of management plans, policies and procedures to manage specific hazards at the site. These include Incident Management Plans which are in place for foreseeable emergency scenarios (such as a building fire, or cyclonic weather conditions, etc.), and which define resources and responses, and specify the risk assessment procedures, including specifications for drills, evacuations and emergency preparedness.

All site personnel (including contractors) undergo comprehensive site inductions and familiarisation when attending site, which covers all aspects of the RMP and associated company procedures. Health and safety refresher training is also provided regularly to employees and contractors. Employees and contractors are also provided with basic first aid and fire training as part of their induction and refresher training.

Checking and Corrective Action

The proponent has established procedures for reporting and investigating systematic and event based non-conformances. Corrective actions, reports and close out statistics are generated on a weekly and a monthly basis, to allow departmental managers to assess department, section and individual performance. In addition, 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 *Mining Management Act*.

Management Review

Auditing forms a key part of the existing RMP and internal auditing of the RMP and its associated procedures is undertaken against corporate standards by an external party in order to measure performance against policy, objectives and targets.

18.3 PRELIMINARY HAZARD ANALYSIS

18.3.1 Overview

A PHA was undertaken for the project based on best practice risk management principles and processes, and the experience and knowledge of the operations on the existing mine. The emphasis of the PHA is on preventing or minimising major hazardous incidents on-site that could potentially result in significant off-site effects on people or property. The focus of the PHA is, therefore, on unplanned or non-routine events. Potential impacts from daily activities associated with the operation of the mine were not considered in this assessment as they have been assessed in other parts of the EIS and will be mitigated, and further managed by compliance with environmental approvals. For example:

- The potential for the project to impact on human health or create nuisance issues for sensitive receptors due to dust emissions is discussed in detail in Section 12 – Air Quality.
- Potential impacts due to noise and vibration are discussed in Section 13 – Noise and Vibration.

These impacts, in addition to being discussed in individual sections of the EIS, are included in the environmental risk assessment contained in Section 4 – Environmental Risk Assessment. These impacts are therefore not reconsidered in this hazard assessment.

The PHA undertaken for this project is described in the following sections and included:

- Identification of the surrounding land use and nearest sensitive receptors (Section 18.3.2); and
- Identification of project activities and hazards with the potential to affect people or property in the surrounding area. This included consideration of the nature and quantities of hazardous materials transported, stored, and used at the site, natural events, and malicious acts (Section 18.3.3).

The PHA was undertaken to identify potential hazards and risks associated with the project, in consideration of the current level of project planning. 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.

The assessment of risk will include consideration of safeguards that would reduce the likelihood and/or severity of the consequences and risks to surrounding people and sensitive receptors. Risk reduction is inherent in many aspects of the layout and design features of the project.

18.3.2 Surrounding Land Use and Sensitive Receptors

Land Within and Surrounding the Project Site

The land within and surrounding the project site comprises natural bushland. Groote Eylandt itself is largely undeveloped and much of the island, including land on the project site, is still used for traditional Aboriginal practices such as hunting and gathering. The Traditional Owners also conduct frequent burns on the island for cultural purposes. The activities currently undertaken within the project site, other than activities undertaken by the Traditional Owners, are related to exploration drilling by the proponent. A 4WD track providing access to Dalumba Bay on the eastern side of the island traverses the project site.

The project will be connected to the existing mine by dedicated haul roads extending from both the Northern Eastern Lease (Northern EL) and Southern Eastern Lease (Southern EL) to the haul roads of the existing mine. The existing mine is located 2 km to the west of the Southern EL, at its closest point.

Sensitive Receptors

In order to identify the potential hazards and risks associated with the project, sensitive receptors in proximity to the project site were identified. These sensitive receptors are listed in Table 18-1, and are the nearest residences or recreation areas to the project site.

Table 18-1 Sensitive Receptors

RECEPTOR ID	NAME	TYPE	EASTING (GDA94)	NORTHING (GDA94)	NEAREST DISTANCE TO PROJECT SITE
R1	Angurugu	Township	658061	8453390	6.5 km to the north-west of the Northern EL
R2	Yedikba	Outstation	657336	8443030	2.2 km to the west of the Southern EL
R3	Wurrumenbumanja	Outstation	663633	8436591	3.5 km to the south of the Southern EL
R4	Leske Pools Swimming Hole	Recreation Area	665871	8437377	2.4 km to the south of the Southern EL

Coordinates in GDA94 MGA53

The township of Angurugu (receptor R1) is home to approximately 850 residents, and is the nearest permanently occupied area to the project site.

Yedikba (receptor R2) and Wurrumenbumanja (receptor R3) are Aboriginal outstations, comprising a small number of residential buildings. The outstations are not permanently occupied, and their level of use is understood to vary from occasional visitation to sporadic residency.

The Leske Pools Swimming Hole (receptor R4) is a public recreation area used by Groote Eylandt residents and visitors to the island for swimming, camping and fishing activities. There are no public facilities at this recreation area, and it is not permanently occupied.

18.3.3 Key Project Hazards

Section 3 – Project Description describes the main activities that will be undertaken on the project site. The project is considered to be an additional mining area that will be operated as part of the existing mine, rather than an independent mine. Where possible, the project will make use of infrastructure at the existing mine.

Consequently there is very limited infrastructure required to be constructed within the project site. This limits the types of activities that could give rise to hazards and risks. The primary hazards identified for the project site are

therefore in relation to the transport and use of hazardous and dangerous goods and materials on the project site. These hazards are summarised below. Other potential project hazards are also discussed in the following section.

Hazardous Goods and Materials

A hazardous material is a material which, in sufficient quantities, has the potential to cause harm to people, property or the environment because of its chemical, physical or biological properties. Hazardous substances are listed under the National Occupational Health and Safety Commission (NOHSC) *List of Designated Hazardous Substances (1999)*, or under the NOHSC *Approved Criteria for Classifying Hazardous Substances (2004)*. Hazardous substances may be classified as very toxic, toxic, harmful, corrosive, irritant and/or sensitisers.

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.

The only significant hazardous material / substance required for the project is diesel fuel. Diesel for the project will be stored at the fuel storage facilities located at the existing mine site (Figure 18-1), and any on-site storage of diesel will be limited to small, portable containers.

Diesel will be transported to the project site, via the dedicated internal haul road network. The on-site equipment that will require refuelling includes the small diesel generators used for night-lighting, pit dewatering, and the powering of the crib hut facilities, and for on-site mining vehicles and equipment that remain permanently on the project site, such as dozers. The proponent has refuelling procedures in place to prevent and control any spills that may occur during vehicle refuelling. In addition, the proponent will ensure spill cleanup kits are available on-site and located at strategic and easily accessible locations, and that all staff are adequately trained in the use of these emergency kits.

There will be servicing and maintenance of the construction mobile equipment fleet in the vicinity of the crib hut and parking areas of the project site (refer to Figure 3-14). Servicing and maintenance work may include replacing batteries, tyres, filters or other such maintenance works. Any spills that may occur during equipment servicing and maintenance procedures will be contained within the temporary facility, and spill cleanup kits will be readily available.

The project may utilise other hazardous materials on the project site, such as lubricating oils or oily rags. However, the quantities of these materials required for project operations are considered insignificant, and unlikely to cause a hazardous incident.

Should other hazardous substances (or dangerous goods) be required during the life of the project, transport, use and disposal issues will be planned and managed prior to arrival on site and appropriate measures implemented in accordance with the requirements of the RMP and relevant guidelines and legislation.

Dangerous Goods and Materials

Materials are dangerous goods if they meet the criteria in the *Australian Dangerous Goods Code (Edition 7.3)* (ADGC), and are classified on the basis of the potential for immediate physical or chemical effects (such as fire, explosion, corrosion and poisoning) affecting property, the environment or people.

The project will periodically utilise explosives during the operations phase of the project for blasting associated with open cut mining activities. Blasting is carried out using both emulsions (starch and oil based compound which are water-resistant) and ANFO (Ammonium Nitrate and Fuel Oil) dependent upon ground moisture conditions. Explosives are stored at a dedicated, licensed explosives storage facility located on the existing mine (Figure 18-1), and will be transported to the project site by a licensed explosives contractor. The explosives storage facility is operated in accordance with the ADGC and Regulations. No changes in the operation of this facility are proposed as part of the project.

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. The proponent's current site processes for the management of explosives and blasting include:

- Risk assessment and management procedures;
- Explosives vehicle approvals and compliance check forms;
- Procedures addressing explosives transport, storage and use;
- Training and assessment addressing explosives transport, storage and use;
- 24 hours notification of blasting events and designated public road closures (where applicable); and
- Designated firing times and re-entry procedures.

These procedures will be implemented for the project.

There are no other dangerous goods or materials that will be required for the project, and no dangerous goods or materials will be permanently stored on site.

Other Potential Project Hazards

Manganese Exposure

Manganese is naturally occurring on Groote Eylandt, and is typically found in low-lying valley areas (refer to Section 3 – Project Description). The manganese ore is extensive throughout these valleys and underlies several watercourses. There are areas where the manganese ore outcrops and natural weathering processes mean that there are naturally elevated levels of this metal found in the environment.

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.

Based on the proponent's more than 50 years of mining on the island, the monitoring has not detected any human health effects in the mine workforce due to manganese exposure. This is evidenced by substantial surveillance data gathered for employees and contractors over many years as part of routine health checks of the workforce. Surveillance data is measured against the proponent's rigorous mandated measurement and reporting criteria for health impacts. It is also compared to published occupational exposure standards and the data is used to identify priorities for abatement projects and control design. This data does not indicate any human health issues associated with air quality impacts from mining processes.

In addition to ongoing health surveillance, the workforce of the existing mine was also the subject of a comprehensive research project undertaken by the University of Tasmania between 2006 and 2008 (Summers et al, 2011). The research project examined the relationship between occupational exposure to manganese particulates, and clinical and subclinical health impacts. This research concluded that exposure to manganese dust or fumes at the existing mine is not associated with impacts to human neuromotor or neuropsychological performance.

It is noteworthy that the annual production rate of the existing mine will not increase as a result of the project. The overall exposure to manganese amongst the workforce or in nearby communities is therefore unlikely to increase beyond current levels. Manganese processing activities on the island are limited to washing and blending the raw product, which is stockpiled at the port at Milner Bay for export (refer to Section 3 – Project Description). No ore refining activities, such as smelting, occur on the island.

Mine Water Dams

All mine water dams on the project site will be designed by a suitably qualified engineer. They will be designed and constructed in accordance with relevant design standards and licence requirements. Designs will adequately address the structural integrity of containment walls during climatic extremes, including cyclone, flood and drought. This will reduce the risk of any unplanned releases from mine water storages. The potential risk associated with unplanned discharges or catastrophic failures is considered unlikely. Further detail on the mine water dams is provided in Section 10 – Surface Water.

Malicious Acts

Acts of vandalism and sabotage toward the project have been identified as having the potential to create hazardous conditions. Access to the operating mine site will be restricted and appropriate signage will be erected.

18.3.4 Natural Hazards

In addition to hazards from project activities, potential natural hazards to the workforce, sensitive receptors and the community include:

- Cyclones and flooding;
- Bushfires; and
- Increases in biting insects that may be vectors for disease.

Cyclones

The project is located in the northern tropics, and frequently experiences cyclones and intense storm events.

The proponent has well established emergency preparedness and response plans in place for natural hazards such as cyclones and flooding, given these events are common in the region. Personnel are evacuated from the island in the event of a severe cyclone (Category 4 or 5). Routine drills for all emergency response scenarios are conducted by designated emergency service officers, and key learnings and corrective actions are incorporated into the emergency response plans. These plans will be implemented for the project.

Bushfire

The majority of Groote Island contains large areas of natural bushland, and bushfire consequently poses a potential hazard. The Traditional Owners of Groote Eylandt frequently conduct burns on the island for cultural reasons, and also as a land management tool.

The proponent will work with the Traditional Owners to develop and implement a fire management regime for the project site to optimise biodiversity values, whilst also ensuring the risks to human safety and property are managed. This regime will be in line with the NT *Bushfires Act*. The proponent will continue to work with the Traditional Owners in relation to land management, particularly with respect to fire management.

Biting Insects

Mine sites have the potential to create additional areas of ponded water that may encourage mosquito breeding. Because of this, all mining operations in the NT are required to monitor mosquito populations and to minimise mosquito breeding sites in accordance with the *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* (DHF, 2005).

There are several exotic mosquito species found on Groote Eylandt that are potential vectors for diseases, such as Ross River Virus. The proponent will implement a program of regular mosquito monitoring and management, which will be conducted in collaboration with the Medical Entomology Group of the NT Department of Health. This will include regular mosquito trapping, and the mosquitoes caught will be identified to check for mosquito species known to be disease vectors. The proponent will implement mosquito management procedures as required, which may involve dispersing mosquito insecticide pellets in an effort to eradicate mosquitoes and reduce the public health nuisance caused by mosquitoes, in line with the *Public and Environmental Health Act*.

The proponent has had significant success with its mosquito management procedures for the existing mine, and in 2008, the mosquito species known to harbour Dengue Fever was declared eradicated from Groote Eylandt.

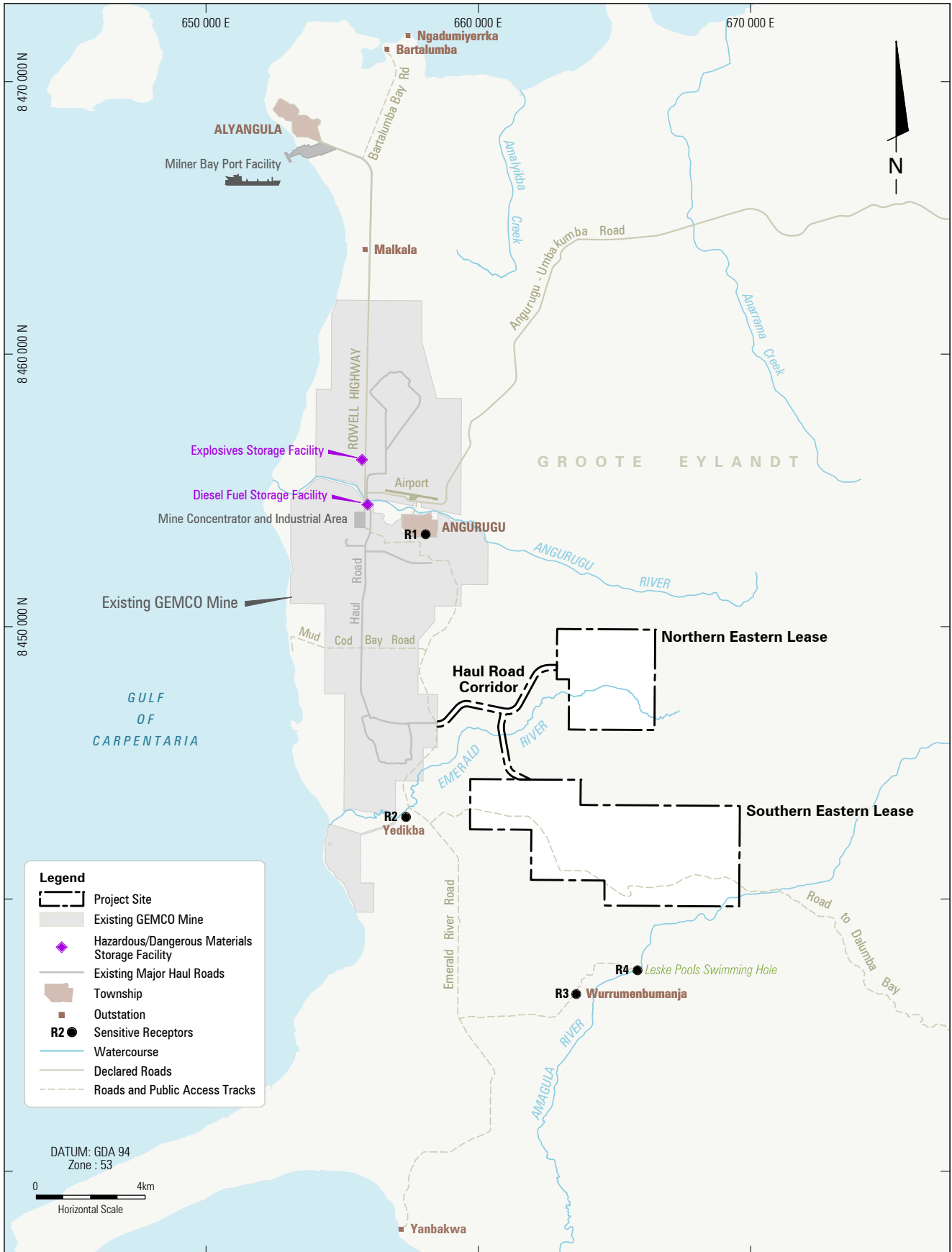
There are several features of the project's design and management which will reduce the risk of mosquitoes breeding on the project site, such as:

- The mine water dams that will be constructed on the project site will be deep, with steep sides. This will discourage macrophyte growth which typically provides suitable habitat for mosquito breeding;

- Waterway crossings for the project will be culverts that will not impede the flow of water in the watercourses, or cause water to back up and pond behind the crossings;
- Areas that will be rehabilitated following mining will be designed to ensure they are free draining; and
- Used tyres that may be generated on site, that could contain pooled water and act as a breeding ground for mosquitoes, will be transported to the used tyre bay on the existing mine site for disposal (refer to Section 17 – Non-mining Waste), and not left on the project site.

There are no other activities that will be undertaken on the project site that will significantly increase areas of ponded water available for mosquito breeding. In addition, project personnel are required to wear long-sleeved shirts and long trousers which will prevent mosquito bites. The risk of project activities creating areas for suitable mosquito breeding is considered minimal, and this risk is therefore not assessed further.

FIGURES



EASTERN LEASES PROJECT